الندوة الدولية الخامسة حول النباتات الطبية والمواد

Fifth International Symposium on Medicinal Plants & Materials

MPM 2024

Organized by

09-12 May 2024

Rosa Beach Hotel
Skanès-Monastir, Tunisia

Abstracts of Lectures and Communications
List of Participants

Tunisian Chemical Society - Short Program of MPM 2024

	Jeudi 9 Mai 2024
14.00 - 16.15	**Accueil des Participants, inscriptions et distribution des documents**
16.15 - 16.30	**Salle I - Inauguration & Cérémonie d'ouverture**
16.30 - 17.15	**Salle I** - **Conférence Plénière 1** **Abdelhamid ERRACHID EL SALHI** - *Chair : Hatem Majdoub* *Université Claude Bernard, Lyon 1, France*
17.15 - 18.00	**Salle I** - **Conférence Plénière 2** **Samir MESSAOUDI** - *Chair : Hichem Ben Jannet* *Ecole Polytechnique (Ex-Palaiseau)*, France
18.00 - 19.30	**Cours de formation -** Salle **I : Jalloul BOUAJILA** | Salle **II : Halim HAMMI** | Salle **III : Houcemeddine OTHMAN**
19.30	**Dîner**
	Vendredi 10 Mai 2024
08.45 - 09.30	**Salle I** - **Conférence Plénière 3** **Jean-François NIERENGARTEN** - *Chair : Mohamed Lotfi Efrit* *Université de Strasbourg et CNRS, Strasbourg, France*
09.30 - 09.45	**Ahmed DHIFAOUI** : Représentant JEOL
09.45 - 10.15	**Salle I -** Session : Chimie des Substances Naturelles **Conf. Thématique 1** : **Jalloul BOUAJILA** *Université de Toulouse 3-Paul Sabatier, France* - Chair : Mehrez Romdhane **Salle III -** Session : Chimie des Matériaux **Conf. Thématique 2** : **Latifa LATROUS** *FST - Tunis & IPEIM El Manar* - Chair : Adel Megriche
10.15 - 11.15	**Com. orales (15min) - Session 1 - Salle I, II, III & IV**
11.15 -12.00	**1ère Session Poster (P 1 - P 50) Ordre Alphabétique**
12.00 -13.15	**Com. orales (15min) - Session 2 - Salle I, II, III & IV**
13.15	**Déjeuner**
14.30 -16.00	**Com. orales (15min) - Session 3 - Salle I, II, III & IV**
16.00 - 16.45	**Pause-café + 2ème Session Poster (P 51 - P 100) Ordre Alphabétique**
16.45 - 17.45	**Com. orales (15min) - Session 4 - Salle I, II, III & IV**
18.00-19.30	**Cours de formation -** Salle **I, Jalloul BOUAJILA** | Salle **II, Halim HAMMI** | Salle **III & IV, Mabrouk HORCHANI + Salma JLIZI**
19.30	**Dîner**
	Samedi 11 Mai 2024
08.45 - 09.30	**Salle I** - **Conférence Plénière 4** - **Pierre WAFFO-TEGUO** - *Chair : Noureddine Allouche* *Université de Bordeaux, France*
09.30 - 10.00	**Salle I -** Session : Chimie des Substances Naturelles **Conf. Thématique 3** : **Chedly ABDELLY** *National Agency for the Promotion of Scientific Research* (ANPR) - Chair : Mohamed Neffati **Salle III -** Session : Chimie des Matériaux **Conf. Thématique 4** : **Mohamed M. CHEHIMI** *Université Paris Cité & CNRS (UMR 7086), ITODYS Lab* - Chair : Hatem Ben Romdhane
10.00 - 11.00	**Com. orales (15 min) - Session 5 - Salle I, II, III & IV**
11.00 - 11.45	**3ème Session Poster (P 101-P 150) Ordre Alphabétique**
11.45 -13.00	**Com. orales (15 min) - Session 6 - Salle I, II, III & IV**
13.00	**Déjeuner**
	Après-midi libre
	Dimanche 12 Mai 2024
08.45 - 09.15	**Salle I -** Session : Chimie des Substances Naturelles **Conf. Thématique 5 : Emmanuel ROULLAND** *Faculty of Pharmacy, University of Paris, France* - Chair : Ridha Ben Salem **Salle III -** Session : Chimie des Matériaux **Conf. Thématique 6 : Ayhan ORAL** *Çanakkale Onsekiz Mart University, Çanakkale, Türkiye* - Chair : Latifa Bergaoui
09.15 - 10.00	**4ème Session Poster (P 151-P 201) Ordre Alphabétique**
10.00 - 11.45	**Com. orales (15 min) - Session 7 - Salle I, II, III & IV**
11.45 - 12.15	**Clôture du Symposium**
12.15	**Déjeuner et départ**

Avant-Propos

Au nom de la Société chimique de Tunisie et son bureau régional de Monastir, nous sommes heureux de vous accueillir à la cinquième édition du Symposium International sur les Plantes Médicinales et Matériaux – MPM 2024. MPM 2024 est un congrès international qui offre un forum ouvert aux chercheurs universitaires et aux industriels pour présenter leurs travaux et projets originaux et échanger des idées et des expériences technologiques. La cinquième édition du MPM 2024 vise à intensifier et à promouvoir la coopération entre le monde universitaire, les centres de recherche et les industries concernées. Nous espérons également que la conférence encouragera l'innovation et la créativité parmi les chercheurs travaillant dans le domaine du développement durable et apportera d'importantes contributions à l'industrie du futur.

Les principaux objectifs de ce symposium sont d'offrir de larges opportunités aux participants, de partager leur expérience, de développer des contacts et des partenariats pour construire des stratégies communes pour les plantes médicinales, les matériaux et l'utilisation rationnelle et la conversion de la biomasse, mettre en avant l'importance médicinale et socio-économique des plantes et la valorisation de la biomasse, encourager la production, la transformation et la conservation des plantes médicinales et développer l'extraction verte de molécules biosourcées, et, enfin, de discuter des nouvelles méthodes de synthèse et de fonctionnalisation des matériaux et des applications récentes.

Tous ces thèmes feront l'objet de quatre (04) conférences plénières, six (06) conférences thématiques, 136 communications orales et 201 communications par affiche qui seront présentées par d'éminents professeurs et des scientifiques en provenance de 09 pays (Algérie, France, Arabie Saoudite, Maroc, Kenya, Libye, Sénégal et Tunisie).

Outre les conférences et les communications, les participants profiteront de trois cours de formation qui porteront sur l'analyse par CPG, CPG-SM et LC-SM des substances naturelles, le Docking moléculaire et paramètres pharmacocinétiques et la rédaction des brevets.

Nous souhaitons que MPM 2024 soit aussi un forum passionnant pour discuter des dernières avancées de la recherche en phytochimie et matériaux et une excellente opportunité de rencontres et de création de nouvelles collaborations. Nous avons choisi l'une des plus belles régions côtières de la Tunisie, la région de Skanès-Monastir pour organiser MPM 2024, dans l'un des meilleurs hôtels de la région, le Rosa Beach****, en espérant ainsi un séjour agréable pour nos hôtes. J'adresse mes remerciements les plus sincères à tous les conférenciers et les participants qui ont aimablement confirmé de prendre part au MPM 2024. Enfin, nous ne saurions terminer ce propos sans remercier également l'Université de Monastir et la Faculté des Sciences de Monastir, qui ont contribué à la tenue de cette rencontre scientifique par leur soutien financier et logistique.

Pr. Hichem BEN JANNET et **Pr. Hatem MAJDOUB**
Chairmen du MPM 2024

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Programme MPM 2024

	Jeudi 9 Mai 2024		
14.00 - 16.15	**Accueil & Inscriptions des Participants**		
16.15 - 16.30	**Salle I - Inauguration**		
16.30 - 17.15	**Conférence Plénière 1**: **Abdelhamid ERRACHID EL SALHI** - *Chair : Hatem Majdoub* *Université Claude Bernard, Lyon 1, France* PoC devices for real time monitoring of biohazard and man-made chemical contaminants in the marine environment		
17.15 - 18.00	**Conférence Plénière 2**: **Samir MESSAOUDI** - *Chair : Hichem Ben Jannet* *Ecole Polytechnique (Ex-Palaiseau)*, France Design and synthesis of Novobiocin analogues as HSP90 inhibitors : Development of new tools and applications		
	Cours de formation		
	Salle I	**Salle II**	**Salle III**
18.00 - 19.30	Analyse par CPG, CPG-SM et LC-SM des substances naturelles (I) **Jalloul BOUAJILA**	Rédaction des brevets (I) **Halim HAMMI**	Docking moléculaire et paramètres pharmacocinétiques (I) **Houcemeddine OTHMAN**
19.30	**Dîner**		

	Vendredi 10 Mai 2024 (Matin)							
08.45 - 09.30	**Salle I** - **Conférence Plénière 3**: **Jean-François NIERENGARTEN** - *Chair : Mohamed Lotfi Efrit* *Université de Strasbourg et CNRS, Strasbourg, France* Stopper exchange reactions for the preparation of pillar[5]arene-containing rotaxanes							
09.30 - 09.45	**Ahmed DHIFAOUI** : Représentant JEOL							
	Salle I - Session : Chimie des Substances Naturelles				**Salle III -** Session : Chimie des Matériaux			
09.45 -10.15	**Conf. Thématique 1**: **Jalloul BOUAJILA** - *Chair : Mehrez Romdhane* *Université de Toulouse 3-Paul Sabatier, France* Notions de base pour la caractérisation des substances inconnues par GC-MS et LC-MS				**Conf. Thématique 2**: **Latifa LATROUS** - *introduite par Adel Megriche* *Université de Tunis El Manar, FST - Tunis & IPEIM El Manar* High performance Materials in sample preparation			
Com. orales (15min)	**Salle I**- Chair: Gaith Rigane		**Salle II** - Chair : Salah Neghmouche Nacer		**Salle III** - Chair : Mustapha Majdoub		**Salle IV** - Chair : Mohammed El Hadi Attia	
10.15 - 10.30	COSN-1	ALZUBIDY Nada	COSN-20	DEMS Lobna	COCM-1	BHIRI Fatma [fsm]	COCM-20	REJAB Fatma
10.30 - 10.45	COSN-2	AOUIDENE Mariem	COSN-21	JLIZI Salma	COCM-2	BOUICHA Mohamed Achraf	COCM-21	RHIMI Najah
10.45 - 11.00	COSN-3	BOUABIDI Noura	COSN-22	MZOUGHI Zeineb	COCM-3	CHEMEK Mourad	COCM-22	SALHI Siwar
11.00 - 11.15	COSN-4	SFAR Manel	COSN-23	ASSIOUI Houssam	COCM-4	TOUNSI Mohamed Noemen	COCM-23	WANNASSI Jassem
11.15 -12.00	**1ère Session Poster (P 1 - P 50)**							
Com. orales (15min)	**Salle I** - Chair: Younes Moussaoui		**Salle II** - Chair : Djamel El Hadi		**Salle III** - Chair : Habib Nasri		**Salle IV** - Chair : Halim Hammi	
12.00 - 12.15	COSN-5	HORCHANI Mabrouk	COSN-24	ARGUI Hayfa	COCM-5	HFAIEDH Amira	COCM-24	BEN CHAABENE Khouloud
12.15 - 12.30	COSN-6	JEBRI Dorsaf	COSN-25	OULDYEROU Karima	COCM-6	KHLIFI Akila	COCM-25	GHEDIRA Wafa
12.30 - 12.45	COSN-7	BACCARI Wiem	COSN-26	BEN HSOUNA Anis	COCM-7	MESKINI Islem	COCM-26	MACHERKI Ameni
12.45 - 13.00	COSN-8	BEN HAJ MBAREK Asma	COSN-27	BENDAOUD Houcine	COCM-8	MIGHRI Zaineb	COCM-27	ALI Emna
13.00 - 13.15	COSN-9	BEN MUSTAPHA Mayssa	COSN-28	BEDJOU NASRI Fatiha	COCM-9	MKACHER Hayfa	COCM-28	BEN MABROUK Nouha
13.15	**Déjeuner**							

	Vendredi 10 Mai 2024 (Après-midi)							
Com. orales (15min)	**Salle I** - Chair: Malika Berredjem		**Salle II** - Chair : Hichem Ben Salah		**Salle III** - Chair : Dalila Helalli		**Salle IV** - Chair : Béchir Chaouachi	
14.30 -14.45	COSN-10	BENRABEH Sonia	COSN-29	ELHISS Sawsen	COCM-10	DJERIBI Malek	COCM-29	BEN DLALA Sirine
14.45 - 15.00	COSN-11	BENSALHA Ghada	COSN-30	FAIDI Abir	COCM-11	ELLOUMI Abir	COCM-30	DRIDI Oumaima
15.00 - 15.15	COSN-12	BSAIHIA Mayssa	COSN-31	FRIKHA Fakher	COCM-12	GHABI Wissal	COCM-31	ALOUI Zeineb
15.15 - 15.30	COSN-13	DALLALI Dhouha	COSN-32	GATRAN Rim	COCM-13	GUESMI Sondes	COCM-32	HAMDAOUI Latifa
15.30 - 15.45	COSN-14	DHIF Haifa	COSN-33	HAJLAOUI Hafedh	COCM-14	MOKNI Ines	COCM-33	BOUGOSSA Sarra
15.45 - 16.00	COSN-15	MARZOUKI Hanen	COSN-34	BENDJAZIA Rania	COCM-15	TRIMECH Rihab	COCM-34	BENBELLAT Noura
16.00 - 16.45	**Pause-café, 2ème Session Poster (P 51 - P 100)**							
Com. orales (15min)	**Salle I** - Chair: Mohamed Debouba		**Salle II** - Chair : Fadila Louafi		**Salle III** - Chair : Mohamed Dammak		**Salle IV** - Chair : Nizar Bellakhal	
16.45 - 17.00	COSN-16	HAMDAOUI Nourhène	COSN-35	KADRI Naka	COCM-16	DHAFFOULI Afef	COCM-35	FERCHICHI Amal
17.00 - 17.15	COSN-17	HARABI Malak	COSN-36	MANSOUR Chalbia	COCM-17	ELHAMDI Imen	COCM-36	HALLAB Wissem
17.15 - 17.30	COSN-18	JEBLI Zouhour	COSN-37	MENDILI Mohamed	COCM-18	FANDOULI Amna	COCM-37	KADRI Lina
17.30 - 17.45	COSN-19	BENMEKHBI Lotfi	COSN-38	BENSATAL Ahmed	COCM-19	BENCHIKH Lilia	COCM-38	ALKSKAS Ismail
	Cours de formation							
18.00-19.30	**Salle I**		**Salle II**		**Salle III + Salle IV**			
	Analyse par CPG, CPG-SM et LC-SM des substances naturelles (II) **Jalloul BOUAJILA**		Rédaction des brevets (II) **Halim HAMMI**		Docking moléculaire et paramètres pharmacocinétiques (II) **Mabrouk HORCHANI + Salma JLIZI**			
19.30	**Dîner**							

	Samedi 11 Mai 2024							
08.45 - 09.30	**Salle I** - **Conférence Plénière 4**: **Pierre WAFFO-TEGUO** - *Chair : Noureddine Allouche* *Université de Bordeaux, France* **Développements méthodologiques en chromatographie de partage centrifuge : Application aux composés phénoliques**							
	Salle I - Session : Chimie des Substances Naturelles				**Salle III -** Session : Chimie des Matériaux			
09.30 - 10.00	**Conf. Thématique 3**: **Chedly ABDELLY** - *Chair : Mohamed Neffati* *National Agency for the Promotion of Scientific Research* (A N P R) -Non- Conventional Crops and Food security: the suitability of halophytes to become important components in new farming systems				**Conf. Thématique 4**: **Mohamed M. CHEHIMI** - *Chair : Hatem Ben Romdhane* *Université Paris Cité & CNRS (UMR 7086), ITODYS Lab* Valorisation d'agro-déchets en matériaux carbonés fonctionnels			
Com. orales (15min)	**Salle I** - Chair : Mohammed Ridha Ouahrani		**Salle II** - Chair : Ahmed Snoussi		**Salle III** - Chair : Khaled Hriz		**Salle IV** - Chair : Marzouk Laajili	
10.00 - 10.15	COSN-39	MJAIED Sawsen	COSN-48	REGUIGUI Amira	COCM-39	DAGHFOUS Sinda	COCM-48	KANZARI Ameni
10.15 - 10.30	COSN-40	MNIF Sami	COSN-49	RGUEZ Safa	COCM-40	BOUHJAR Malek	COCM-49	BHIRI Fatma [borj]
10.30 - 10.45	COSN-41	RAHMOUNI Fatma	COSN-50	WAHABI Soumaya	COCM-41	BEN KACEM Imene	COCM-50	CHAHBANI Amna
10.45 - 11.00	COSN-42	BOUGHROUD Hajar	COSN-51	BRADAI Fatiha	COCM-42	ASKRI Houyem	COCM-51	GHEMIT Khaoula
11.00 - 11.45	**3ème Session Poster (P 101-P 150)**							
Com. orales (15min)	**Salle I** - Chair : Lazhar Zorgui		**Salle II** - Chair : Mohammed Lakhdar Belfar		**Salle III** - Chair : Essebti Dhahri		**Salle IV** - Chair : Majed Kammoun	
11.45 -12.00	COSN-43	YAHYA Ahlem	COSN-52	CHIKHOUNE Anis	COCM-43	RZIG Boutheina	COCM-52	ALIBI Amin
12.00 -12.15	COSN-44	OMRANI Rania	COSN-53	DOUKILO Ibtissam	COCM-44	JENDOUBI Baya	COCM-53	JEMAI Mahdi
12.15 - 12.30	COSN-45	BRAHIM Imen	COSN-54	EL BRAHMI Nabil	COCM-45	MOKDED Fatma	COCM-54	MNAFKI Rim
12.30 - 12.45	COSN-46	CHEMAM Yasmine	COSN-55	EL FAQER Othman	COCM-46	OMRANI Souha	COCM-55	OUNALLY Chayma
12.45 - 13.00	COSN-47	CHGARI Oumaima	COSN-56	AOUAICHIA Ikram	COCM-47	BENRAHMA Hamza	COCM-56	NAOUS Mohamed
13.00	**Déjeuner**							
	Après-midi libre							

	Dimanche 12 Mai 2024							
	Salle I - Session : Chimie des Substances Naturelles				**Salle III -** Session : Chimie des Matériaux			
08.45 - 09.15	**Conf. Thématique 5**: **Emmanuel ROULLAND** - *Chair : Ridha Ben Salem* *Faculty of Pharmacy, University of Paris, France* Vers la Synthèse Totale de l'EnacyloxenIIa				**Conf. Thématique 6**: **Ayhan ORAL** - *Chair : Latifa Bergaoui* *Çanakkale Onsekiz Mart University, Çanakkale, Türkiye* Medicinal Plants in Nanofibers			
09.15 - 10.00	**4ème Session Poster (P 151-P 201)**							
Com. orales (15min)	**Salle I** - Chair : Ouarda Brahmia		**Salle II** - Chair : Hanen Najjaa		**Salle III** - Chair : Brahim Ayed		**Salle IV** - Chair : Sami Zouari	
10.00 - 10.15	COSN-57	EL HADI Djamel	COSN-64	SAMB Issa	COCM-57	BEN SMIDA Nourhene	COCM-64	ZAOUI Manel
10.15 - 10.30	COSN-58	HABA Hamada	COSN-65	SAMBOU Oumar	COCM-58	BOUALLAGUI Zouhaier	COCM-65	BOUMOUS Samira
10.30 - 10.45	COSN-59	HAMINI Faiza	COSN-66	TOUATI Naima	COCM-59	FARHAT Donia	COCM-66	UZUN Metehan
10.45 - 11.00	COSN-60	LANEZ Elhafnaoui	COSN-67	ZAABOUBI Siham	COCM-60	JRABA Nawel	COCM-67	MSAADI Radhia
11.00 - 11.15	COSN-61	OUADGHIRI Zaynab	COSN-68	ELBIRGUI Kaouthar	COCM-61	MANNAI Faten	COCM-68	
11.15 - 11.30	COSN-62	RAOUHANI Salma	COSN-69	HAMADA Djamila	COCM-62	CHIBI Souaad	COCM-69	
11.30 - 11.45	COSN-63	BELFAR Mohamed Lakhdar	COSN-70		COCM-63	KHAMMAR Rachida	COCM-70	
11.45 - 12.15	**Clôture du Symposium**							
12.15	**Déjeuner et départ**							

Speakers' Abstracts

Abdelhamid
ERRACHID EL SALHI

Recent developments of point-of-care (POC) testing platform

Prof. Abdelhamid Errachid El Salhi

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Keywords: immuno-FET, mISE, point-of-care, microfluidic, potentiometry, impedancemetry, polymers, Ionophores, Ppy

Silicon technology combined with other materials has become an invaluable strategy for advancing the development of point-of-care (POC) devices for diagnostics and sample analyses. POC technology can transform sophisticated methods into compact and cost-effective microdevices, offering numerous advantages at various levels. These devices include microchannels, microsensors, etc., which have been applied to various miniaturized POC products. In this discussion, we will highlight recent advances in POC technology based on different materials developed in various European projects for handling and quantitative analysis. The first example of a POC application is for real-time monitoring of biohazard and man-made chemical contamination in marine environments [1]. The second POC application is for sewage monitoring to track synthetic drug laboratories [2]. The final example involves the diagnosis and therapy monitoring of heart failure patients using a non-invasive system based on POC technology [3]. This presentation addresses challenges related to scaling up POC devices and to discuss: (1) the fabrication of sensors and microfluidic devices, (2) the functionalization of sensors to enhance capabilities and performance, (3) the integration of existing detection techniques into the POC platform, and (4) the exploration of extracting quantitative readouts via handheld devices.

References:

[1] https://cordis.europa.eu/article/id/203877-protecting-our-seafood-from-marine-pollution
[2] https://cordis.europa.eu/project/id/653626
[3] https://cordis.europa.eu/project/id/768686

Samir MESSAOUDI

Design and synthesis of Novobiocin analogues as HSP90 inhibitors: Development of new tools and applications

Prof. Samir MESSAOUDI

CNRS- Ecole Polytechnique l'X (Palaiseau)

Novobiocin is an aminocoumarin antibiotic that is produced by the actinomycete *Streptomyces niveus*. Novobiocin was licensed for clinical use under the tradename Albamycin (Upjohn) in the 1960s against Gram-positive bacteria including *staphylococca*l in the treatment of MRSA. This compound binds type II topoisomerases, including DNA gyrase, and inhibits the enzyme-catalyzedhydrolysis of ATP.

As a result, novobiocin analogues have garnered the attention of numerousresearchers as an attractive agent for the treatment of bacterial infection.

The 90 kDa heat shock proteins (Hsp90), which are integrally involved in cell signaling, proliferation, and survival, are ubiquitously expressed in cells. Many proteins in tumor cells are dependent upon the Hsp90 protein folding machinery for their stability, refolding, and maturation. Inhibition of Hsp90 uniquely targets client proteins associated with all six hallmarks of cancer.

Novobiocin was reported to bind weakly to Hsp90 C-terminal and induce degradation of Hsp90 client proteins. Starting from this state of the art, our group conducted a series of structure-activity relationship (SAR) studies in the aim to increase the activity of the newly synthesized analogues against the Hsp90 target. Herein we will present the design, the synthesis and the biological evaluation of these novobiocin analogues (Fig.1).

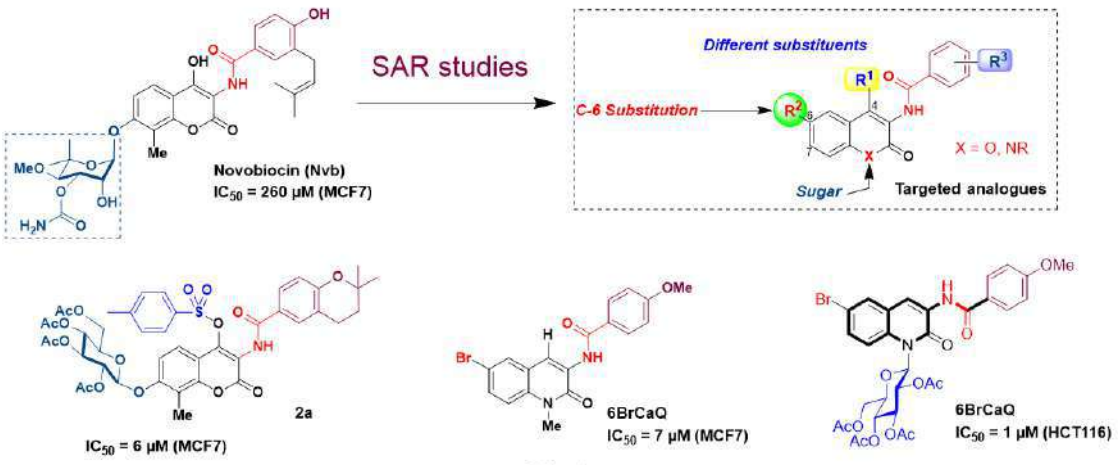

Fig.1

Jean-François
NIERENGARTEN

Stopper exchange reactions for the preparation of pillar[5]arene-containing rotaxanes

Jean-François Nierengarten

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Interlocked molecular ensembles such as rotaxanes and catenanes are fascinating systems in which large amplitude molecular motions are possible. Chemists became rapidly interested in controlling the conformation of such molecules and the pioneering work of Sauvage and Stoddart in this area gave rise to the field of molecular machines.[1] The possible applications of such systems in various fields including biology, nanotechnology or catalysis have been a strong driving force to further improve the synthetic strategies allowing to efficiently produce mechanically interlocked molecules. Their preparation remains often challenging as pre-organization of separate molecular units into a well-defined supramolecular structure is mandatory. For example, the most classical approach to prepare rotaxanes is based on the grafting of bulky stoppers onto a linear building block associated to a macrocyclic moiety in an inclusion complex. This strategy is efficient as long as the reaction conditions are compatible with the formation of the supramolecular complex. This requirement is however often problematic, in particular when weak intermolecular interactions are used to assemble the two components. This is for example the case when pillar[5]arene is used as the macrocyclic component for the preparation of rotaxanes.[2] The direct preparation of rotaxanes from pillar[5]arene-based inclusion complexes is highly dependent on the nature of the reagents even when similar reactions are used for their synthesis and yields are often quite moderate. To solve this problem, we have developed the preparation of pillar[5]arene-containing [2]rotaxane building blocks allowing their efficient post-modification by a stopper exchange reaction.[3] The latest advances in this particular field will be presented.

Acknowledgements: Financial support from the ANR (projects FastGiant ANR-17-CE07-0012-01 and Pillar ANR-19-CE06-0032) and the *Fondation Jean-Marie Lehn* is gratefully acknowledged.

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Jalloul BOUAJILA

Notions de base pour la caractérisation des substances inconnues par GC-MS et LC-MS

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Résumé

L'analyse des substances organiques dans des mélanges complexes nécessitent une phase chromatographique pour les séparer. Les deux principales méthodes utilisées dans la littérature sont la chromatographie en phase gazeuses, pour les substances volatiles et thermostables, et la chromatographie en phase liquide, pour les autres substances. Pour avoir les empreintes les plus précises pour chaque substance, le spectromètre de masse est la détection la plus utilisée et la plus sensible.

Le contenu de cette conférence va rappeler les principales étapes à suivre pour essayer de caractériser les substances inconnues par ces deux techniques.

Latifa LATROUS

High performance materials in sample preparation

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Solid-phase extraction (SPE) stands as a fundamental technique in the field of analytical sample preparation. Since its inception, this method has undergone continuous refinement. This talk is aimed to deliver key research approaches on the development of novel extractant phases, offering superior efficiency compared to conventional ones.

Miniaturization requires the use of highly efficient extractant phases as its quantity/ volume is reduced to the very low milligram or microliter level. In this context, nanostructured materials play a crucial role.

Moreover, one of the most important recent advances is the use of natural materials as sorbent phases in extraction processes. Among the most relevant characteristics of these substrates regarding Green Chemistry is the reusability of resources, which is increasingly valued to achieve a circular production model.

Another notable feature is the combination of magnetic nanoparticles with various microextraction sorbents, which has opened up new possibilities for extracting target analytes from sample matrices containing high volumes of matrix interferents. Different variations of SPE, including solid-phase microextraction and magnetic solid-phase extraction, have been developed.

Pierre
WAFFO-TEGUO

Développements méthodologiques en chromatographie de partage centrifuge : Application aux composés phénoliques

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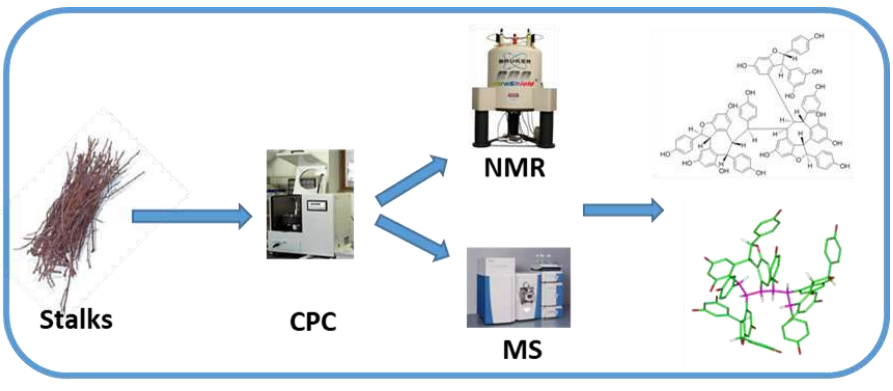
La chromatographie de partage centrifuge (CPC), parfois appelée chromatographie à contre-courant (CCC), est une méthode de séparation chromatographique qui se distingue par l'utilisation simultanée d'une phase mobile liquide et d'une phase stationnaire liquide. Cette technique, employée à la fois dans les laboratoires et dans l'industrie, repose sur l'utilisation de système de solvants biphasique qui présente des avantages significatifs en termes de sélectivité et de capacité de charge, bien qu'elle requière un équipement spécifique.
Les techniques de chromatographie à contre-courant sont de plus en plus utilisées pour le fractionnement et la purification des produits naturels en raison de leur versatilité et de leur efficacité.
L'un des objectifs de ce travail est de développer un ensemble de stratégies à la fois analytiques et préparatives utilisant la Chromatographie de Partage Centrifuge (CPC) pour l'étude et l'obtention de composés phénoliques (stilbénoïdes) à partir des sous-produits de la vigne.Nous avons développé une approche de couplage entre cette technique purement préparative et les spectromètres à Résonance Magnétique Nucléaire (RMN) et de masse (MS).

Centrifugal Partition Chromatography (CPC), sometimes referred to as Countercurrent Chromatography (CCC), is a chromatographic separation method distinguished by the simultaneous use of a liquid mobile phase and a liquid stationary phase. This technique, employed in both laboratories and industry, relies on the use of a biphasic solvent system that offers significant advantages in terms of selectivity and loading capacity, albeit requiring specific equipment.
Countercurrent chromatography techniques are increasingly utilized for the fractionation and purification of natural products due to their versatility and efficiency.
One objective of this work is to develop a set of analytical and preparative strategies using Centrifugal Partition Chromatography (CPC) for the study and purification of phenolic compounds (stilbenoids) from grapevine by-products. We have developed a coupling approach between this purely preparative technique and Nuclear Magnetic Resonance (NMR) and Mass Spectrometry (MS) instruments.



Chedly ABDELLY

Non- Conventional Crops and Food security: The suitability of halophytes to become important components in new farming systems

Chedly ABDELLY [1,2]

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The world's human population is expected to reach 9.1 billion by 2050, and global food production will need to increase by up to 70% by this time to match this growth (FAO, 2011).Food production (excluding crops used as biofuels) should increase by 70%.The annual production of cereals will have to reach about 3 billion tons compared to the current 2.1 billion and, the annual production of meat will have to increase by more than 200 million tonsto reach 470 million tons. Therefore, population and food requirements continue to rise steadily while cultivated areas became constant since 1975. In several regions the cultivated areas showed a large decrease as consequence of abiotic constraints (salinity and drought) resulting in a large Imbalance between cultivated perimeters and food requirements.

The majority of the crop and forage species used in modern agriculture are salt sensitive (glycophytes) and can handle only a very limited concentration of salt in their growth media. A 50% yield decrease is observed in rice, wheat, Maize and Mung bean respectively at 4, 7, 3.3 and 2.4 g l-1 NaCl.Genetic engineering, advocated since the early 1990s, has not provided any cultivar with true salt tolerance as consequence of (i) the Complexity of the tolerance trait,(ii) the Quasi-absence of field validation: among more than 430 publications on genetically transformed plants, only 7 transgenic plants were evaluated in the field; and (iii) the limited range of genetic diversity in this trait within traditional crops, stress tolerance genes and mechanisms must be identified in extremophiles and then introduced into traditional crops.

Given the time constraints, an approach to breeding for salt tolerance that involves putting 'all eggs in one basket' may be unwise. Other options for combating salinisation, such as finding alternative crops for farming in those conditions and the restoration of salt-affected areas should be considered. This lecture focuses on the suitability of halophytic species to become important components of 21st century farming systems. We argue that the use of halophytes may be a viable commercial alternative to ease pressure on the requirement of good quality land and water for conventional cropping systems and the utilization of land degraded by salinity.

Mohamed M. CHEHIMI

Reactive and functional biochar for biomedical, environmental and energy applications

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Biochar is a porous carbon allotrope obtained by thermochemical conversion of biomass (agrowastes, manure, leather…) under inert or oxygen-deficient atmosphere, in the 300-1000 °C temperature range. Biochar has raised much hope recently and falls into the concept of « *Waste-to-Wealth* ». Indeed, high-added-value materials could be obtained from biochar, such as pollutant adsorbents, supports for nanocatalysts, porous materials for soil amendment, composite materials for fighting pathogenic micro-organisms, and energy storage to name but a few. For this reason, biochar has been coined « new black gold ».

Interestingly, biochar particle composition, size and texture can be suitably controlled with pyrolysis parameters, wet impregnation, and loading of nanomaterials within the porous structure. The initial biomass nature has also a dramatic effect on the final biochar properties.

Herein, we will summarize our research on biochar-based functional materials obtained from a large set of agro-wastes such as olive stones, palm wastes, sugarcane bagasse, walnut and peanut shells, millet, marine algae, rose petals and brewer spent grains.

We will discuss control over porosity via maceration, grinding, pre-hydrothermal treatment, and wet impregnation. We will then present some interesting applications of biochar as Fenton-like catalyst for water treatment, leishmania treatment using biochar@nanoAg, and CO_2 methanation over biochar@Ni composite catalysts, among other results.

Keywords: .Biochar, porous structure, surface modification, immobilized nanocatalyst, neglected tropical disease (NTD), CO_2 methanation.

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Emmanuel ROULLAND

Towards the Total Synthesis of Enacyloxine IIa

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The enacyloxins' family gathers structurally unique polyketides first isolated in 1982 from the soil aerobe xanthomonadaceae *Frateuria* sp. W-315 (Figure 1) [1]. Only in 2007 were their unusual structures finally fully elucidated [2]. In samples enacyloxin-IIa (ENX-IIa, **2**) is the most abundant of the family as it is the ultimate metabolite of its biosynthesis chain. It is accompanied with ENX-Ia, IIIa, IVa and decarbamoyl ENX-IIa and IVa. All these molecules invariably present an exotic and easily isomerizable chlorinated pentaenoic ester chain which bonds a cyclohexane head, structural variations being solely located at the oxygenated C13-C19 region.[3] In 2011, ENX-IIa (**2**) and its 4Z isomer were found again in *Burkholderia ambifaria*, a bacterium that also makes ENX-IIa and IIIa, along with their 4Z isomers, while another bacterium, *Burkholderia gladioli*, also produces them.[4,5] ENX-IIa (**2**) displays antibiotic activity against both Gram-positive bacteria (*S. aureus*) and Gram-negative (*B. multivorans, B. dolosa, A. baumannii, and N. gonorrhea*) some being pan-resistant pathogens [6]. Remarkably ENX-IIa (**2**) is also active on *Plasmodium falciparum*.[7] The crisis of antibiotic drug discovery, conjugated with the increasing prevalence of bacterial antibio-resistance, poses a significant threat to contemporary medicine. In this context, identifying new antibiotics interacting with new biological targets and devising accesses to them and their analogues, have become absolutely crucial. This led us to conduct this study which resulted in setting a pathway towards several members of the ENX tribe through chemical total synthesis. Our strategy of synthesis was in particular based on a key reaction implemented in the challenging construction of the chlorinated polyene chain. This reaction is dually catalyzed by palladium and copper and allows the cross coupling of allenes with alkynes resulting in (*E*)-enynes with full stereoselectivity, under smooth conditions and with total atom-economy. Our DFT calculations indicate that this remarkable reaction displays an original mechanism featuring a catalytic cycle in which a palladium (IV) species appears, and likely involving an unprecedented heterodinuclear complex as catalyst.[8] It is noteworthy that this reaction allowed us to carry out the total synthesis of other natural products of interest, and thus for instance it previously made the success of the total synthesis of the tiacumicin B antibiotic drug.

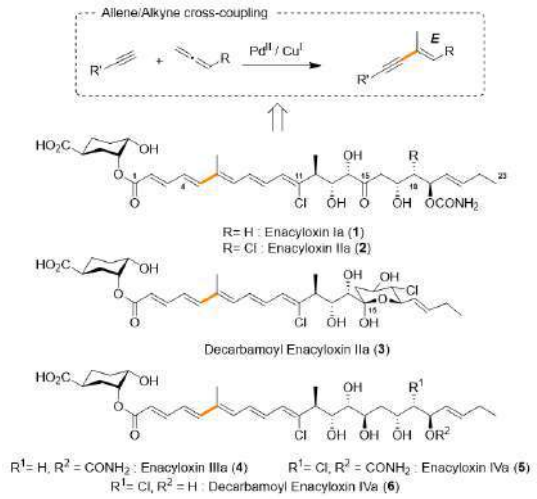

Figure 1. The enacyloxins' family, and the key allene/alkyne cross coupling

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Ayhan ORAL

Medicinal Plants in Nanofibers

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Medicinal plants have been used for different purposes throughout human history. For different applications, they are used in different ways, such as direct use of plants, direct use of extracts, and mixing with other substances. One of these usage methods is the use of nanofiber as a carrier matrix. Nanofiber matrices are one of the most prominent matrices, especially for medical applications, in recent years due to their high surface area and porosity, different permeability options, and the variety of polymers that can be used. The placement of medicinal plants, extracts, or active substances in the carrier nanofiber matrix increases the effectiveness of these materials, becomes a protective matrix for them, and provides controlled release. In the matrices prepared in this way, chitosan, various cellulose derivatives, collagen, gelatin, polyacrylonitrile, poly(lactic-co-glycolic acid), poly (lactic-co-glycolic acid), poly ε-caprolactone, polyethylene glycol, poly(lactic acid), various polyurethanes, polyvinyl alcohol, polyvinyl pyrrolidone, etc. are the main polymers used as polymeric matrix. Barberry, carvacrol, cinnamon, cinnamaldehyde, curcumin, cypress essential oil, eucalyptus *Camaldulensis, Garcinia mangostana*, geraniol, levander oil, *L. inermis, Lithospermi Radix*, menthol, mint, *Origanum vulgare*, phenylethyl alcohol, rose oil, thyme oil, saffron, etc. are some of the medicinal plants and extracts used.

Medicinal plants and polymeric materials, after being prepared as nanofiber matrix, are used in applications such as wound dressing, wound healing, different tissue scaffolds, wound dressings with anti-adhesion, anti-infection, and angiogenic functions, wound healing for diabetics, skin regeneration, etc.

The use of medicinal plants together with nanofiber matrices has increased their efficacy, provided controlled release, enabled them to be used for a longer period of time without degradation, offered more application areas, and will continue to increase in the future.

Key words: Medicinal plant, nanofiber, application, extracts

List of Oral Communications

Nr.	Authors, Institution and Title of Abstract	Ref
1	**E. Ali**, S. Bouriga, H. Barhoumi, N. Missaoui *FSM - Monastir* Synthesis and characterisation of porous hybrid materials for the adsorption of hexavalent chromium	**COCM-27**
2	**A. Alibi**, N. Elleuch, M. Ben Hassan, S. Shova, F. Chabchoub, M. Boujelbene *FSS - Sfax* Characterization of new hybrid material based on 5-amino-3-methyl-1-phenyl-1H-1,2,4-triazole and bismuth: Hydrothermal synthesis, structural analysis, thermal behavior, vibrational and optical properties, and Hirshfeld surface calculations	**COCM-52**
3	**I. Alkskas** *Misurata University, Libya* Synthesis and characterization of novel thermotropic liquid crystalline poly(ether-ketone)s based on cycloalkanone moiety	**COCM-38**
4	**Z. Aloui**, B. Chaouachi *ENIG - Gabès* Improving heat transfer using nanoparticles in a solar collector	**COCM-31**
5	**N. Alzubidy**, L. Zourgui *FSB - Bizerte* The effect of regular exercise on polycystic Ovary syndrome	**COSN-1**
6	**I. Aouaichia**, L. Cheriak, R. Bendjazia, D. Dris, H. Bouabida *Echahid Cheikh Larbi Tebessi University, Tebessa, Algeria* Assessement of larvicidal and pupicidal activities of Mentha piperita essential oil and effects in biomarkers against Culex pipiens	**COSN-56**
7	**M. Aouidene**, M. Znati, H. Ben Jannet *FSM - Monastir* Synthesis of new quinoline alkaloid scaffolds using click chemistry, in silico prediction, and pharmacokinetic parameters of their anti-inflammatory potential	**COSN-2**
8	**H. Argui**, F. Bradai, O. Ben Youchret-Zallez, E. Hamzaoui, G. Türker, M. Ben-Attia, Y. Coşkun, A. Oral *FSB - Bizerte* Chemical composition, antioxidant, antibacterial and anti-insect activities of Tunisia Citrus Limon essential oil	**COSN-24**
9	**H. Askri**, B. Rzig, K. Djebeli, M. Maamar, N. Bellakhal *INSAT - Tunis* Treatment of chlorpheniramine by using an advanced oxidation process : Boron doped diamand electrode	**COCM-42**
10	**H. Assioui**, W. Taha, K. Elbirgui, C. Saadoune, O. Anachad, A. Tahiri, M. El Messal, F. Bennis, F. Chegdani *Hassan II University, Casablanca, Morocco* Unlocking the Satureja nepeta's therapeutic potential essential oil	**COSN-23**
11	**W. Baccari**, I. Saidi, M. Znati, P. Waffo-Teguo, H. Ben Jannet *FSM - Monastir* Semi-synthesis, α-amylase inhibition, kinetic and molecular docking studies of novel structural analogs based on a sesquiterpene coumarin isolated from Ferula tunetana	**COSN-7**
12	**F. Bedjou Nasri**, M. Meddas Meriem, T. Chekkal *University of Bejaia, Algeria* Antioxidant activity of essential oils and ethanolic extracts of four medicinal plants alone and in combination	**COSN-28**

Nr.	Authors, Institution and Title of Abstract	Ref
13	**M.L. Belfar**, L. Djari, Z. Ghiaba , H. Zerrouki , Derradj Hadef , K. Mokadem , H. Debbache *Kasdi Merbah University, Ouargla, Algeria* Studying the residual effect of agricultural pesticides on vegetables and their impact on human health (southeastern Algeria as a model)	**COSN-63**
14	**K. Ben Chaabene**, G. Promis, M. Laajili *FSM - Monastir* Use of crab shell chitin in Portland cement matrices	**COCM-24**
15	**S. Ben Dlala**, M. Haj Romdhane, Z. Mzoughi , D. Le Cerf, H. Korri-Youssoufi, H. Majdoub *FSM - Monastir* Isolation and characterization of polysaccharides from pods of tunisian broad beans (Vicia faba L)	**COCM-29**
16	**A. Ben Haj Mbarek**, M. Haj Romdhane, M. Itaimi Dammak, A. Cheikh Mhamed, H. Lazreg, A. Laouani, D. Le Cerf, L. Bouslama, H. Majdoub *FSM - Monastir* Isolation and physicochemical characterization of polysaccharides from Boswellia Sacra Oleo-Gum-Resin	**COSN-8**
17	**A. Ben Hsouna**, R. Ben Saad, F. Brini *FSG - Gafsa* The essential oil of Tunisian halophyte: A natural food preservative agent of ground beef meat	**COSN-26**
18	**I. Ben Kacem**, W. Mabrouk, K. Charradi, S. M.A.S. Keshk, N. Bellakhal *INSAT - Tunis* Enhancing the performance of proton exchange membranes : Incorporating layered double hydroxides into low sulfonated polyether sulfone octyl sulfonamide composite membranes	**COCM-41**
19	**N. Ben Mabrouk**, C. Youssef, M. Chemli, H. Ben Ammar *FSM - Monastir* Design and synthesis of a novel N-substituted pyrrole derivatives as an anti-diabetic agent: Optical and in silico studies	**COCM-28**
20	**M. Ben Mustapha**, I. Chaieb, H. Ben Jannet *FSM - Monastir* Chemical composition, toxicity and repellency of essential oil from Inula graveolens roots against Tribolium castaneum	**COSN-9**
21	**N. Ben Smida**, R. Abderrahim *FSB - Bizerte* Design of a new functionalized polymer with heterocyclic compound	**COCM-57**
22	**N. Benbellat**, O. Khaoua, H. Soukehal *University of Batna 1, Algeria* Novel hybrid complex Cu(hfac)2(Me3TTF-CH=CH-Pyr) and Mixed-Valence Radical Ion Salt (Me3TTF-CH=CH-Pyr)2(PF6)3: Synthesis, X-ray characterization, and DFT investigation	**COCM-34**
23	**L. Benchikh**, Y. Aitferhat, M. Guessoum, A. Merzouki, Y. Grohens *CRTA, Universitary Campus, Bejaia, Algeria* Cellulose nanocrystal's (CNC) dispersion in PP/CNC nanocomposites	**COCM-19**
24	**H. Bendaoud**, D. Salem, H. Saada, F. Mokdad, M. Romdhane *ENIG - Gabès* Application de la méthodologie de surface de réponse pour l'optimisation simultanée du rendement d'extraction et du pouvoir inhibiteur de corrosion des hydrolats d'hydrodistillation des huiles essentielles d'Euclyptus Diversifolia	**COSN-27**
25	**R. Bendjazia**, D. Dris, H. Seghir, I. Aouaichia, H. Bouabida *Echahid Cheikh Larbi Tebessi University, Tebessa, Algeria* Chemical composition and insecticidal activities of some plants against vectors of avian plasmodium culiseta longiareolata	**COSN-34**

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26	**L. Benmekhbi**, L. Bencharif, I. Hamlaoui *Salah Boubnider Uinversity, Constantine3, Algeria* Caracterisation and physicochimical properties of some chloronated diaryl-2-pyrazolines analogue of natural product as antimicrobial agents	**COSN-19**
27	**S. Benrabeh**, K. Ben Yahia, M. Romdhane, E. Saadaoui, M.L. Fauconnier *FSG - Gabès* Environmental impact on the yield, chemical composition and antioxidant activity of essential oils of Tunisian Eucalyptus species	**COSN-10**
28	**H. Benrahma**, M. Bouhallaoui, B. Elhaimeur, H. Bessi *Hassan II University, Casablanca, Morocco* Evaluation of the environmental impact of pollution on the Moroccan Coast using a Multi-biomarker approach	**COCM-47**
29	**G. Bensalha**, M. Abderrabba, J. Labidi *IPEST - La Marsa* Terpenes: Structure, function and bioactive properties	**COSN-11**
30	**A. Bensatal** *University of Djelfa, Djelfa, Algeria* Dissolution of lithiasis urinary by polysaccharides of Cucurbita moschata fruits	**COSN-38**
31	**F. Bhiri**, S. Abidi, A. Bouallegue, G. Bensidhom, S. Ellouz Chaabouni, A. Ben Hassen Trabelsi *CRTEn - Borj Cédria* Chemical processing of Rosa canina hydro-distilled waste for the extraction of cellulose	**COCM-49**
32	**F. Bhiri** , M. Chemli, N. Sakli, M. Majdoub *FSM - Monastir* A Switch-On fluorescent sensor for detection of metal based on the cleavage of carbon-nitrogen double bond of new Schiff base	**COCM-1**
33	**N. Bouabidi**, K. Chouaïb, H. Ben Jannet *FSM - Monastir* Semi-synthesis and in silico prediction of the anti-inflammatory potential of new derivatives of a triterpenic acid isolated from olive pomace	**COSN-3**
34	**Z. Bouallagui**, M. Chamkha, S. Sayadi *CBS - Sfax* Protective effect of Olea europaea and Ficus carica leaf extracts on human embryonic kidney cells	**COCM-58**
35	**H. Boughroud**, F. Amarir, S. Rais, F. Bourjilat *Hassan II university, Ain Chock, Morocco* Exploring the promising virtues of *Syzygium aromaticum*: Chemical composition, antioxidant and antistaphylococcal activities	**COSN-42**
36	**S. Bougossa**, N. Mhadhbi, A. Ben Ahmed, M. Hamdi, K. Elghniji, J. Erwann, K. Hamden, A. Oueslati, H. Naïli *FSS - Sfax* Designing of new palladium (II) halide complex as bio-active material: Synthesis, physico-chemical studies, DFT-computations and evaluation of anti-inflammatory, antioxidant and anti-gastric damage activities	**COCM-33**
37	**M. Bouhjar**, K. Zaghdoudi, N. Bellakhal *INSAT - Tunis* Valorisation of chicken egg shells for calcium supplementation : Treatment process, physicochemical characterization and microbiological analysis	**COCM-40**
38	**M.A. Bouicha**, T. Roisnel, H. Nasri *FSM - Monastir* Spectroscopic, X-ray structure and catalytic degradation of methyl orange dye investigation of the meso-tetrakis(p-tolyl) diprotonated porphyrin	**COCM-2**

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39	**S. Boumous**, Z. Boumous, M. Boumous, H. Belhouchet *MCM, Souk Ahras University, Algeria* Investigation on innovative materials for photovoltaic panels	**COCM-65**
40	**F. Bradai**, H. Argui, A. Moussaoui, K.E. Hennaoui, R. Mebarki, N. Moussaoui *University Center Morsli Abdallah, Tipaza, Algeria* Comparative study of two medicinal plants from the Tipaza region, Algeria.	**COSN-51**
41	**I. Brahim**, A. Djerah, S. Zaaboubi, K. Charif, I. Brahim *Université de Batna 1, Batna, Algérie* Effet de l'extrait aqueux du romarin pour contrôler Tuta absoluta (Meyrick) au laboratoire	**COSN-45**
42	**M. Bsaihia**, N. Allouche, H. Ben Salah *FSS - Sfax* Structural study and biological evaluation of Volutaria lippiii cultivated in Tunisia	**COSN-12**
43	**A. Chahbani**, N. Zouari *ISBAM - Médenine* Safran-enriched cheeses: Physicochemical, antioxidant and sensory evaluation	**COCM-50**
44	**Y. Chemam**, S. Benayache, E. Marchioni, F. Benayache *Badji Mokhtar University, Annaba, Algeria* Etude phytochimique et in silico de la phase acétate d'éthyle d'une plante médicinale	**COSN-46**
45	**M. Chemek**, M. Ben Braick, A. Mabrouk, A. Kamel *ISSAT - Sousse* Photophysical and electronic properties of a new luminescent synthesized organic material based on carbazole and thiophene rings for a new generation of OLEDs devices: Experimental investigation and DFT modeling	**COCM-3**
46	**O. Chgari**, H. Wahnou, M. Ndaymbaje, H. Boughroud, Z. Ouadghiri, Y. Limami, M. Oudghiri *Hassan II University, Casablanca, Morocco* Evaluation of antioxidant, biocompatibility and anti-inflammatory activity of Caralluma europaea	**COSN-47**
47	**S. Chibi** *Saad Dahlab University, Blida, Algeria* Valorization of used vegetable oils: Physico-chemical characterization and potential of methyl esters for sustainable biodiesel production	**COCM-62**
48	**A. Chikhoune**, N. Louati *ESSAIA, Alger, Algérie* Antioxidant potential of Algerian Lentisk oil and its extracts	**COSN-52**
49	**S. Daghfous**, C. Gomri, E. Petit, M. Semsarilar, M. Cretin, C. Trellu, N. Bellakhal *INSAT - Tunis* Development of new advanced oxidation technologies for PFAS degradation	**COCM-39**
50	**D. Dallali**, J. Fakhfakh, C. Paris, S. Philippot, A. Risler, M. Varbanov, N. Allouche *FSS - Sfax* Analyse par HPLC-HESI-MS/MS des composés phénoliques extraits des feuilles de Cynoglossum tubiflorus et évaluation de leurs propriétés cytotoxique, antioxydante et antibactérienne.	**COSN-13**
51	**L. Dems**, Z. Mzoughi, I. Chraief, H. Majdoub *FSM - Monastir* Extraction, characterization, and cosmetic applications of oil from prickly pear seed	**COSN-20**
52	**A. Dhaffouli**, P.A. Salazar-Carballo, S. Carinelli, M. Holzinger, H. Barhoumi *FSG - Gafsa* Improved electrochemical sensor using functionalized silica nanoparticles (SiO2-APTES) for high selectivity detection of lead ions	**COCM-16**

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53	**H. Dhif**, J. Ben Salaha, M. Venditti, S. Minucci, S. Abbès *ISBB - Béja* Sub-acute effect of orally route exposure to Zearalenone mycotoxin on mice liver counteracted by Ziziphus Lotus Fruit.	**COSN-14**
54	**M. Djeribi**, I. Nagazi, B. Ayed *FSM - Monastir* Preparation, Characterization, and In vitro cytotoxicity evaluation of a novel material (C7H10N)4[Se2Mo5O21]·4H2O	**COCM-10**
55	**I. Doukilo**, L. Somoue, O.K. Belhsen, A. Errhif *Hassen II University, Casablanca, Morocco* Étude de la biodiversité du phytoplancton de la lagune de Oualidia et son potentiel pour la valorisation de sa biomasse	**COSN-53**
56	**O. Dridi**, Z. Mzoughi, M. Haj Romdhane, I. Djelassi, M. Mastouri, A. Papetti, H. Majdoub, Y. Kacem *FSM - Monastir* Utilization of natural deep eutectic solvent for extracting polysaccharides from bergamot peels: assessing NADES as film plasticizer and its antimicrobial potential	**COCM-30**
57	**N. El Brahmi** *Euromed University of Fes, Morocco* Genetic identification, chemical profiling, and in Silico/in Vitro biological assessment of Moroccan Cannabis sativa L. seed extracts	**COSN-54**
58	**O. El Fager**, Z. Ouadghiri, S. Rais, E.M. Mtairag *Hassan II University, Casablanca, Morocco* Effect of clove (Syzygium aromaticum) and Bay Laurel (Laurus nobilis) essential oils on human neutrophils degranulation and oxidative burst	**COSN-55**
59	**D. El Hadi**, Boutaiba Zohra Mouna *University of Blida 1, Algeria* Extraction et caractérisation des composés phénoliques contenus dans la pellicule et le pépin du marc de raisin	**COSN-57**
60	**K. Elbirgui**, H. Anibat, H. Assioui, N. Habti, N. Iounes, S. Ibenmoussa *Hassan II University, Casablanca, Morocco* Evaluation of antiproliferative activity and antioxidant potential of ethanolic extracts of tow fabaceaes : Adenocarpus decorticans and Ebennus pinnata	**COSN-68**
61	**I. Elhamdi**, H. Souissi, O. Taktak, S. Kammoun, E. Dhahri, J. Pina, B. F. O. Costa, E. López-Lago *FSS - Sfax* Optical characterization and defect-induced Behavior in ZnAl1.999Ho0.001O4 spinel: Unraveling novel insights into structure, morphology, and spectroscopic features	**COCM-17**
62	**S. Elhiss**, L. Chahed, H. Majdoub, D. Le Cerf, R. M. Maaroufi, F. Chaubet, M. Ben Mansour *ISBM - Monastir* Hyaluronic acid from Bluefin tuna by-product: Structural analysis and pharmacological activities	**COSN-29**
63	**A. Elloumi**, H. Essoussi, F. Echouchene, N. Missaoui, H. Kahri, H. Barhoumi *FSM - Monastir* Molecularly imprinted polymer-ZIF-7 sensor for urea monitoring in human serum samples	**COCM-11**
64	**A. Faidi**, M. Treilhou, N. Tene, N. Allouche *FSS - Sfax* Antioxidant and antimicrobial activities of Enarthrocarpus Clavatus flowers extracts and identification of phenolic compounds from its methanol extract	**COSN-30**
65	**A. Fandouli**, A. Fandouli, A. Rayes, A. Houas *FSG - Gabès* Synthesis, crystal structure, and luminescence properties of a 0D organic-inorganic hybrid material: [(CH3)2NH(CH2)2Cl]2CdI4.	**COCM-18**

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66	**D. Farhat**, R. Khiari, Y. Moussaoui *FSG - Gafsa* Extraction of cellulose from pruned wood of Citrus Aurantium	**COCM-59**
67	**A. Ferchichi**, W. Smirani *FSB - Bizerte* Self-assembly of new cobalt thiocyanic complex based on Histamin, Synthesis, Empirical, Antioxidant activity, and Quantum theory investigations	**COCM-35**
68	**F. Frikha**, M.A Jardak, S. Aifa, S. Mnif *FSS - Sfax* A novel perspective on eugenol as a natural anti-quorum sensing molecule against Serratia sp.	**COSN-31**
69	**R. Gatran**, M. Harabi, D. Mergbi, A. Ben Arfa, M. Neffati, H. Najjaa *IRA - Medenine* Biochemical characterization, antioxidant, anti-inflammatory and antitumoral properties of three wild edible plants in southern Tunisia	**COSN-32**
70	**W. Ghabi**, K. Landolsi, F. Echouchene *FSM - Monastir* Optimization of the synthesis of new β-ketoimine complexes of Co (II) by experimental design and ANN	**COCM-12**
71	**W. Ghedira**, M. Souissi, F. Carrillo Navarrete, C. Boudokhane', H. Dhaouadi *FSM - Monastir* Development of an environmentally-friendly water-repellent process for cotton-based textile materials	**COCM-25**
72	**K. Ghemit**, F.Z. Akika, K. Rouibah *Mohammed Saddik Ben Yahia University, Jijel, Algeria* Synthèse et étude de l'activité photocatalytique d'un nano matériau de type spinelle pour l'élimination d'un colorant anionique	**COCM-51**
73	**S. Guesmi**, F. Echouchene, H. Barhoumi *FSM - Monastir* Enhancing MOF conductivity with ZIF-7@PANI composite for heavy metals ions electrochemical determination: An ANN-optimized approach	**COCM-13**
74	**H. Haba** *University of Batna 1, Algeria* Phytochemistry of Euphorbia plants from the flora of Algeria: Extraction, isolation and structure determination of natural molecules and biological evaluation	**COSN-58**
75	**H. Hajlaoui**, N. Slimani, S. Arraouadi *FST - Sidi Bouzid* Phytochemical study and biological activities of safflower (Carthamus tinctorius L.) methanolic extracts cultivated under saline stress	**COSN-33**
76	**W. Hallab**, R. Msalmi, N. Mhadhbi, H. Naili *FSS - Sfax* A new 2D lead-free halide perovskite material for energy conversion: Structural, vibrational, optical, and thermal properties	**COCM-36**
77	**D. Hamada**, S.E. Bencheikh, R. Badidja, I. Belhani, M.B. Goudjil, S. Ladjel *University of Ouargla, Algeria* Optimization of extraction of essential oil of Anacyclus clavatus (Desf.) from Algeria and evaluated the antioxidant activity	**COSN-69**
78	**L. Hamdaoui**, F. Rahmouni, R. Amri, H. Oudadesse, M. Saoudi, T. Rebai', H. Keskes *Faculty of Medicine, Sfax* Experimental study of the application of biomaterial: Interest in bone filling in adult Wistar rats	**COCM-32**

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79	**N. Hamdaoui**, O. Majdoub, A. Ben Chira, M. Chamkha, S. Hasni, G. Rigane, R. Ben Salem, A. El Feki, M. Saoudi *FSS - Sfax* Neuropathological alterations and cognitive deficits Induced by chronic exposure to heavy metals in Wistar rats: Exploring the antioxidant properties of the medicinal plant Zizyphus lotus	**COSN-16**
80	**F. Hamini**, S. Hachani, M. Yousfi *ENSA El-Harach, Algiers, Algeria* Characterization of bioactive compounds in leaves and roots of rare date palm cultivars (Phoenix dactylifera L.): Insights and potential applications	**COSN-59**
81	**M. Harabi**, H. Tlili, A. Ben Arfa , H. Najjaa , M. Nefati *IRA - Medenine* Phytochemical screening and some biological activities of a spontaneous plant from a Tunisian arid region	**COSN-17**
82	**A. Hfaiedh**, M. Labiedh, A. Mabrouk, B. Gomez-Lor, K. Alimi *FSM - Monastir* Isoindigo-containing conjugated polymers: Design, synthesis, photo-physical properties and photovoltaic applications.	**COCM-5**
83	**M. Horchani**, S. Chortani, H. Jaziri, H. Ben Jannet, A. Romdhane *FSM - Monastir* Design, efficient synthesis and in silico evidence of new quinazoline-1,2,3-triazole hybrids with effective antibacterial and antibiofilm properties	**COSN-5**
84	**Z. Jebli**, H. Riguene, A. Yahyaoui, S. Hassni, S. Dali, R. Ben Salem, G. Rigane *FSS - Sfax* Extraction by ultrasound, optimization via response surface methodology, and identification of phenolic compounds from Tunisian-cultivated Passiflora edulis S. peel	**COSN-18**
85	**D. Jebri**, M. Znati, H. Ben Jannet *FSM - Monastir* Novel bioactive quinoline conjugates: In silico study and pharmacokinetic analysis	**COSN-6**
86	**M. Jemai**, N. Issaoui, H. Marouani *FSB - Bizerte* Synthesis, molecular structure, DFT calculations and in silico drug evaluation of the novel (4-phenylpiperazin-1-ium) Hydrogenfumarate as a Tyrosinase inhibitor	**COCM-53**
87	**B. Jendoubi**, M.S. Romdhane, R. Missaoui *INAT - Tunis* Caractérisation quantitative et physico-chimique des sous-produits issus de l'industrie halio-alimentaire tunisienne	**COCM-44**
88	**S. Jlizi**, H. Lazrag, A. Zardi-Bergaoui, F. Cacciola, H. Ben Jannet *FSM - Monastir* HPLC-PDA/ESI-MS determination of the polyphenolic profile and assessment of the α-amylase inhibitory activity of Pulicaria vulgaris using in vitro and in silico methods	**COSN-21**
89	**N. Jraba**, G. Delahay, H.Tounsi *FSS - Sfax* Catalytic activity of Cu/η-Al2O3 catalysts prepared from aluminum chips in the NH3-SCO in presence of water vapor	**COCM-60**
90	**L. Kadri**, S. Salhi, A.S. Schuller, L. Ionut Atanase, C. Delaite, H. Ammar *FSS - Sfax* Preparation of phenylalanine-based polyesteramides nano-drug delivery system with high cell-viability and chemical stability.	**COCM-37**
91	**N. Kadri**, A. Bougarech, M. Baltas, H. Ammar *FSS - Sfax* Synthèse et caractérisation de nouveau composé à base du Facteur G3	**COSN-35**

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93	**R. Khammar** *University of Souk Ahras, Algeria* Characterization of leschate from household waste of Souk Ahras city	**COCM-63**
94	**A. Khlifi**, M.S. Atallah, K. Khlifi, N. Barhoumi, M.J. Sima Nkele, M. Atapour, A. Hadj Said *CRMNS - Sousse* Biodegradation performance of an innovative silane-chitosan-graphene oxide composite coating on magnesium alloys for implant applications	**COCM-6**
95	**E. Lanez**, M.L Namor, T. Lanez *University of Eloued, Algeria* Extraction, GC/MS analysis, and antidiabetic activity study of essential oils from two medicinal plants of Southern Algeria	**COSN-60**
96	**A. Macherki**, M. Itaimi Dammak, D. Le Cerf, H. Lazreg Aref, H. Majdoub *FSM - Monastir* Polysaccharides from Moringa seeds pomace: Physico-chemical characterizations and biological evaluation	**COCM-26**
97	**F. Mannai**, H. Elhleli, A. Feriani, I. Otsuka, M.N. Belgacem, Y. Moussaoui *FSG - Gafsa* Electrospun Cactus Mucilage/poly(vinyl alcohol) nanofibers as a novel wall material for Dill seed essential oil (Anethum graveolens L.) encapsulation	**COCM-61**
98	**C. Mansour**, F. Ben Taheur, S. Bayar, D. Saidane Mosbahi *Faculté de Pharmacie de Monastir* The effects of feeding Kefir on growth, immunity and disease resistance in clam Ruditapes decussatus	**COSN-36**
99	**H. Marzouki**, M. Horchani, Y. M'rabet, M. Besbes, B. Djelassi, H. Ben Jannet, A. Piras, E. Saadaoui *ISBM - Monastir* Eucalyptus torquata, Eucalyptus woodwardii and their hybrid Eucalyptus torwood essential oils: GC-MS profiling, in vitro antioxydant and antimicrobial assessment in addition to in silico evaluation involving molecular docking and ADME prediction	**COSN-15**
100	**M. Mendili**, S. Aschi-Smiti, A. Khadhri *FST - Tunis* Lichen dyes: Harnessing nature's palette for sustainable coloration and therapeutic potential	**COSN-37**
101	**I. Meskini**, B. Ayed *FSM - Monastir* Hybrid vanadate: X-Ray crystal structure, spectral characterisation, DFT studies, and molecular docking	**COCM-7**
102	**Z. Mighri**, I. Deniz Yıldırım, L. N. Leonat, O. El Khouja, E. Erdem, H. Nasri, A. Catalin Galca, A. Mihai Rostas *FSM - Monastir* Hybrid supercapacitors based on X-site Ba(II) ions substituted by Sr (II) in Langbeinite-type phosphates	**COCM-8**
103	**S. Mjaied**, H. Ben Daoud, M. Romdhane *ENIG - Gabès* Polyphenol content and antioxidant activities of solvent extracts from Rhanterium suaveolens	**COSN-39**
104	**H. Mkacher**, R. Chaabane-Banaoues, S. Hrichi, P. Arnoux, H. Babba, C. Frochot, H. Nasri, S. Acherar *FSM - Monastir* Synthesis, physical chemical properties and anti-fungal activities of new meso-arylporphyrins	**COCM-9**

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106	**S. Mnif**, M. Jardak, S. Aifa *Centre of Biotechnology of Sfax* Essential oils from medicinal plants as anti-biofilm agents against microbial pathogens	**COSN-40**
107	**F. Mokded**, I. Dhifallah, K. Bouteraa, H. Bendaoud *ENIG - Gabès* Modélisation de l'activation de l'argile vitreuse et son application pour la défluoration de l'acide phosphorique	**COCM-45**
108	**I. Mokni**, S. Slimi, A. Badri, R.M. Solé, M. Aguiló, F. Díaz, B. Ayed, X. Mateos *FSM - Monastir* Nd3+-doped Sr6Y(PO4)5 novel Whitlockite-type phosphor for optical temperature sensing applications: Synthesis and luminescence properties	**COCM-14**
109	**R. Msaadi**, W. Sassi, S. Ammar, M.M. Chehimi *FSG - Gabès* A zinc oxide-modified black gold employed in electro-Fenton for the degradation of Congo red	**COCM-67**
110	**Z. Mzoughi**, H. Lazreg, D. Le Cerf, H. Dhaouadi, H. Majdoub *FSM - Monastir* Supercritical extraction technology in orange peels polysaccharides: Chemical characterizations and biological activities	**COSN-22**
111	**M. Naous**, A. Halfadji *Tiaret University, Algeria* Comparative study on the adsorption efficiency of CTAB-surfactant-coated functionalized magnetite and Maghemite nanoparticles for chromium removal from wastewater	**COCM-56**
112	**R. Omrani**, A. R. El Ouederni, A. Katar *FST - Tunis* A field exploration and inventory of the most toxic plants of Southern Flora Tunisian	**COSN-44**
113	**S. Omrani**, I. Ben Tekaya, A. Snoussi, R. Karoui *ESIAT - Tunis* Extraction et caractérisation de l'extrait fibro-protéique des noyaux de dattes tunisiennes « Deglet Nour »	**COCM-46**
114	**Z. Ouadghiri**, O. El Faqer, H. Wahnou, S. Saidi, A. Guedmioui, S. Rais, E.M. Mtairag *Hassan II University, Morocco* Antioxidant, antibacterial and immunomodulatory effects of Lavandula angustifolia	**COSN-61**
115	**K. Ouldyerou**, F. Elkadi, Ma Manine Zemallach Ouarri Kheira, N.I. Marouf *Mustapha Stambouli University of Mascara, Algeria* Physico-chemical study, phytochemical screening and evaluation of antioxidant activity of Apium graveolens	**COSN-25**
116	**C. Ounally**, Z. Aloui, M. Essid, S. Abid *FSB - Bizerte* Synthesis, crystal structure, vibrational studies, optical properties and DFT calculation of a new Bi(III) halide complex: (C9H14N3)4[Bi2Cl11] [BiCl6].4H2O.	**COCM-55**
117	**F. Rahmouni**, L. Hamdaoui, M. Saoudi, R. Badraoui, T. Rebai *Faculty of Medicine, Sfax* Antioxidant and antiproliferative effects of Teucrium polium extract in vivo study in rats	**COSN-41**
118	**S. Raouhani**, A. Errhif, M. Idhalla *Hassan II University, Morocco* Nouvelles perspectives dans la culture d'une algue rouge : Une stratégie prometteuse pour une production contrôlée d'une algue ayant des bienfaits écologiques et nutritionnels.	**COSN-62**

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119	**A. Reguigui**, J. Bouajila, A. Juppeau, S. Beaufort, M. Gorai, P. Taillandier, M. Debouba, M. Romdhane *ENIG - Gabès* Identification of the phenolic and aromatic compounds in fermented Salvia aegyptiaca tea by kombucha	**COSN-48**
120	**F. Rejab**, M. Echabaane, A. Rouis, K. Ezzayani *FSM - Monastir* A sensitive electrochemical sensor for bisphenol A detection based on magnesium (II) porphyrin	**COCM-20**
121	**S. Rguez**, M. Hammami, I. Hamrouni Sellami *Centre de Biotechnologie - Borj Cédria* Sesquiterpenes from Pistacia lentiscus L. as potential antibacterial, antifungal and allelopathic agents	**COSN-49**
122	**N. Rhimi**, J. Dhahri, J. Juraszek *FSM - Monastir* Cu2+ and W6+ co-doped Na0.5Bi0.5TiO3 solid solution: An effective approach to inhibit oxygen vacancy generation and suppress oxygen ion conduction	**COCM-21**
123	**B. Rzig**, N. Bellakhal *INSAT - Tunis* Adsorption performance of tartrazine dye from wastewater by raw and modified biomaterial: Kinetic, isotherm and thermodynamic studies	**COCM-43**
124	**S. Salhi**, H. Nasri *FSM - Monastir* Synthesis and spectroscopic characterization of a new 4-dimethylaminopyridine (DMAP){meso-tetrakis(4α-o-pivalamidophenyl) porphyrin} Iron (III) complex. Crystal structure of [FeIII (TpivPP)(C7H10N2)2] (SO3CF3).	**COCM-22**
125	**I. Samb**, M. Thiaw, M.-L. Fauconnier *Université Alioune Diop, Bambey, Sénégal* Identification of fatty acids in *Momordica balsamina* plant leaves	**COSN-64**
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127	**M. Sfar**, Z. Mzoughi, M. Itaimi Dammak, H. Lazreg, J. Hafsa, D. Le Cerf, H. Majdoub *FSM - Monastir* Ultrasonic extraction of red pepper seeds polysaccharide: Structural characterization, antiglycation and α-amylase inhibitory activities	**COSN-4**
128	**N. Touati**, K. Saidani, L. Ahouari, D. Chibane, F. Bedjou *University of Bejaia, Algeria* Antimicrobial activity of essential oils from nine medicinal plants	**COSN-66**
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131	**M. Uzun**, D. AYKORA, A. ORAL, Ö. YÜLEK *Çanakkale Onsekiz Mart University, Türkiye* The investigation of bone regenerative effects of melatonin loaded PLGA composite nanofibers in an experimental critical calvarial defect model in rats	**COCM-66**

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132	**S. Wahabi**, K. Rtibi, C. Abidi, B. Eto, H. Sebai *ISB - Béja* Effect of two wild edible fruits on intestinal dysmotility and modulation of spontaneous intestinal contraction ex vivo	**COSN-50**
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135	**S. Zaaboubi**, I. Brahim, A. Djerah, H.A. Bouzid *Université de Batna 1, Algérie* Exploration du potentiel thérapeutique des plantes médicinales spontanées : Résultats d'une étude dans l'Est de l'Algérie (W. Batna)	**COSN-67**
136	**M. Zaoui**, M. Abdessalem, T. Mekhelfi, I. Mokadem, S. Ghellai[c]*University of Ouargla, Algeria* Promoting eco-friendly biodiesel production	**COCM-64**

Abstracts of Oral Communications

Program of
Friday
10 May 2024

The effect of regular exercise on polycystic Ovary syndrome

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Polycystic ovary syndrome in one of most common female endocrine disorder that affect 6-15% of the female population. It can significantly affect a women's ability to conceive another quality of life. Women with PCOS have a hormonal imbalance and metabolic problems that may affect their overall health and appearance. The study was conducted on 100 patients suffering from polycystic ovary syndrome at the Sahel Medical Clinic - and the Specialized Plasma Laboratory in Libya, with the group aged 25-35 years. The aim of the study is to know the effect of regular exercise on ending polycystic ovary syndrome, as they were subjected to ovarian function tests before. After completing the program, the group was subjected to ovarian function tests before and after completing the exercise program. The results of the research showed that 67% of the women who exercised in an organized manner had a positive change in the test results, while 33% of the women who suffered from polycystic ovary syndrome and did not exercise in an organized manner showed who their ovarian function tests were negative.

Synthesis of New quinoline alkaloid scaffolds using click chemistry, *in silico* prediction, and pharmacokinetic parameters of their anti-inflammatory potential

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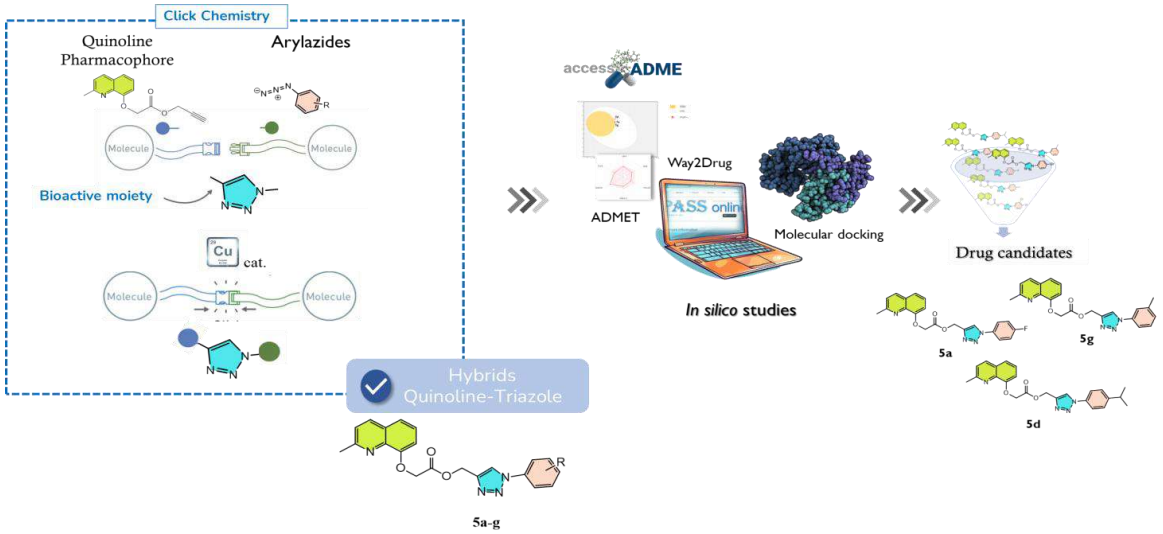
Quinoline alkaloids, derived from the benzo[*b*]pyridine skeleton,are present in a number of natural compounds (Rutaceae) and containing the famous quinine, which has been reported as an antimalarial agent, and identified as important compounds in therapeutic research.[1]In view of the accessibility of quinoline and its derivatives by direct synthesis, and the need to obtain increased quantities to pursue biological research,a new series of structural analogues of quinoline attached to 1,2,3-triazoles was designed and synthesized from 8-hydroxyquinaldine*via* click chemistry. Moreover, their anti-inflammatory activity was simulated using *in silico* studies. Given the encouraging results obtained by the online platform way2drug, all our cycloadducts showed potentially interesting anti-inflammatory activity. To understand the Structure-Activity Relationship (SAR), a molecular docking study was carried out to predict and discuss the possible interactions between these derivatives and the active site of the human COX-2 enzyme (PDB: 5IKR). A simulation study of the properties of ADMET was also discussed and consolidated the conclusion reached.

Keywords : 8-hydroxyquinaldine, 1,2,3-triazole, synthesis, click chemistry, way2drug, anti-inflammatoryactivity, COX-2, moleculardocking, ADMET.



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Semi-synthesis and *in silico* prediction of the anti-inflammatory potential of new derivatives of a triterpenic acid isolated from olive pomace

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As part of our efforts to contribute to the development of Tunisia's olive industry, our focus has been on leveraging the abundant biomass available in our country, specifically olive pomace. Our investigation concentrated on the precise isolation of oleanolic acid (OA), a hydroxy pentacyclic triterpene acid found in significant quantities in *Olea europaea* L.. Due to its wide spectrum of biological activity, oleanolic acid continues to attract great attention from the scientific community[1]. Also, with the aim of expanding our library of structures capable of exhibiting various therapeutic activities, we have successfully synthesized a new series of hybrid molecules (**5a-h**). This was achieved by combining isolated oleanolic acid (**1**) with various primary amines using 1,4-bis(bromomethyl)benzene as a spacer linker (Figure 1). The desired products were obtained in significant yields and high purity. These hybrid compounds were screened through molecular docking to assess their iNOS activity, which was predicted by the Way2Drug server. The results indicated that all derivatives exhibited strong inhibitory potential.

Keywords: *Olea europaea* L., Oleanolic acid, 1,4-bis(bromomethyl)benzene, iNOS, molecular docking.

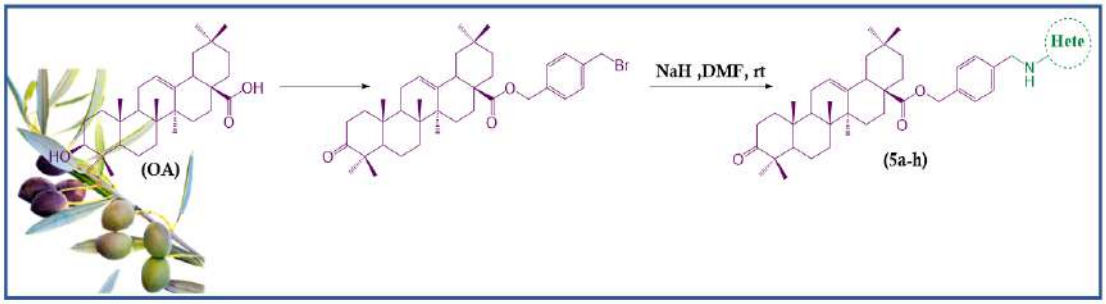

Figure 1. Semi-synthesis pathway of oleanolic acid derivatives

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Ultrasonic extraction of red pepper seeds polysaccharide: Structural characterization, antiglycation and α-amylase inhibitory activities

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Abstract

Currently, the high added-value compounds contained in plant by-products and wastes offer a wide spectrum of opportunities for their reuse and valorization, contributing to the circular economy. These biowastes contain a great level of marketable bio-products extracted for added-value products such polysaccharides [1]. Current study deals with polysaccharide extraction from pepper seeds waste using ultrasonic extraction technique [2]. The extracted polysaccharide was characterized using Fourier Transform Infrared Spectroscopy (FTIR) analysis, UV‑vis, Size Exclusion Chromatography (SEC/MALS/VD/DRI), GC-MS after hydrolysis and NMR. Polysaccharide from pepper seeds was composed of galactose, glucose arabinose, rhamnose, xylose, mannose and fructose in molar percentage of 64.5%, 7.0%, 4.7%, 2.9%, 2.6%, 7.2% and 11.1%, respectively with a weight average molecular weight of 504 000 g/mol. Finally, results showed that pepper seeds polysaccharide presents strong antioxidant activities and an interesting antiglycation and alpha amylase inhibitory properties.

Key words: Pepper seeds, By-products valorization, Polysaccharides, α-Amylase

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Design, efficient synthesis and *in silico* evidence of new quinazoline-1,2,3-triazole hybrids with effective antibacterial and antibiofilm properties

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As it is known, the incidence of multidrug-resistant (MDR) bacteria in elevation [1] and in recent decades, previous research assured that heterocyclic compounds are ubiquitous in bioactive molecules in medicinal chemistry field and show impressive functional versatility in synthetic products [2].

Encouraged by the above informations, a series of novel quinazoline linked to 1,2,3-triazole derivatives **4a-u** have been synthesized from the 1,3-dipolar cycloaddition reaction. All synthetic compounds were assessed for their *in vitro* anti-biofilm and antibacterial activities against four bacterial strains namely Gram-negative (*Escherechia coli* and *Pseudomonas aeruginosa*) and Gram-positive bacteria (*Staphylococcus aureus* and *Enterococcus faecalis*). Significant results were obtained and are consolidated by *in silico* docking studies which highlighted the interaction modes of the docked compounds within the active sites of four target enzymes. Furthermore, the combination of molecular docking analysis with *in vitro* activities can help to progress prediction success and encourages the uses of few of these compounds as potential alternatives towards bacterial strains.

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Novel bioactive quinoline conjugates*:* *In silico* study and pharmacokinetic analysis

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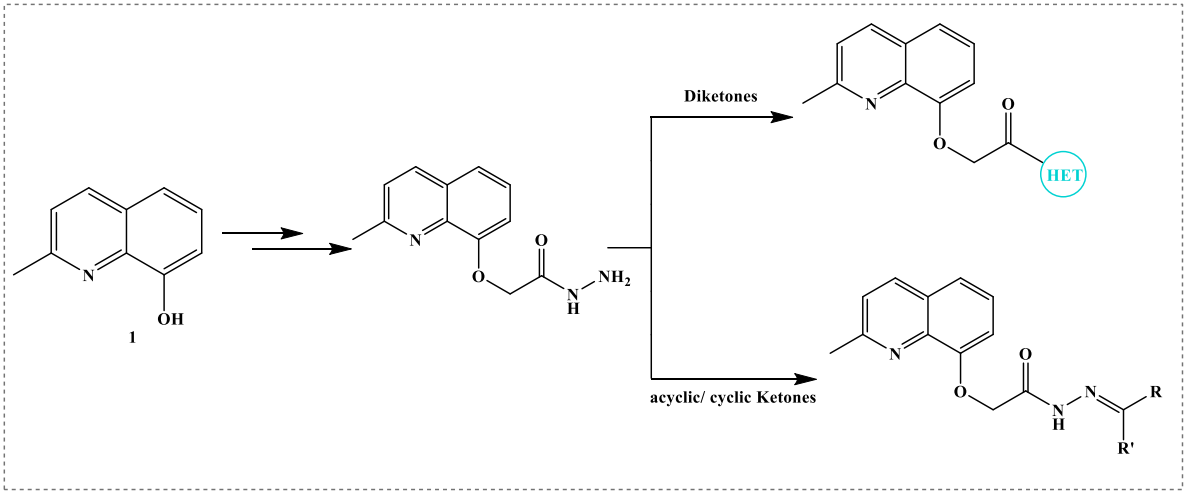
The quinoline moiety is historically significant due to its presence in several plants such as *Cinchona* (Rubiaceae)[1]. Pharmalogical research has consistently displayed the diverse biological activities associated with the quinoline ring system. Due to its broad range of biological effects, this fragment has garnered notable attention in organic synthesis. In this regard, this work contributes to the synthesis of novel heterocyclic structures containing nitrogen, incorporating pyrrole, pyrazole, and imine motifs starting from 8-hydroxyquinaldine **1**.
The synthesized analogues, evaluated *in silico* for their anti-metastatic activity, were selected by the Way2Drug platform. In the Structure-Activity Relationship (SAR) study, molecular docking was employed to predict potential interactions of this series of compounds with the active site of the u-PA enzyme. Notably, the ADMET evaluation results of the synthesized hybrids demonstrated promising anti-metastatic activities compared to the standard ESI ligand. This opens up new avenues for the development of anticancer drugs.

Key words: Quinoline, Hydrazide, mono/di-ketones, PASS Online prediction, Anti-metastatic activity, docking studies, ADMET.



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Semi-synthesis, α-amylase inhibition, kinetic and molecular docking studies of novel structural analogs based on a sesquiterpene coumarin isolated from *Ferula tunetana*

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Despite the significant progress in enhancing the existing bank of drugs used to treat and cure type-II diabetes mellitus, there remains a need to search for and develop novel bioactive compounds with minimal adverse effects. This work describes the valorization of a natural bioactive compound through the semi-synthesis of new analogs and the investigation of their α-amylase inhibition activity. Coladonin (**1**), a sesquiterpene coumarin, was quantitatively isolated from the chloroform extract of the endemic *Ferula tunetana* roots. Subsequently, a series of new structural analogs based on coladonin (3a-m) was synthesized *via* the Claisen-Schmidt reaction. All compounds were characterized using NMR and ESI-HRMS experiments. *In vitro* evaluation of their α-amylase inhibitory potential revealed promising results, with IC_{50} values ranging from 7.24 to 28.98 µM. Notably, compounds 3k and 3m demonstrated lower IC_{50} values (7.24 µM and 8.38 µM, respectively) compared to the standard (acarbose: IC_{50} = 9.83 µM). The structure-activity relationship (SAR) for all the compounds was studied thoroughly. The most active compounds were identified as mixed-type inhibitors through kinetic studies. Additionally, *in silico* molecular docking study was conducted for all synthesized analogs with the binding site of the α-amylase enzyme.

Keywords: Sesquiterpene coumarin, α-amylase, kinetic study, molecular docking.

Isolation and physicochemical Characterization of Polysaccharides from *Boswellia sacra* Oleo-Gum-Resin

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Frankincense, the resinous extract from the trees of the genus *Boswellia*, is extremely valuable and it has been utilized for centuries for its several bioactive curative effects **[1]**. In this study, polysaccharides were extracted from frankincense from *Boswellia sacra* (PBS). The structural characterization of the obtained product was achieved throw Fourier transform infrared spectroscopy (FT-IR), gas chromatography (GC/MS), Ultraviolet-visible spectroscopy (UV-Vis), Differential Scanning Calorimetry (DSC), Nuclear Magnetic Resonance (NMR1D), and Size exclusion chromatography (SEC) analysis. The chemical composition showed that the product is composed predominantly of Arabinose, Galactose and Xylose with small amounts of Talose, Glucose, Mannose and Rhamnose. The calorimetric assays confirmed that the uronic acid content is 48.58%. These results confirmed the polysaccharide belongs to the type of pectin. The SEC determination disclosed that PBS had an average molecular weight of 181 kDa. The obtained biopolymer has been evaluated for its antioxidant (79.37%), cytotoxicity (1800 µg/mL), and it showed an interesting inhibitory power on the α-amylase enzyme with a competitive type.

Key words: *Boswellia sacra*, Polysaccharide, Physicochemical characterization, Antioxidant, Cytotoxicity, Amylase.

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Phenolic composition, anti-α-amylase activity and molecular docking study of bioactive compounds from *Pinus pinea* L. extracts

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Medicinal Plants are recognized as a rich source of phenolic compounds and widely used as an efficient alternative therapeutic for the treatment of several diseases.[1]

The aim of this research was to identify, quantify and compare the polyphenolic composition of EtOAc and MeOH extracts from the trunk bark of *Pinus pinea* L. and to investigate their anti-α-amylase activity and their enzymatic kinetic studies. Total phenolic and total flavonoid contents of the studied extracts were determined. Eighteen compounds were identified in both extracts, by LC-HRMS analysis, with *trans*-taxifolin and ellagic acid as the main compound, respectively. EtOAc and MeOH extracts inhibited α-amylase with IC_{50} values of 9.16 and 8.33 µg/mL, respectively. EtOAc extract exerted a non competitive inhibition while MeOH extract presented a competitive inhibition on α-amylase. The molecular docking analysis of the major compounds explained the significant anti-α-amylase activity of the studied extracts.

Key words: *Pinus pinea* L, polyphenolics, LC-HRMS, anti-α-amylase, molecular docking

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Environmental impact on the yield, chemical composition and antioxidant activity of essential oils of Tunisian *Eucalyptus* species

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The present work investigates the quantitative and qualitative variations of essential oils from the leaves of four *Eucalyptus* species in different locations in Tunisia and highlights their antioxidant activities. A trial was carried out during winter season of 2021 and samples collected from arboreta from different parts of Tunisia *viz*., Northern, Central and Southern region of Tunisia, and characterized by two climates; semi-arid (Henchir Naam and Hanya arboreta) and arid (Hamma and Metouia arboreta). The obtained results refer to presence of high significant differences between species and locations. The hydrodistilled oils obtained from arid region recorded higher yield compared to semi-arid regions for all species studied. GC/MS analysis indicated a significant variation in oil composition among and within species. The essential oil of *E. salmonophloae* was characterized by 1,8-cineole, α-pinene, *trans*-pinocarveol and *p*-cymene. However, p cymene was totally absent only in Hamma oil. In all samples, torquatone (36.5–44.7%) was the major molecule in *E. torquata* and the highest amount was found in Hanya (44%). All analyzed samples of *E. lesouefii* were dominated by 1.8 cineole with higher per cent was noticed in Henchir naam (44%). The essential oils extracted from plants of *E. astringens* cultivated in Hamma showed the high percentage of 1,8-cineole (45%). Examined oils exhibit substantial antioxidant activities which were varied according to species and regions. In the DPPH assay, *E. salmonophloae* from semi arid region showed the major effectiveness (IC_{50}= 86.93 µg/mL). However, *E. lesouefii* essential oil from arid region showed the highest antioxidant activity according to ferric reducing antioxidant power assay (35.26% at a concentration of 100 µg/mL). These results show the importance of bioclimates on the quantity, chemical composition and biological activities of *Eucalyptus* essential oils.

Key words: *Eucalyptus*; essential oil; chemical composition; antioxidant activity; bioclimatic effect.

Terpenes: Structure, Function and Bioactive properties

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Abstract

Terpenes or terpenoids are extracted or steam distilled for the recovery of the essential oils of specific fragrant plants. These steam distillates are used to create fine perfumes, to refine the flavor and the aroma of food and drinks, and to produce medicines from plants (phytopharmaca). In recent years, consumers have developed an increasing interest in natural products, as most of these terpenoids have been identified as high value chemicals in food, cosmetic, pharmaceutical, biotechnology, and industrial crops. Extensive chemical techniques and biological tests have led to the identification, biological characterization, and extraction of major components that are of wide interest, especially to the cosmetic and industrial recovery of selective terpenes. The current status of the knowledge of their general structure, functions, and bioactive properties are covered in this review.

Keywords: Terpenes, fragrant plants, industrial crops, functions, biological characterization.

Structural study and biological evaluation of *Volutaria lippiii* cultivated in Tunisia

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Belonging to the *Asteraceae* family, *Volutaria lippii* is an indigenous perennial herb that grows widely in the Mediterranean Basin, especially in Tunisia and Algeria.Ithas been the object of a various phytochemical investigations highlighting its richness in bioactive secondary metabolites mainly flavonoids and sesquiterpene lactones.This work aims to carry out a chemical investigation and a biological evaluation of this local species.

First, we extracted the aerial part of *V. lippii*by cold maceration in the presence of an acetone-water mixture (50-50, v/v) and thereafter the aqueous phase was fractionated using successively four organic solvents of increasing polarities: hexane, dichloromethane, ethyl acetate and n-butanol. Then, a phytochemical screening showed that polar extracts had high levels of polyphenols and flavonoids especially for then-butanol and ethyl acetate. In addition, the latter are equipped with an interesting antioxidant activity and a significant antimicrobial property thanks to their high content of phenolic compounds.

Second, Phytochemical investigation on the aerial parts of *V.lippii*. led to the isolation of aguaiane-sesquiterpene lactone identified as3-β-*O*-acetylcynaropicrin. Its structural elucidation was carried out using different spectroscopic techniques (MS, IRand NMR) and further supported by comparison with the data descripted in literature.

Keywords: *Volutaria lippii*, antioxidant activity, antimicrobial activity, 3-β-*O*-acetylcynaropicrin.

Analyse par HPLC-HESI-MS/MS des composés phénoliques extraits des feuilles de *Cynoglossum tubiflorus*et évaluation de leurs propriétés cytotoxique, antioxydante et antibactérienne.

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L'objectif de cette étude était d'analyser la composition chimique ainsi que les propriétés antioxydante, antibactérienne et cytotoxique de trois extraits (hexane, dichlorométhane et méthanol) issus de *Cynoglossum tubiflorus*. La composition de l'extrait méthanolique a été déterminée par une analyse HPLC-HESI-MS/MS. L'activité antioxydante a été évaluée à l'aide des tests DPPH, FRAP et CAT, tandis que l'activité antimicrobienne a été évaluée par microdilution en bouillon en utilisant diverses souches bactériennes. Les perturbations structurelles chez les bactéries Gram-positives ont été visualisées grâce à la microscopie électronique à balayage (MEB). Les effets cytotoxiques ont été étudiés sur des cellules humaines MRC-5 en culture, en utilisant le test MTT. Les résultats ont révélé une teneur élevée en composés phénoliques dans l'extrait méthanolique. Au total, 32 composés, comprenant des acides phénoliques, des flavonoïdes, des lignanes et des acides gras, ont été identifiés. L'extrait méthanolique a démontré des activités antioxydante (CI_{50} = 0,043 ± 0,001 mg/mL) et antimicrobienne (CMI = 156 µg/mL) significatives. Les observations au MEB ont révélé des altérations membranaires et de forme bactérienne. Enfin, aucun effet cytotoxique n'a été observé sur les cellules humaines MRC-5 à une concentration de 600 µg/mL.

Mots-clés:*Cynoglossum tubiflorus*,HPLC-HESI-MS/MS, Antioxydant, Antimicrobien; Cytotoxicité.

Sub-acute effect of orally route exposure to Zearalenone mycotoxin on mice liver counteracted by *Ziziphus Lotus* Fruit.

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Zearalenone (ZEN) is a fungal toxin with estrogenic effects naturally found in foods. In Tunisia, climate change enhances the cereals ZEN-mycotoxin contamination in food chain, linked to an increase of health problem and economic loses. This study aims to investigate the impacts of sub-acute effect ZEN on oxidative stress, inflammation, and autophagy, as well as to evaluate the effectiveness of *Ziziphus lotus* fruit extract (ZLFE) to get ride against oxidative stress damage. For this in vivo study, female Balb/c mice aged 10 weeks were randomly assigned to four treatment groups: 1) control group, receiving daily 200 µl PBS; 2) group receiving ZLFE at a concentration of (510^{-3} g/ml); 3) group treated with ZEN (40 mg/kg b w) ; 4) group treated with both ZEN and ZLFE. The results indicate that ZEN induces liver damage in ischemic animals, characterized by histological alterations such as cellular disorientation, cellular necrosis, and reduction in Centro-lobular vein diameter. Additionally, ZEN increased oxidative stress in the ischemic liver, with increased expression of apoptosis markers (Caspase 3, P53, Bax, Bcl2), inflammation markers (IL-6, NFkB), and autophagy markers (P62, LC3) confirmed by immunofluorescence and Western blot analyses. However, ZLFE demonstrated a significant ability to mitigate ZEN toxicity, resulting in a notable reduction in the evaluated markers. These combined data support the efficacy of ZLFE in protecting against apoptosis, inflammation, and autophagy at the liver level, thereby helping to alleviate the cellular dysfunction induced by ZEN.

Key words: Zearalenone, prevention; *Ziziphus lotus* fruit, Liver, Inflammation, Autophagy, Apoptosis

Eucalyptus torquata, *Eucalyptus woodwardii* and their hybrid *Eucalyptus torwood* essential oils: GC/MS profiling, *in vitro* antioxidant and antimicrobial assessment in addition to *in silico* evaluation involving molecular docking and ADME prediction

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Abstract

*Eucalyptustorwood*is a spontaneous hybrid of two species: *Eucalyptus torquata* and *Eucalyptuswoodwardii*. Our work aims to study the species essentialoils of these three trees, including yield, chemical composition, antioxidant and antimicrobial activities, in order to analyze the effect of hybridization on these parameters.The essential oil yields were 2.6, 2.52 and 2.12 % for *E. torquata*, *E. woodwardii* and *E. torwood*, respectively. All three oils showed the same α-pinene content (around 12%), but *E. woodwardii* was richer in aromandendrene than the other two eucalypts, which have higher torquatone contents. Also, *E. torwood* showed a specific richness in β-Eudesmol and a lower percentage in 1,8-cineole.The evaluation of the antioxidant potential by the DPPH method proved that these essential oils have a significant antioxidant capacity for the two parental species (IC_{50}= 0.374 mg/mL for *E. torquata* and IC_{50} = 0.523 mg/mL for *E. woodwardii*), this activity is well minimized for the essential oil of hybrid species (IC_{50} = 0.887 mg/mL) by contribution to the two parental species as well as by the contribution of ascorbic acid (IC_{50} = 0.58 mg/mL). The antimicrobial activity was determined against six bacterial strains, the results obtained highlight that the essential oils tested showed antimicrobial activity against gram-positive bacteria to varying degrees, while on gram-negative bacteria they showed resistance. The yeast *Candida albicans* was most sensitive to the three *Eucalyptus* essential oils.In order to clarify the antibacterial effect of the identified phytocompounds, we employed computational methods, specifically ADME and molecular docking. Significant results were obtained, molecular docking simulations highlighted high bindingscore of four major abundant compounds towards targeted receptors (pdb: 2zcq and pdb: 1kzn).

Keywords:*Eucalyptus* sp., hybridization, essential oils, antimicrobial activity, antioxidant potential, ADME, docking study.

Neuropathological Alterations and Cognitive Deficits Induced by Chronic Exposure to Heavy Metals in *Wistar* Rats: Exploring the Antioxidant Properties of the Medicinal Plant *Zizyphus lotus*

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Abstract: High accumulation of heavy metals can lead to neurotoxicity, causing disturbances in neurobehavioral skills, disruption of neural function and increased oxidative stress. This study aims to investigate the toxic effects induced by heavy metals (Al/Fe) and the therapeutic and the beneficial effects as well as the antioxidant capacity, of a medicinal plant called "*Zizyphus lotus*" known for its health benefits in Tunisia.

In vitro findings demonstrate that the ethyl acetate extract of *Z.lotus* leaves contains significant levels of polyphenols and flavonoids compared to the hexanic extract. Additionally, the extract is rich in various antioxidant molecules, as revealed by HPLC analysis. These results are corroborated by evaluations of the antioxidant properties using DPPH, ABTS, and FRAP tests.

In vivo, the administration of metals in the treated rats group induced a neurotoxic effect, confirmed by behavioral tests such as the open field test that shows an increase in anxiety incidence and spatial memory impairment were tasted using maze Y… Thus, an increase in oxidative stress markers such as MDA and PC that are biomarkers of lipid and protein oxidations in the brain and cerebellum. In addition, the activities of antioxidant enzymes (CAT, GPx and SOD) decreased significantly as compared to control rats which are also confirmed by histological perturbations of brain and cerebellar tissues in the group of rats receiving the metals.

The co-administration of *Z. lotus* extract significantly reduced signs of neurotoxicity. This preventive effect could be at the origin of the bioactive compounds of this extract such as flavonoids and polyphenols.

Key words: *Zizyphus Lotus*, oxidative Stress, neurotoxicity, heavy metals

PHYTOCHEMICAL SCREENING AND SOME BIOLOGICAL ACTIVITIES OF A SPONTANEOUS PLANT FROM A TUNISIAN ARID REGION

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Abstract

The aim of this study is to evaluate the biochemical composition and to examine the *in vitro* antioxidant, anti-inflammatory, antiproliferative, and antibacterial activities of *Fumaria officinalis* leaves extracts, a spontaneous plant growing in a Tunisian arid region. The used extracts were obtained by different extraction methods (maceration and decoction) and solvents (water and ethanol). The biochemical composition was determined by measuring the content of phenols, tannins, flavonoids, and alkaloids, showing a great richness in them. Meanwhile, the antioxidant activity was assessed using three tests showing a great antioxidant capacity. The *in vitro* anti-inflammatory activity showed a moderate activity for both aqueous and ethanol extracts obtained by maceration. The results of the antiproliferative activity revealed an important inhibitory capacity on the proliferation of breast cancer cells (MCF-7).Besides, the evaluation of the antibacterial activity of *Fumaria officinalis* against both gram-positive and gram-negative bacteria, confirmed that it has a limited efficacy against them.

To summary, this research aims to highlight the various properties of *Fumaria officinalis* extracts and their potential applications, particularly in the field of health care and pharmacology.

Key words: *Fumaria officinalis*, biochemical composition, anti-inflammatory activity, antiproliferative activity, antibacterial activity.

Extraction by Ultrasound, Optimization via Response Surface Methodology, and Identification of Phenolic Compounds from Tunisian-Cultivated *Passiflora edulis* Sims Peel

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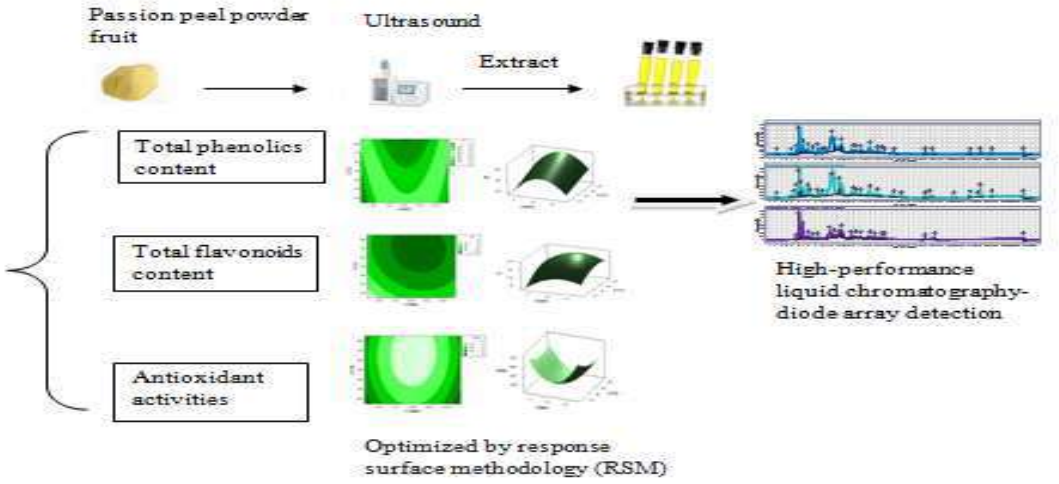
Abstract:
In this research, a method employing ultrasound to extract phenolic compounds, particularly flavonoids, from Passiflora species was developed. *Passiflora edulis* Sims peels were utilized, extraction parameters including time, temperature, liquid-to-solid ratio, and pH were optimized using response surface methodology (RSM). The efficiency of extraction was assessed by quantifying total phenolics, flavonoids, and antioxidants. Optimal extraction conditions yielded the highest values for Total Phenolic Content (TPC) at 221.078 mg GAE/g DW, Total Flavonoid Content (TFC) at 177.346 mg QE/g DW, DPPH at 35.746 µg/ml, and FRAP at 31.423 µM of BHT/g DW, achieved after 9.78 minutes extraction time, at 49.64 °C temperature, a liquid-to-solid ratio of 22.07 ml/g, and pH 5.54. High-Performance Liquid Chromatography with Diode Array Detection (HPLC-DAD) analysis revealed that gallic and caffeic acids were the primary phenolic acids, while apigenin-7-*O*-glucoside and rutin were identified as the prominent flavonoids. These results propose a sustainable method for acquiring phenolic-rich extracts with potential applications in various industries.



Key words: *Passiflora edulis*, Ultrasound, Response surface methodology.

CARACTERESATION AND PHYSICOCHIMICAL PROPERTIES OF SOME CHLORONATED DIARYL-2-PYRAZOLINES ANALOGUE OF NATURAL PRODUCT AS ANTIMICROBIAL AGENTS

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Pyrazolines are a significant class of heterocyclic compounds with essential biological activities. They are quite stable, which has inspired medicinal chemists to experiment with the ring's structure in many different ways to create a variety of pharmacological activities. Substitued pyrazolines and their derivatives analogue of natural product isolated from various medicinal plants are important biological agents and a significant amount of research activity has been directed towards this class; their prominent effects are antimicrobial[1] antifungical antiviral, antiparasitic, anti-tubercular[2] and insecticidal agents[3].

A series of chlorinated 3, 5-diaryl-2-pyrazolines has been synthesized by the reaction of appropriately substituted chlorochalcones (analogue of flavonoids) and phenyl hydrazine in hot acetic acid solution. The structures of all compounds have been elucidated by microanalysis and ^{1}H- and ^{13}C- NMR spectroscopic measurements. The antibacterial activites of the synthesized compounds against *staphylococcus aures* ATCC 6538, *Escherichia coli* ATCC 8739, *klebsiella pneumoniae* ATCC 4352, *pseudomonas aeruginosa* ATCC 1539, *proteus mirablis,* were tested using disk diffusion method and the minimum inhibitory concentration (MIC) Method. All the determinations tests were performed in triplicate and the results were taken as a mean of at least three determinations. The tested compounds exhibited different degrees of antibacterial activities or inhibition actions.

Key-words: pyrazolines, biological agents, chlorochalcones; antibacterial activites

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Extraction, Characterization, and Cosmetic Applications of Oil from Prickly Pear Seed

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Opuntia ficus-indica seed pomace, a by-product of seed oil extraction, was investigated due to its richness of phytochemical compounds and high antioxidant capacity [1]. We investigated various methods for extracting oil from the flour of prickly pear seeds, including maceration, sonication, and Soxhlet extraction. After initially extracted oil from prickly pear seeds using cold-press methods, we focused on extracting residual oil from the remaining seed residues, known as "flour." Consequently, we employed three solvent-based extraction techniques: maceration, sonication, and Soxhlet extraction. Additionally, we conducted a physicochemical characterization of the extracted oil to detect any potential compositional changes. Based on the yield of oil extracted from prickly pear seed powder, we identified the most efficient extraction method. Our findings indicated that Soxhlet extraction was the most cost-effective approach. Qualitatively, the residual oil closely resembled that obtained through cold-press extraction. Recognizing the manifold benefits of prickly pear seed oil, particularly in cosmetics, we emphasized its importance in cream formulations. Subsequently, we performed sensory and instrumental analyses to evaluate the stability of the cream.

Tests conducted on the cream demonstrated its stability in terms of sensory attributes (appearance, texture, odor, etc.) as well as physicochemical properties (pH, viscosity, stability, etc.).

Key words: Prickly pear, Seed pomace, Soxhlet extraction, Physicochemical characterizations, Cosmetics.

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Chemical composition and cytotoxic activity of the fractionated trunk bark essential oil from *Tetraclinis articulata* (Vahl) Mast. growing in Tunisia

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Essential oils from medicinal and aromatic plants are a very interesting source of secondary metabolites, because of their many different biological properties such as cytotoxicity, anti-inflammatory, antioxidant, insecticidal, antifungal, and antimicrobial, many of which are of increasing interest in the field of human and animal health [1]. Herein, we carried the extraction of *Tetraclinis articulata* trunk bark essential oil obtained using hydrodistillation and five fractions were obtained by normal phase silica chromatographic separation. Chemical analysis allowed the identification of 54 components. Relatively high amounts of oxygenated sesquiterpenes (44.4–70.2%) were detected, mainly consisting of caryophyllene oxide (13.1-26.6%), carotol (9.2-21.2%), 14-hydroxy-9-epi-(*E*)-caryophyllene (3.2-15.5%) and humulene epoxide II (2.6-7.2%). In addition, the cytotoxic activity against human mammary carcinoma cell lines (MDA-MB-231) and colorectal carcinoma cell lines (SW620) of the essential oil and its fractions were assessed *in vitro*. As a result, all the samples displayed moderate to weak activity compared to 5-fluorouracil. The colorectal carcinoma cell line was relatively more sensitive to the essential oil and its fractions compared to the breast cancer cell line, showing IC_{50} values ranging from 25.7 to 96.5 µg/mL. In summary, the essential oil and its fraction E.2 revealed the most potent cytotoxic activity against colorectal carcinoma cell line, with IC_{50} values lower than 30 µg/mL. Notably, the *in vitro* studies were in agreement with the *in silico* analysis.

Key words: *Tetraclinis articulata*, essential oil, chemical composition, cytotoxic activity

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Supercritical extraction technology in orange peels polysaccharides: Chemical characterizations and biological activities

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This study explores the application of supercritical fluid extraction (SFE) technology for the isolation of polysaccharides from orange peels and investigates their chemical characteristics and biological activities in vitro (antioxidant and α-amylase inhibitory). Polysaccharides obtained from orange peels have gained recognition for their potential functional and therapeutic properties in various industries. Moreover, the chemical characterizations of the extracted polysaccharides were comprehensively examined, encompassing structural analyses, molecular weight distribution assessments, and monosaccharide composition determinations. Advanced analytical techniques, such as FTIR spectroscopy, NMR spectroscopy, and GC-MS, were employed for a detailed understanding of their chemical properties. Furthermore, the biological activities of these orange peel polysaccharides were evaluated through in vitro assays, focusing on their antioxidant effect and potential α-amylase inhibitory properties. The results shed light on the unique attributes of polysaccharides extracted using supercritical technology, providing insights into their application in the food, pharmaceutical, and cosmetic industries. This research underscores the significance of supercritical extraction as a valuable technique for the isolation of bioactive compounds from orange peels, offering opportunities for the development of functional ingredients with diverse industrial applications.

Key words: Orange peels, polysaccharides, supercritical fluid extraction (SFE), chemical characterizations, biological activities.

Unlocking the *Satureja nepeta*'s therapeutic potential essential oil

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Abstract

Satureja nepeta, an aromatic plant endemic to Morocco and belonging to the Lamiaceae family, has long been valued in Moroccan traditional medicine for its effectiveness in treating intestinal issues and upper respiratory infections. Past studies have highlighted its healing potential, especially its ability to reduce inflammation and act as an antioxidant.

The objective of this study is to determine the chemical composition of *S. nepeta* essential oil and to evaluate its antibacterial and cytotoxic properties.

The essential oil was obtained by steam distillation with the Clevenger apparatus. Identification of the chemical components was carried out by gas chromatography coupled to mass spectrometry (GC/MS). The antibacterial activity was tested according to the standard method, on two bacterial strains *Escherichia coli* and *Pseudomonas aeruginosa.* The minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) were determined. We also evaluated the impact of *S. nepeta* essential oil on human myeloma cells. All tests were performed in triplicate and repeated three times.

The results obtained by GC/MS revealed the predominance of three molecules pulegone (39%), menthone (33.61%) and menthol (3.58%) in the essential oil of *S. nepeta*. This essential oil was found to have a significant ability to inhibit the growth of *E. coli* and *P. aeruginosa* bacterial strains, with inhibition zones of 37 mm and 27 mm, respectively. In comparison, the standard antibiotic generated inhibition zones of 25 mm for *E. coli* and 31 mm for *P. aeruginosa*. Furthermore, cytotoxicity testing on myeloma cells demonstrated a dose-dependent response to *S. nepeta* essential oil, with a median lethal concentration (LC50) of 127 µg/ml.

In conclusion, our study highlights the potential of *S. nepeta* essential oil as a natural remedy against bacterial infections, supported by its significant inhibitory effects on *E. coli* and *P. aeruginosa*. The dose-dependent cytotoxic response on myeloma cells also highlights the complex interactions of essential oil components with human cells.This knowledge contributes to the understanding of *S. nepeta*'s therapeutic potential and warrants further exploration of its clinical applications.

Key words: *Satureja nepeta* - Essential oil - Antibacterial activity – GC/MS – Cytotoxicity

Chemical composition, antioxidant, antibacterial and anti-insect activities of Tunisia *Citrus Limon* essential oil

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Abstract: This research aimed to chemical composition of the essential oil (EO) extracted from the peels of *Citrus limon* and to evaluate its antioxidant, antibacterial and insecticidal activities against rice weevil adults. Essential oil is obtained by steam distillation with a yield of 0.576 ± 0.01% and analyzed by gas chromatography coupled to mass spectrometry (GC/MS). The antioxidant activity of *C. limon* essential oil was investigated using DPPH, FRAP, and chelating activity on ferrous ions methods. This essential oil exhibited a remarkable antiradical and reducing power against DPPH, FRAP and chelating activity. The in vitro antibacterial tests using the agar well diffusion method were carried out on four bacteria, such as *Staphylococcus aureus, Bacillus cereus, Pseudomonas aeruginosa* and *Escherichia coli*. The essential oil demonstrated a considerable antibacterial activity against all bacterial strains. Insecticidal assessments were carried out against storage food pest rice weevil. Two insecticidal activities of the essential oil were performed using two different methods that contact toxicity and repellent tests. The essential oil showed repellent and insecticidal effects against rice weevil.

Keywords: *Citrus limon* EO, GC/MS, antioxidant activity, antibacterial activity, insecticidal activity

Physico-chemical study, phytochemical screening and evaluation of antioxidant activity of *Apium graveolens*

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The use of medicinal plants is growing in most countries of the world. This use is mainly based on the idea that plants are a natural means of traditional remedies far from all risks. Through the centuries, human traditions have been able to develop the knowledge and use of medicinal plants.

Our research has focused on the study of medicinal plants and the use of chemical methods to extract the active principles of this plant. So, the plant we have chosen is celery which bears the famous scientific name "*Apium graveolens* L".

The objective of our study is to evaluate the in vitro antioxidant activity of the plant "Apiumgraveolens L" from two different regions (Mostaganem and Ain el-Defla). To obtain the different extracts from the powder of the leaves, we carried out aqueous, ethyl acetate and ethanolic extractions.

Our phytochemical screening results demonstrated that the plant from two different regions is rich in secondary metabolites. We also found the presence of polyphenols and flavonoids in considerable concentration.

In vitro antioxidant tests by method of DPPH and iron reduction FRAP and total antioxidant capacity TAC showed that ethyl acetate and ethanol extracts have great ability to scavenge free radicals with IC_{50} inhibitory concentration.

Key words: Apium graveolens L., polyphenols, tannins, yield, DPPH.

The essential oil of Tunisian halophyte: a natural food preservative agent of ground beef meat

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Abstract

This study was directed towards the investigation of the chemical composition and antimicrobial properties of the essential oil of Tunisian halophyte *Lobularia maritima*. The antibacterial effects against major food-borne pathogenic and food spoilage bacteria were tested using the well diffusion method, followed by the determination of the minimum inhibitory (MIC) and bactericidal (MBC) concentrations. The essential oil has shown strong antimicrobial activity against eight pathogenic strains, which was attributed mostly to predominant constituents of the essential oil: benzyl alcohol, linalool, terpien-4-ol and globulol, as well as to, synergistic effects of its major and minor constituents. Considering strong antimicrobial effects of the tested essential oil, it was further tested as a natural alternative to food preservatives, using minced beef meat as a model system. Overall, results indicated that the essential oil of *Lobularia maritima* deserves to be considered as a natural preservative in the meat industry.

Keywords: *Lobularia maritima* essential oil; antimicrobial properties; minced meat preservation; quality assessment.

Application de la méthodologie de surface de réponse pour l'optimisation simultanée du Rendement d'extraction et du Pouvoir Inhibiteur de corrosion des hydrolats d'hydrodistillation des huiles essentielles d'*Euclyptus Diversifolia*

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Les huiles essentielles constituent l'un des produits naturels de haute valeur ajoutée. Elle est souvent extraite à partir des plantes aromatiques et médicinales par la vapeur d'eau. Ces substances sont devenues de plus en plus demandées sur le marché international pour leurs utilisations dans diverses formulations industrielles, notamment dans les produits pharmaceutiques et cosmétiques. L'hyrodistillation des huiles essentielles constitue la technique d'extraction normalisée (Afnor) la plus populaire, surtout pour son meilleur rendement et son coût relativement faible comparé à ceux des nouvelles techniques telles utilisant les fluides supercritiques ou les microondes. Les procédés d'hydrodistillation génèrent des résiduels liquides et solides (hydrolats et biomasses épuisées) qui sont couramment rejetés. La valorisation de ces sous produits peut constituer une voie de recherche assez importante.

Ce travail vise la recherche de piste de valorisation des hydrolats, récupérés à la fin de l'opération d'extraction de l'huile essentielle des feuilles d*'Eucalyptus diversifolia,* comme bio inhibiteur de corrosion de l'acier ordinaire en milieux aqueux acide aéré. La méthode de perte de masse à été adoptée pour déterminer le pouvoir inhibiteur de corrosion de ces produits. Cette propriété est intimement liée à la composition chimique de l'hydrolat résiduel qui, à son tour, dépend des conditions d'hydrodistillation. Une étude par planification d'expériences a été faite en se basant sur le plan de Box Behnken. L'objectif est de déterminer les paramètres opératoires d'hydrodistillation (durée d'extraction, rapport matière végétale/eau et puissance de chauffe) permettant d'obtenir à la fois un meilleur rendement d'huiles essentielles et un meilleur pouvoir inhibiteur de corrosion. Deux modèles mathématiques exprimant les réponses "Rendement" et "Pouvoir Inhibiteur de corrosion" en fonction des facteurs considérés, ont été déterminés. L'étude mathématique basée sur la fonction de désirabilité a permis de déterminer les conditions optimales recherchées. L'étude a permis, via la méthodologie de surface de réponses, de déterminer les conditions opératoires permettant à la fois l'obtention d'un meilleur rendement et un hydrolat ayant un pouvoir inhibiteur de corrosion assez encourageant.

Mots clés : Corrosion, hydrodistillation, inhibiteur de corrosion, hydrolat, plan d'expérience de surface de réponse, Eucalyptus.

ANTIOXIDANT ACTIVITY OF ESSENTIAL OILS AND ETHANOLIC EXTRACTS OF FOUR MEDICINAL PLANTS ALONE AND IN COMBINATION

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The present work aims to evaluate the antioxidant activity of ethanolic extracts and essential oils of aromatic plants of the Lamiaceae family: *Thymus algeriensis* and *Salvia rosmarinus*, and Anacardiaceae: *Pistacia lentiscus*, Myrtaceae: *Eucalyptus polybracetea*. The polyphenols were measured using the Folin-Ciocalteu method; the results showed that the essential oils studied as well as the ethanolic extracts are relatively rich in polyphenols. Their antioxidant properties were tested by the synthetic DPPH radical trapping method. The IC50 values were determined according to the graph representing the percentage of inhibition of the DPPH radical by essential oils and by ethanolic extracts, according to our results there is a correlation between the level of polyphenols present in the different essential oils and different ethanolic extracts and their ability to neutralize free radicals. Several combinations were carried out between the essential oils and also between the ethanolic extracts in order to determine the type of interactions existing between the combined substances, the results were represented in the form of isobolograms. Additive and super-additive effects were observed in combinations of essential oils, and super-additive and sub-additive effects were observed for combinations of ethanolic extracts.

Keywords: Essential oils, ethanolic extracts, DPPH, Combination

Hyaluronic acid from Bluefin tuna by-product: Structural analysis and pharmacological activities

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The fishing and aquaculture industries generate a huge amount of waste during processing and preservation operations, especially those of tuna. Recovering these by-products is a major economic and environmental challenge for manufacturers seeking to produce new active biomolecules of interest. A new hyaluronic acid was extracted from bluefin tuna's vitreous humour to assess its antioxidant and pharmacological activities. The characterization by infrared spectroscopy (FT-IR), nuclear magnetic resonance ((1D–1H) and 2D (1H COSY, $^{1}H/^{13}C$ HSQC)) and size exclusion chromatography (SEC/MALS/DRI/VD) revealed that the extracted polysaccharide was a hyaluronic acid with high uronic acid content (55.8%) and a weight average molecular weight of 888 kDa. This polymer possesses significant anti-radical activity and ferrous chelating capacity. In addition, pharmacological evaluation of its anti-inflammatory and analgesic potential, using preclinical models, in comparison with reference drugs (Dexamethasone, diclofenac, and acetylsalicylate of lysine), revealed promising anti-inflammatory activity as well as interesting peripheral and central antinociceptive activity. Therefore, our new hyaluronic acid compound may therefore serve as a potential drug candidate for the treatment of pain sensation and inflammation of various pathological origins.

Keywords: Marine waste, Hyaluronic acid, Vitreous humour, Physico-chemical characterization, Pharmacological activities

Antioxidant and antimicrobial activities of *Enarthrocarpus clavatus* flowers extracts and identification of phenolic compounds from its methanol extract

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Since ancient times plants have been used in traditional medicine. Medicinal plants are a source of substances with varied biological and pharmacological activities. In this work, we investigated the total phenolic and total flavonoid contents in *Enarthrocarpus clavatus* flower extracts (hexane, ethyl acetate and methanol) as well as their antimicrobial and antioxidant (FRAP, DPPH and TAC) activities. Then, we proceeded with an LC-MS/MS characterization. The phytochemical composition of *Enarthrocarpus clavatus* flower extracts was investigated to explain the results obtained in antioxidant and antimicrobial activities. The results obtained showed that the methanolic extract contained the highest content of total phenolics and flavonoids as it exhibited the strongest antioxidant activity. In addition, *E. clavatus* extracts have been tested for their activity against gram-positive and gram-negative bacteria and the interesting activity was obtained with the methanolic extract. Then after the chemical composition of the methanolic extract was investigated using a high-performance liquid chromatographic method coupled with electrospray ionization mass spectrometry by the negative mode (HPLC-ESI-MS). Therefore, 25 compounds were detected; the major identified components were flavonoids and phenolic acids.

Key words: *Enarthrocarpus clavatus*, LC-HESI-MS^n, antioxidant and antimicrobial activities

A novel perspective on eugenol as a natural anti-quorum sensing molecule against *Serratia* sp.

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Serratia marcescens is commonly noted to be an opportunistic pathogen and is often associated with nosocomial infections. In addition to its high antibiotic resistance, it exhibits a wide range of virulence factors that confer pathogenicity. Targeting quorum sensing (QS) presents a potential therapeutic strategy for treating bacterial infections caused by S. marcescens, as it regulates the expression of various virulence factors. Inhibiting QS can effectively neutralize S. marcescens' bacterial virulence without exerting stress on bacterial growth, facilitating bacterial eradication by the immune system. In this study, the antibacterial and anti-virulence properties of eugenol against *Serratia* sp. were investigated.

Eugenol exhibited inhibitory effects on the growth of *Serratia*, with a minimal inhibitory concentration (MIC) value of 16.15 mM. At sub-inhibitory concentrations, eugenol also demonstrated antiadhesive and eradication activities by inhibiting biofilm formation. Furthermore, it reduced prodigiosin production and completely inhibited protease production. Additionally, eugenol effectively decreased swimming and swarming motilities in Serratia sp. This study demonstrated through molecular modeling, docking and molecular dynamic that eugenol inhibited biofilm formation and virulence factor production in *Serratia* by binding to the SmaR receptor and blocking the formation of the HSL-SmaR complex. The binding of eugenol to SmaR modulates biofilm formation and virulence factor production by *Serratia* sp. These findings highlight the potential of eugenol as a promising agent to combat *S. marcescens* infections by targeting its virulence factors through quorum sensing inhibition.

Key words: Eugenol, *Serratia*, Quorum sensing, biofilm, SmaR, HSL, molecular docking, molecular dynamic.

Biochemical characterization, antioxidant, anti-inflammatory and antitumoral properties of three wild edible plants in southern Tunisia

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Abstract

Plants have demonstrated potential as valuable biological sources for exploring promising therapeutic agents in cancer treatment. Many effective anti-cancer drugs, or their analogues, are currently derived from plants, with numerous others undergoing clinical trials. This study aims to investigate the phytochemical screening, antioxidant, and antiproliferative activities of different parts of three widely used spontaneous edible plants in Tunisian ethnomedicine. Aqueous and ethanolic extracts from *Allium roseum* L. (leaves), *Asphodelus tenuifolius* Cav. (vegetative part, leaves, roots), and *Scorzonera undulata* vahl (leaves, tubers) were analyzed for various secondary metabolites (polyphenols, flavonoids, condensed tannins). High-performance liquid chromatography (HPLC) was performed on the ethanolic extracts. Three tests were used to evaluate their antioxidant activity. The antiproliferative activity was assessed using the MTT test on breast cancer cells (MCF-7). The metabolic profiles of the polyphenolic extracts revealed quinic acid, 1,3-di-*O*-caffeoyquinic acid, luteolin, naringin, apigenin, rutin, chlorogenic acid, and epicatechin as primary and prevalent components among the different plant parts. All plant parts exhibited remarkable antioxidant activities, with the highest antioxidant capacity detected in the ethanolic extracts rather than in the aqueous ones for all tested plants. The in vitro anti-proliferative activity showed a dose-dependent inhibitory effect on MCF7 cell growth, particularly with *A. roseum* (leaves) ethanolic extracts (0.45 and 3.9 mg/mL). Overall, this study supports the potential development of functional food and chemotherapeutic agents from the studied Tunisian plants.

Key words: Spontaneous plants, edible, Antioxidant, Anticancer, MCF-7

Phytochemical study and biological activities of safflower(*Carthamus tinctorius* L.) methanolic extracts cultivated under saline stress

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The global focus on bioresources valorization is justified by their critical role as primary sources of food and medicine. In this context, opting to highlight the valorization of often neglected resources, such as the safflower plant (*Carthamus tinctorius* L.), is a wise choice given its inherent advantages. The aim of this research is to conduct a phytochemical investigation and examine the biological activities of methanolic extracts derived from the leaves and petals of the Tunisian safflower variety, named "Jawhara." This cultivation took place under conditions of saline stress in open fields, with irrigation using saline water incorporating various treatments (T1 = 3, T2 = 6, and T3 = 9 g/L NaCl).

The findings indicate that variations in measured parameters are affected by both the saline treatment and the specific organ of the plant. The maceration-based extraction yield in methanol for leaves and petals varies from 8.6% to 11.2%. The extracts show significant richness in total polyphenols, flavonoids, and condensed tannins. Saline treatment notably enhances the synthesis of these compounds in both leaves and petals. Specifically, the leaves exhibit increased levels of total polyphenols (92.27±6.8, 112.95±3.31, and 136.89±1.69 mg EAG g-1RS for treatments T1, T2, and T3) and flavonoids (35.14, 57.46, and 46.97 mg EC g-1RS for the corresponding treatments). Condensed tannin contents range from 10.47 to 15.36 mg EC. g^{-1}RS.

In this study, the exposure to salt stress enhances various tested biological activities, with leaf extracts proving more effective than petal extracts in terms of anti-radical activity against DPPH, ferric ion reduction capacity, and anti-α-amylase activity. The recorded IC_{50} values for T3 are as follows: 11.17 and 35.67 µg/mL (DPPH), 345.67 and 422.67 µg/mL (FRAP), and 0.27 and 0.38 mg/mL (α-amylase) for leaves and petals, respectively.
Conversely, in lipase and tyrosinase tests, petal extracts demonstrate higher activity than leaf extracts, with IC_{50} values ranging from 0.67 to 3.36 mg/mL for lipase inhibition and from 0.4 to 2.1 mg/mL for tyrosinase inhibition.

A strong correlation is evident between the abundance of phenolic compounds and their biological activities. This correlation is notably influenced by both qualitative and quantitative variations in the phenolic compounds present in the studied extracts.

Key words: *Carthamus tinctorius* L., phenolic compounds, DPPH, FRAP, α-amylase, lipase, tyrosinase.

Chemical composition and insecticidal activities of some plants against vectors of avian plasmodium *culiseta longiareolata*

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Mosquito-borne diseases are gaining global severity due to their constant migration and adaptability, allowing them to thrive in diverse climates and conditions (Mayer et *al*., 2017). Synthetic insecticides effectively reduce disease-carrying insects, but their intensive use poses environmental and human health risks (Ahmed and Othman 2020). This is why "green chemistry", based on the use of environmentally-friendly natural products, has been claimed as a useful area of research for the development of new and effective green pesticides and repellents (Benelli et *al*., 2018). This study evaluates the efficacy of essential oils extracted from some medicinal plants in the Tebessa region against *C. longiareolata* mosquito larvae. by determining the chemical composition by (CPG-SM), the lethality parameters (LC50, LC90). In addition, measure of some important biomarkers (GST, GSH) and AChE. Results show potent larvicidal activity, decreasing AChE and GSH levels and increasing GST, making these oils potential alternatives for mosquito control. . It can be concluded that the essential oils with their major compounds was found to exhibit potent larvicidal activity making them potential alternatives for controlling mosquito populations.

Key words: *Culiseta longiareolata,* Essential oils, Larvicidal activity, AChE, GST, GSH.

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Synthèse et caractérisation de nouveau composé à base du Facteur G3

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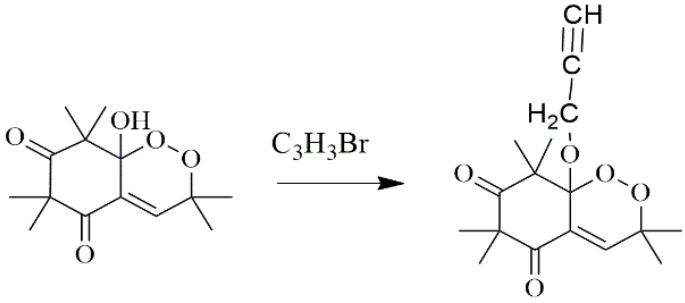
Le paludisme est une maladie à transmission vectorielle que l'on trouve généralement en Afrique subsaharienne, en Asie et en Amérique latine[1]. Compte tenu de la résistance croissante aux médicaments, il est urgent de mettre au point de nouveaux traitements antipaludiques adaptés et abordables. L'examen de la littérature nous a permis de constater le rôle très important de la fonction peroxycétale dans l'évolution de l'activité antipaludique. La présente étude a pour but de synthétiser et de caractériser de nouveaux dérivés basés sur le facteur G3 (hétérocyclique). En effet, nous étudions plus particulièrement une nouvelle molécule **1-oxypropargyle-4,4,8,8,10,10-hexamethyl-2,3-dioxa-bicyclo[4,4,0]dec-5-ene-7,9-dione**, synthétisée par l'introduction d'un groupe alkyle (bromure de propargyle) sur la structure du Facteur G3 dans le DMF en présence de K_2CO_3 .



La structure du ce nouveau composé a été confirmée par la technique spectroscopie IR, RMN (^1H, ^{13}C) et spectrométrie de masse. Cette approche multiforme vise à contribuer à la lutte mondiale contre le paludisme en créant des agents antipaludiques innovants.

Mots clés: Malaria, Endoperoxydes, Facteur G3.

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The effects of feeding Kefir on growth, immunity and disease resistance in clam *Ruditapes decussatus*

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The aim of this study was to investigate the effect of dietary kefir supplementation on growth, immune response and resistance to *Vibrio alginolyticus* infection in clam (*Ruditapes decussatus*). Clams were divided into two groups, a control group and a treated group. The control group was fed with basal diet alone. The treated group was fed with basal diet enriched with 10% dried kefir. After 21 days feeding period, the clams were exposed to *Vibrio alginolyticus* (5×10^5 CFU mL^{-1}) for 30 min. Seven days post-infection, both clam groups exhibited 100% survival. Results revealed a slight increase in weight and condition index in clams fed a kefir-enriched diet for 21 days compared to control clams. For immune parameters, our results showed an increase in phenoloxidase, and alkaline phosphatase activities while a decrease in lectin activity in the treated group compared to the control group. In conclusion, the results of the present study suggest that kefir supplementation enhances the immune response of infected clams. This knowledge contributes to our understanding of the potential benefits of kefir in aquaculture, specifically in bolstering the immune defenses of clams against *Vibrio alginolyticus* infection.

Key words: Kefir, *Ruditapes decussatus*, *Vibrio alginolyticus*, Immune response.

Lichen Dyes: Harnessing Nature's Palette for Sustainable Coloration and Therapeutic Potential

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Abstract

Natural colors with biological qualities derived from lichens have shown enormous potential. In this study, eight abundant lichen species:*Lobariapulmonaria, Flavoparmeliacaperata, Evernia prunastri, Parmotrema hypoleucinum, Parmotrema perlatum, Ramalina farinacea, Roccella phycopsis,* and *Xanthoria parietina*were collected and taxonomically identified. Their dyeing ability on wool and toile fiberswas evaluated using two extraction techniques: boiling water extraction and 10% ammonia fermentation. In addition, three mordants were used: iron sulfate, copper sulfate, and alum. The results showed that lichens are an important source of natural dyes, capable of producing a wide range of colors from purple to brown. The major compounds that contributed to the dyeing process, such as parietin, atranorin, methyl orsellinate, and (+)-iso-usnic acid, were separated using chromatographic techniques. Moreover, significant anti-inflammatory effects were observed through the evaluation the anti-inflammatory activity of these compounds. The Griess test, measuring the amount of NO generated by RAW 264.7 murine macrophages activated by lipopolysaccharide (LPS), was used to assess their efficacy. Atranorin and (+)-iso-usnic acid exhibited anti-inflammatory activities of 75.99% and 57.27%, respectively, at a concentration 25 µg/mL. The anti-inflammatory activity of methyl orsellinate and the organic extracts of three lichens ranges from 29.16% at 25µg/mL to 86.91% at 100µg/mL. Parietin showed modest anti-inflammatory action, reaching 29.4% at 100µg/mL. Notably, at a concentration of 25 µg/mL, no discernible detrimental effect on cell viabilitywas observed. Lichens represent an important natural resource for producing eco-friendly dyes with potential therapeutic applications.

Keywords: Lichen, natural dyes, Tunisia, dyeing properties, chromatographic techniques, NMR, secondary metabolites, anti-inflammatory activity, cytotoxicity.

Dissolution of lithiasis urinary by polysaccharides of *cucurbita moschata* fruits

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ABSTRACT

Cucurbita moschata (C. moschata) is one of the vegetables used in traditional medicine in many countries such as Algeria, Tunisia and Morocco because of the nutritional and health benefits of the compounds biologically active obtained from its seeds and fruits. The objective of this study is to evaluate in vitro the activity antilithiasic of the polysaccharides extracted from of the fruits of C. moschata, by the gravimetric technique. The dosage of total polysaccharides was determined by spectrophotometry, according to the colorimetric method using the reagent described by Fatemeh Boshagh[1]. We evaluated the effectiveness of polysaccharides in vitro for the dissolution of calcium oxalate (COD) using the gravimetric technique illustrated by Bensatal [2]. The results of the study demonstrated an activity equal to 41,66% against the formation of the precipitate of Calcium oxalate compared to the reference solution (sodium citrate: 55.55%). The values obtained clearly show that the variation in weight and the values of the inhibition percentage decrease as the inhibitor concentration increases. In conclusion, the fruits of *Cucurbita moschata* can be used as a natural source of antilithiasis.

Key words *Cucurbita moschata*, polysaccharides, antilithiasis

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A Switch-On fluorescent sensor for detection of metal based on the cleavage of carbon-nitrogen double bond of new Schiff base

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A new Schiff base sensor containing carbazole moiety CrAp was synthesized by the condensation of 9-hexyl-2,7-bisformylcarbazole with 2-aminophenol. The structure was confirmed by ^{1}H NMR and FT-IR spectroscopies. The sensing action was studied by UV-visible absorption and emission spectroscopies in presence of different metals in THF-H_2O medium. For this, 20 equivalents of different metals ions were added separately to the solution of the ligand CarAp. A short time after adding cations, the color of the solution containing Al^{3+} changed from yellow to colorless and no such change was observed with other metal ions. Furthermore, the solution CarAp-Al^{3+} showed intensive emission under UV-irradiation at 365 nm while Carp is not luminescent. These results confirmed the colorimetric sensing behavior of sensor towards Al^{3+} ions. In another hand, with the excitation at 325 nm, the emission intensity of the probe increases massively in the presence of 1 equivalent of Al^{3+} and a turn on fluorescence phenomenon was observed[1]. No other metal has any significant effect on the enhancement of the emission intensity of the probe in the detection process for either of the metal ions. The limit of detection was determined with Al^{3+} titration of 1.22 µM through photoluminescence and 2.02 µM through UV-visible absorption.
The binding mechanism was determined by ^{1}H NMR titration, UV-Visible absorption and photoluminescence.

Key words: Schiff base sensor, colorimetric behavior, carbazole, turn-on fluorescence

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Spectroscopic, X-ray Structure and Catalytic Degradation of Methyl Orange Dye Investigation of the *Meso*-tetrakis(*p*-tolyl) Diprotonated Porphyrin

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Abstract

With the aim to fully characterize the diprotonated porphyrin: *meso*-tetrakis(*p*-tolyl) porphyrindi-ium dichloride chloroform trisolvate with the formula $[H_4TTP]Cl_2{\cdot}3CHCl_3$ (**2**) this porphyrinic diacid species was first prepared by protonation of the *meso*-tetrakis(*p*-tolyl) porphyrin (H_2TTP, (**1**)). Compound **2** was studied by UV/Vis, fluorescence, IR, ^1H NMR spectroscopy as well as by MALDI-TOF mass spectroscopy. The single crystal X-ray structure of **2** was a very useful technique to show the very important deformation of the porphyrin core of the diprotonated $[H_4TTP]^{2+}$ porphyrinic species (**2**) which is considered the principal cause of the important redshift of the UV/Vis and fluorescence spectra of compound **2**. We used computational studies at B3LYP/6-311+G(d,p) level of theory to investigate the HOMO and LUMO molecular orbitals characteristics and calculate the global reactive parameters of compound **2** such as the electrophilicity index ψ, the chemical potential (μ), the hardness (η) and the chemical softness (S). The diacid porphyrin species (**2**) was tested as adsorbent of the Methyl Orange dye (MO) and also as catalyst of the degradation of this organic dye in presence of hydrogen peroxide.

Photophysical and electronic properties of a new luminescent synthesized organic material based on carbazole and thiophene rings for a new generation of OLEDs devices: Experimental investigation and DFT modeling

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A new organic small molecule based on carbazole and thiophene rings denoted Cbz(-π -Th)$_2$ was chemically synthesized. Photophysical properties of the synthesized material were investigated through infrared absorption spectroscopy, steady-state optical absorption and photoluminescence spectroscopies. Meanwhile, experimental analyses were completed with theoretical investigations based on density functional theory (DFT) allowing the determination of the structural and electronic properties of the synthesized Cbz(-π -Th)$_2$ molecule. Experimental and theoretical analyses show that the investigated material presents interesting photophysical and electronic properties permitting the exploitation for a new generation of an organic light-emitting diode. In the second step, the chemical structure of the synthesized material was used as a photoactive layer in a multilayer structure forming a new generation of an organic light-emitting diode. DFT calculations show that the use of carbon based-molecule such as Graphene monolayers, carbon-nanotube (SWNTs) (5,5) or Buckbully molecule, permits to reduce the energy of the electron injection barrier denoted (ΔE_e) from the used cathode to the Cbz(-π -Th)$_2$ active layer, which enhance the performance of the designed organic devices.

Keywords: carbazole, thiophene, small molecule, Photophysical properties, density functional theory (DFT), Organic light emitting diode (OLEDs).

Physical characterization and analysis of biofilms coated with essential oils.

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In the long history of medicine, food preservation, and fragrance, essential oils (EO) have held a prominent position. Recently, scientific interest in these natural substances has surged due to their potential as insect, bacteria, and fungi repellents. However, a major drawback of EOs is their chemical instability. Exposure to oxygen, light, and humidity can lead to oxidative degradation and loss of their volatile, beneficial compounds.
Biodegradable films are attracting growing interest in the food and pharmaceutical industries. We have prepared biofilms based on sodium alginate infused with essential oils, and analyzed their mechanical, dielectric, optical, wettability and morphological properties. We have highlighted the influence of factors such as immersion in $CaCl_2$, addition of glycerol (G) and essential oils.
The biofilms exhibit hydrophilic or hydrophobic behavior, and the surface energy of the films varies according to the composition of the essential oils.
UV-Visible spectroscopic analysis enabled us to observe the transmittance (T), reflectance (R) and absorption coefficient of our biofilms. We estimate the refractive index (n=1.17) and energy gap (Eg) of our films to be of the order of 5.52 eV, with a slight increase when our samples are immersed in $CaCl_2$. We highlight the influence of essential oils on transmittance.
Dielectric measurements with an impedance analyzer indicate that, for all samples, the real and imaginary parts of the dielectric constant ε', ε'' decrease rapidly at low frequencies and stabilize at high frequencies. This phenomenon is attributed to the relaxation of charges and dipoles present in the films. At low frequencies, charges and dipoles reorient in response to the electric field, leading to an increase in permittivity. At high frequencies, permittivity decreases as the reorientation of charges and dipoles is impeded.
Films with very low conductivity values exhibit behavior consistent with that of perfect insulators. The tan δ (loss tangent) values between 100 Hz and 1 MHz suggest relatively low energy dissipation in our films. The effect of the addition of essential oils on physicochemical properties is quite complex. We used FTIR spectroscopy and X-ray diffraction (XRD) to assess the chemical modifications of sodium alginate coated with essential oils.
Specific interactions between film components and essential oils, such as cross-linking and structural rearrangements, were observed. For example, the absence of peaks characteristic of native species in the FTIR-ATR spectra of Sodium Alginate (AS) and AS_G + EO Rosemary films reveals the absence of chemical reaction between our products. X-ray diffraction confirmed these observations, revealing the appearance of semi-crystalline zones in the amorphous AS, which become more prominent in the rest of the composite films.

Keywords: Alginate film, essential oil, Optical properties, wettability, dielectric properties, UV-Visible spectroscopy, FTIR-ATR, DRX.

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Isoindigo-Containing Conjugated Polymers: Design, Synthesis, Photo-physical properties and photovoltaic applications.

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Abstract:

In the current work, we report the synthesis of novel low-band gap isoindigo-based polymer, denoted as P1, which was derived from electron-accepting isoindigo units and electron-donating group [4-dihydroxyboroniyl] phenyl boronic acid, based on sonogashira coupling reactions. As part of our analysis, both monomer and polymer were characterized by 1H-NMR, cyclic voltammetry (CV), UV-VIS absorption and photoluminescence spectroscopy. The structural and photo-physical properties were evaluated through a DFT and TD-DFT theoretical calculations. We obtain relevant data including electron affinity, ionization potential, HOMO, LUMO and band gap energies. This synthetic polymer is characterized by strong electron-withdrawing, wide absorption spectrum and strong intramolecular charge transfer. P1 possess a small band gap of 2.01 eV. Additionally, our investigation shows that this polymer with carboheptahelicene derivative can be combined with the fullerene derivative of butyric acid methyl ester (PC71BM) to form an electron-donating material for polymer solar cell.

Keywords: π-conjugated polymer, Isoindigo derivative, Organic solar cells, TD-DFT, Optoelectronic properties, photovoltaic applications.

Biodegradation Performance of an Innovative Silane-Chitosan-Graphene Oxide Composite Coating on Magnesium Alloys for Implant Applications

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Abstract

Biodegradable magnesium alloy medical implants have attracted considerable interest because of to their remarkable biocompatibility and mechanical properties. However, the rapid corrosion rate of magnesium alloys in physiological environments presents a major challenge to their practical application. For this reason, this study attempted to design a Silane / chitosan / graphene oxide composite coating that would enhance the corrosion and biodegradation of magnesium alloys used in temporary implants. The composite fabrication process adopted a cost-effective spin-coating technique that would provide a uniform coating of magnesium alloy substrates. Fourier transform infrared spectroscopy (ATR-FTIR), Raman spectroscopy, scanning electron microscopy (SEM) and energy dispersion spectroscopy (EDS) results showed a dense and compact Silane / chitosan / graphene oxide coating on the magnesium coated alloy surface. Finally, the corrosion of the composite coating was assessed in simulated body fluid (SBF) in vitro at37°C. Hydrogen evolution results revealed that graphene oxide seemed to delay the diffusion of corrosive ions into the Mg matrix, while Silane prevented the coupling of graphene oxide sheets to the metal surface. Consequently, a Silane / chitosan / graphene oxide composite would constitute a very useful material for coating magnesium implant devices. It would contribute to reduce the corrosion of the substrate and to alleviate the cost and discomfort of implants.

Keywords: AZ31magnesium alloy, Silane / chitosan / graphene oxide composite, spin coating, corrosion resistance, biodegradation.

Hybrid vanadate: X-Ray Crystal Structure, Spectral Characterisation, DFT Studies, and Molecular Docking

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Hybrid materials have been the topic of several work for the objective of generating compounds with desirable properties and functionalities. This mixture between two type of materials present, not just, a combining of certain properties of both inorganic and organic molecules but, further, lead to proprieties completely news, and opens up a vast field of investigation for the chemist. The applications of these hybrid materials cover diverse fields such as mechanical resistance properties [1], frequency doubling [2] hence their applications in the field of the electronic, optics, electrical conductivity, photochemistry [3], biology [4], pharmacy [5], medicine [6], and photo catalysis [7].

Organic-inorganic hybrid compounds based on vanadate, $(C_2H_{10}N_2)(VO_3)_2$, have been successfully synthesized and structurally characterized using single-crystal X-ray diffraction methods and UV-Visible absorption. The Compound adopt a monoclinic system, belonging to space group $P2_1/c$, with unit cell parameters a = 5.5455 (3) Å, b = 12.7741 (6) Å, c = 5.7116 (3) Å, α = 90°, β = 97.754 (4) °, γ = 90°, V = 400.90 (4) $Å^3$, and Z = 4.

The refinement of the crystal structures resulted in a residual factor R = 0.030 for 1003 independent observed reflections [I > 2σ()] and 75 parameters, Additionally, this study includes theoretical characterization through molecular docking, and DFT calculations. Structural and spectroscopic properties using experimental methods, single crystal X-ray diffraction, spectroscopic measurements were recorded and compared with the DFT calculations in order to carry out correlation between crystal structure and physical properties. Therefore, we determined only the biological activity of $(C_2H_{10}N_2)(VO_3)_2$, considering the biological importance of 'ethylene diamine' present with the target protein, using molecular docking analysis.

Key words: hybrid vanadate, X-ray diffraction**,** DFT studies, Molecular Docking Study.

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Hybrid supercapacitors based on X-site Ba(II) ions substituted by Sr (II) in Langbeinite-type phosphates

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ABSTRACT :

The compounds $KBa_{1-x}Sr_xCr_2(PO_4)_3$ (with x = 0.00; 0.25; 0.50; 0.75; 1.00) were synthesized by a solid-state reaction, and they were thoroughly characterized by different spectroscopic and microscopic techniques. Their structures were indexed in a cubic system with a $P2_13$ space group forming a 3D framework built on CrO_6 octahedra and PO_4 tetrahedra sharing vertices leading to identical $Cr_2P_3O_{18}$ (U) units. The interconnection between the tetrahedral and octahedral groups leads to the formation of two large closed cavities (K, M^{II})(1) and (K, M^{II})(2), statistically occupied by K^+ and M^{2+} (M = Ba, Sr) atoms. Electron paramagnetic resonance spectroscopy confirmed the presence of paramagnetic Cr^{3+} ions, showing the effects of substituting the Ba^{2+} ions with smaller Sr^{2+} ions on the dipolar coupling between the Cr^{3+} centers. The obtained materials and active carbon were used as electrode materials in hybrid SC devices. At the same time, their electrochemical properties were assessed by potentiostatic electrochemical impedance spectroscopy, cyclic voltammetry, and galvanostatic charge-discharge measurements, showing promising results with a maximal specific capacity (3.86 F/g), energy density (343 mWh/kg), and power density (30.9 kW/kg) in the case of $KBa_{0.5}Sr_{0.5}Cr_2(PO_4)_3$, proving them as good candidates for positive and/or negative electrode materials for energy storage applications.

Keywords : Phosphates, Langbeinite, XRD, EPR, supercapacitors.

Synthesis, Physical Chemical Properties and Anti-Fungal Activities of New *Meso*-Arylporphyrins

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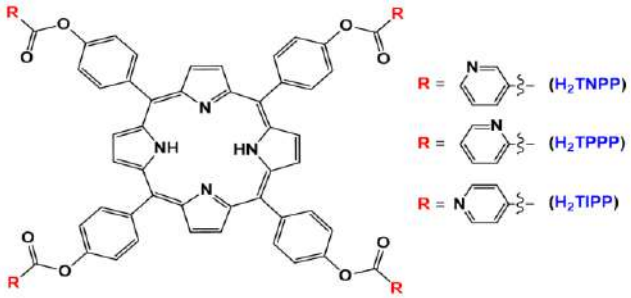
The threat of invasive fungal infections is continually increasing, leading to high morbidity and mortality. This finding prompts researchers to find new drug candidates to fight human pathogenic fungi [1]. Due to their wide chemical and biological applications [2,3], porphyrins and related tetrapyrrolic macrocyclic pigments are important heterocyclic compounds [4,5]. In this work, we describe the synthesis of three new *meso*-arylporphyrins, named *meso*-tetrakis [4-(nicotinoyloxy)phenyl] porphyrin (**H_2TNPP**), *meso*-tetrakis[4-(picolinoyloxy)phenyl] porphyrin (**H_2TPPP**), and *meso*-tetrakis [4-(isonicotinoyloxy) phenyl] porphyrin (**H_2TIPP**). The synthesized **H_2TNPP**, **H_2TPPP** and **H_2TIPP** are characterized by spectroscopic analysis (FTIR and NMR) and mass spectrometry. The photophysical studies of these new porphyrin derivatives (UV-visible absorption, fluorescence emission and singlet oxygen ($^1O_2$) luminescence emission) demonstrated their potential uses as photosensitizers (PSs) in photodynamic therapy (PDT) applications. *In vitro* investigation of anti-fungal activity against *Candida* species (*C. albicans*, *C. glabrata* and *C. tropicalis*) showed that minimum inhibitory concentration (MIC) values of **H_2TNPP**, **H_2TPPP** and **H_2TIPP** ranged from 2.5 to 7.5 µg/mL. The *in vitro* anti-fungal susceptibilities against three clinical isolates of dermatophytes (*Trichophyton rubrum*, *Trichophyton mentagrophytes* and *Microsporum Canis*) are also evaluated and demonstrated good anti-fungal activities of **H_2TNPP**, **H_2TPPP** and **H_2TIPP**.

Key words: *Meso-arylporphyrins; Photophysical properties; Anti-fungal activities.*



Chemical structures of the three new *meso*-arylporphyrins **H_2TNPP**, **H_2TPPP** and **H_2TIPP**.

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Preparation, Characterization, and In vitro cytotoxicity evaluation of a novel material $(C_7H_{10}N)_4[Se_2Mo_5O_{21}]\cdot 4H_2O$

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Abstract:

A newly developed material, composed of Strandberg cluster selenomolybdate and benzylammonium groups $(C_7H_{10}N)_4[Se_2Mo_5O_{21}]\cdot 4H_2O$,has been prepared by conventional solution process. Its structural characteristics were determined by single-crystal X-ray diffraction, confirming its crystallization in the triclinic space group P-1 with four asymmetric units per cell (Z = 4). Various physicochemical analyses such scanning electron microscopy, FT-IR spectroscopy, UV-vis analyses, thermogravimetric and electrochemical analyses were also employed to further determine its specific properties.

An intriguing cytotoxicity assay was performed on the material against A2780 ovarian cancer cells. The findings reveal that the compound effectively inhibits both the proliferation and migration of these cells within a specific concentration range, indicating its potential can be used as a therapeutic agent against ovarian cancer.

Molecularly Imprinted Polymer-ZIF-7 Sensor for Urea Monitoring in Human Serum Samples

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Abstract

A molecularly imprinted polymer (MIP) of Urea (Ur) followed by ZIF-7 layer was investigated by using the electropolymerization of pyrrole (Py) on platinum electrode (PtE). The preparation of ZIF-7/MIP matrix and quantitative measurements were performed by cyclic voltammetry (CV) and differential pulse voltammetry (DPV), respectively. Various physiochemical parameters monitoring the analytical performances of the developed MIP structure such as Py and Ur concentration in prepolymerization mixture, number of cyclic voltammetric scans, pH of electrolyte solution and accumulation time. The calibration curve demonstrated linearity over urea concentration range from 1×10^{-11} M to 1×10^{-5} M with a correlation coefficient of 0.99. The detection limit of urea was about 7×10^{-12} M. The minimum and maximum recovery (%) through the spiking 0.1–0.4 mM urea to human blood serum matrices were determined between 95.9% and 123%, respectively.

Keywords: Molecularly Imprinted Polymer; Urea sensor; CV and DPV measurements.

Optimization of the Synthesis of New β-ketoimine Complexes of Co (II) by Experimental Design and ANN

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This work aims to optimize the synthesis of new cobalt (II) complexes with chelated β-ketoenamine ligands and their applicability in catalysis. ^{13}C, ^{1}H, infrared, and UV-visible spectroscopy were used to characterize the complexes. Response surface methodology and artificial neural networks (ANNs) modeled the effect of synthesis parameters of these inorganic materials. The influence of each factor was determined using a Plackett-Burman design. Central Composite Design and ANNs were used for the remaining optimization processes. The results show that the ANN model has a greater ability to predict the performance of the β-ketoimine Co(II) complexes. This interdisciplinary approach advances the field of catalysis and provides a systematic framework for optimizing complex synthesis processes.

Enhancing MOF Conductivity with ZIF-7@PANI Composite for heavy metals ions electrochemical determination: An ANN-Optimized Approach

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Abstract

Metal-Organic Frameworks (MOFs), renowned for their expansive specific surface area and remarkable porosity, hold significant promise for sensing and identification applications [1]. Nonetheless, the limited conductivity of MOFs has hindered their practical utility. Addressing this challenge involves integrating MOFs with conductive materials such as carbon and polymers [2]. This study introduces a pioneering composite material, ZIF-7@PANI, wherein a zeolitic imidazolate framework (ZIF), specifically ZIF-7, is amalgamated with the conductive polymer polyaniline (PANI). The synthesis entails the deposition of PANI onto the MOF surface, thereby enhancing conductivity. ZIF-7 comprises zinc nitrate hexahydrate units and imidazole linkers. The synthesis validity was confirmed through X-ray diffraction, scanning electron microscopy, and Fourier transform infrared spectroscopy. Subsequently, the material was applied onto a glassy carbon electrode (GCE) via drop-casting for heavy metal ion detection. Optimization of experimental parameters including pH, incubation time, deposition quantity, and drying time was achieved using Box-Behnken design and artificial neural networks (ANN). The ANN produced high square correlation coefficients (R^2) of 0.84 for Cd^{2+} ions and 0.99 for Pb^{2+} ions. The ZIF-7@PANI/GCE sensor exhibited a broad concentration range for both ions with low detection limits (2.96 nM for Pb^{2+} and 10.6 nM for Cd^{2+}, S/N = 3). This sensor, when applied to real water samples, yielded a recovery rate between 85% and 110% for cadmium and lead ion detection.

Keywords: electrochemical determination, Metal-Organic Frameworks (MOFs), ZIF-7@PANI, artificial neural networks (ANN), heavy metals

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Nd^{3+}-doped $Sr_6Y(PO_4)_5$ novel Whitlockite-type phosphor for optical temperature sensing applications: Synthesis and luminescence properties

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Abstract

Active research in science and technology is boosting the development of materials that emit infrared light, with the aim of improving optical thermometric sensors. In this paper we report the synthesis of a new NIR-emitting phosphate phosphor, $Sr_6Y(PO_4)_5$:Nd^{3+} (SYP: Nd^{3+}), at differing concentrations of Nd^{3+} using a conventional solid-state reaction route. X-ray diffraction analysis showed that the prepared phosphors exhibit a singular phase with a monoclinic whitlockite structure (space group *I2/a*). SEM images show micrometer-sized particle. FTIR and Raman spectroscopies confirm the presence of PO_4^{3-} groups in the examined phosphates. Luminescence features, comprising emission spectra, concentration quenching, and fluorescence lifetime, were investigated for the prepared SYP:Nd^{3+} samples at various Nd^{3+} doping concentrations. Excited at 808 nm, the phosphors emitted near-infrared light with four distinct bands corresponding to specific Nd^{3+} transitions from $^4F_{3/2}$ to ($^4I_{9/2,}$ $^4I_{11/2}$ and $^4I_{13/2}$) and $^4F_{5/2}$ to $^4I_{11/2}$, falling within the first and second biological windows (NIR-I and NIR-II). Importantly, Nd^{3+} emission characteristics are affected by concentration and temperature. The powders' effectiveness as optical temperature sensors using fluorescence intensity ratio (FIR) between coupled and non-coupled levels was researched across 303–473 K, resulting in two distinctive FIR-based temperature sensor strategies employing emissions at 874.8 nm ($^4F^{3/2}\rightarrow{}^4I_{9/2}$) and 956 nm ($^4F_{5/2}\rightarrow{}^4I_{11/2}$) transitions, all within the first biological window for excitation and emission. Using this method, SYP:Nd^{3+} exhibited a notably elevated sensitivity of approximately 1.16 % K^{-1} at 303 K, surpassing other Nd^{3+}-doped materials when stimulated within the infrared range. These results strongly suggest the prospective applicability of the analyzed material in monitoring the temperature of biological systems.

Development and characterization of nickel iron and chromium-based phosphates as anode materials for sodium-ion batteries

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The α-$CrPO_4$-type structure of $Na_2Ni_2Cr(PO_4)_3$[1] material is a research topic of great interest due to its obvious strength in terms of structural stability, thermal safety and remarkable 3D open framework that ensures fast alkali-metal ion mobility.
In this work, the electrochemical performance of $Na_2Ni_2Cr(PO_4)_3$ as anode in Na-ion batteries NIBs will be improved by substituting chromium with iron. The new materials $Na_2Ni_2Cr_{1-x}Fe_x(PO_4)_3$ (x=0 ; 0.5 and 1) were synthesized via modified Pechni method using the polymerized complex[2]. Their crystal structures were refimed using the Rietveld method from X-ray powder diffraction data. They crystallise in the orthorhombic system with the space group Imma. The particle morphology, chemical compositions and microstructural characterization of the materials were carried out using scanning electron microscopy (SEM), an energy dispersive X-ray spectrometer (EDS) and X-ray diffraction (XRD). The electrochemical properties were investigated using galvanoststic tests. These good materials also showed good sodium reversibility during discharge-charging in the first cycle.

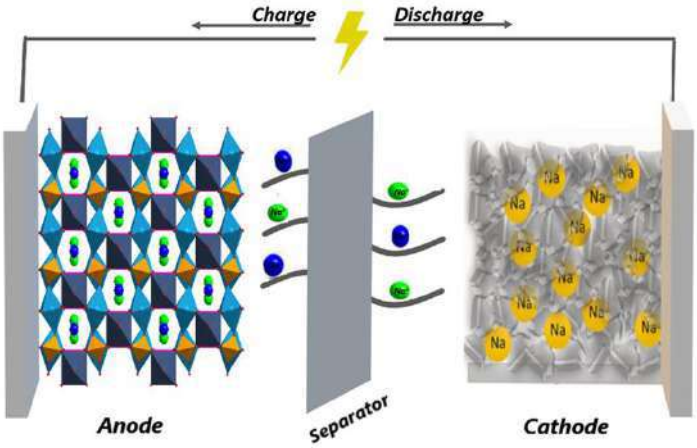

Figure 1. α-$CrPO_4$-type framework for $Na_2Ni_2Cr_{1-x}Fe_x(PO_4)_3$ (x=0 ; 0.5 and 1) materials used as anodes for Na-ion batteries.

Key words: Batteries Na-ion, Phosphates, α-$CrPO_4$, Anode, Iron, Chromium

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Improved electrochemical sensor using functionalized silica nanoparticles (SiO_2-APTES) for high selectivity detection of lead ions.

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Abstract

Nanomaterials modified with (3-aminopropyl) triethoxysilane (APTES) have performed well in the electrochemical detection of heavy metal ions, notably Pb^{2+} and Cd^{2+}. In addition, previous studies have shown that APTES exhibits a higher efficiency for this ion compared to other modifying agents such as 1, 8-Diaminoaphalene and (3-Mercaptopropyl) triethoxysilane. This behavior can be attributed to the electron-rich amino groups within APTES, which likely facilitate coordination with metal ions, thereby enhancing the efficient accumulation of these ions. Based on these two concepts, APTES-functionalized porous SiO_2 materials have the potential to enhance the adsorption capabilities and the electrochemical detection of heavy metal ions, such as Pb^{2+}. Herein we report the synthesis and functionalization of mesoporous (3-aminopropyl) triethoxysilane (APTES)-modified silica particles (SiO_2-APTES), and their electrochemical and sensing properties for lead (Pb^{2+}) detection. SiO_2-APTES particles were subjected to characterization using Xray diffraction, electron microscopy and infrared spectrum analyses. The sensors' performance was evaluated by cyclic voltammetry and differential pulse voltammetry. Furthermore, the impact of experimental variables, such as incubation time, pH of the buffered solution, and quantity of SiO_2-APTES deposited on the electrode was investigated to determine the optimal operating conditions. Ultimately, to showcase its reliability for the intended application, the proposed particles were effectively tested with tap water and seawater samples demonstrating the sensor applicability in complex matrices and its potential for environmental

Keywords: Nanoparticles of Silica (SiO_2) ; (3-aminopropyl) triethoxysilane (APTES) ; Lead(II) ; SiO_2-APTES ; Electrochemical sensor.

Optical Characterization and Defect-Induced Behavior in $ZnAl_{1.999}Ho_{0.001}O_4$ Spinel: Unraveling Novel Insights into Structure, Morphology, and Spectroscopic Features

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Abstract

The $ZnAl_{1.999}Ho_{0.001}O_4$ phosphor, synthesized by the solid-state method, crystallizes in the cubic spinel structure. Morphology and chemical composition homogeneity were determined via SEM and Energy Dispersive X-ray analysis. The optical band gap (E_g) was calculated from the UV/vis absorption spectrum, confirming direct transition behavior according to Tauc's law. The Urbach energy (Eu) in the $ZnAl_{1.999}Ho_{0.001}O_4$ spinel was higher than that in the $ZnAl_2O_4$ spinel, indicating increased disorder and a higher concentration of defects due to Ho^{3+} ions. The penetration depth ($\delta(\lambda)$), optical extinction ($k(\lambda)$), and refractive index ($n(\lambda)$) were assessed across wavelengths (λ). The room temperature absorption spectrum revealed several peaks corresponding to the 4f-4f transitions of Ho^{3+} ions.

Keywords: $ZnAl_{1.999}Ho_{0.001}O_4$ spinel; Raman; FTIR; UV/Vis spectroscopy; Optical band-gap; Lanthanide.

Synthesis, crystal structure, and Luminescence Properties of a 0D Organic-Inorganic Cadmium iodide.

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ABSTRACT

This abstract highlights the syntheses of a low dimensional hybrid organic-inorganic materials based on cadmium and their luminescence proprieties. These materials were prepared by combining iodo or chlorocadmate with N-(2-chlorothyl)-N,Ndimethylammonium chloride cations to create unique properties. $[(CH_3)_2NH(CH_2)_2Cl]_2CdI_4$ (**I**), has been synthesized in aqueous solution by slow evaporation method and characterized by IR, Raman, UV-Vis spectroscopy, powder and single crystal X-Ray diffraction. Also the luminescent properties of obtained compounds are reported and discussed.The asymmetric unit of (I) is composed of one tetraiodocadmate $[CdI_4]^{2-}$, two cations. The crystal packing is governed by the formation of various non-covalent intermolecular forces between inorganic anions, organic cations to ensure the crystal cohesion and form a 3D supramolecular network. The Hirshfeld surface analysis and two-dimensional fingerprint plots indicate that the most important contributions to in the crystal packing for both compounds are from O···H/H···O and H···H bonds.

Keywords: 0D organic metal halides; X-ray diffraction; Hirshfeld surface analysis; Thermal analysis; Optical absorption; Photoluminescence properties;

Cellulose nanocrystal's (CNC) dispersion in PP/CNC nanocomposites

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Sustainable development is becoming a government priority because of fossil reserves depletion. Natural fiber-reinforced composites have a particular attention since they present a positive environmental impact and cellulose is the most abundant bio-renewable material and their unique structure generates nanoparticles as cellulose nanocrystals (CNC) **[1,2]**.
Due to their reduced size, nanomaterials exhibit markedly improved properties when compared to traditional composites **[3]**. CNC presents exceptional characteristics as: a high modulus and strength comparable or better than conventional materials but has a strong tendency for agglomeration. Also, CNC's hydrophilic characteristic leads to a chemical incompatibility with hydrophobic polymer matrices **[4]**.
Solution-casting is one of the most suitable methods to obtain nanocellulose dispersion and enhancement of such interactions is typically addressed by fibers surface modification and coupling agent. However, during nanocomposites industrial processing, the possible way to obtain CNC reinforced nanocomposites is a melting compounding technique **[5,6]**.
The aim of this work is to explore CNCs extraction efficiently from El Diss plant, thus providing potential candidates for cost-effective CNCs production. CNC_D were incorporated into a polypropylene (PP) matrix. To ensure CNC_D optimal dispersion, solvent casting method benefits is investigated on a masterbatch PP/CNC preparation compatibilized by a PP-g-MAH coupling agent. Afterward, the obtained masterbatch is used on PP/CNC nanocomposites obtained by fusion. PP/CNC/ PP-g-MAH nanocomposite properties were studied.

Key words: Cellulose nanocrystals, nanocomposite, masterbatch, PP-g-MAH.

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A sensitive electrochemical sensor for bisphenol A detection based on magnesium (II) porphyrin

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Abstract

In this work we present a highly sensitive and specific electrochemical sensor utilizing (5,10,15,20-tetraphenylporphyrinato) magnesium (II) (MgTPP) for detecting bisphenol A (BPA). The sensing platform was constructed on an indium tin oxide (ITO) working electrode via MgTPP drop-coating. The efficacy of the sensitive film immobilization was confirmed through various analyses including contact angle (CA), scanning electron microscopy (SEM), electrochemical impedance spectroscopy (EIS), and cyclic voltammetry (CV). The resulting ITO/MgTPP electrode was employed for BPA monitoring using the differential pulse voltammetry (DPV) technique, demonstrating a linear response within the concentration range of 10^{-7} M to 10^{-4} M with a low detection limit (LOD) of approximately 90 nM.

Key words: Electrochemical sensor, Bisphenol A, DPV, ITO

Cu^{2+} and W^{6+} co-doped $Na_{0.5}Bi_{0.5}TiO_3$ solid solution: an effective approach to inhibit oxygen vacancy generation and suppress oxygen ion conduction

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Thanks to its outstanding features, the $Na_{0.5}Bi_{0.5}TiO_3$ is a promising as a dielectric material for various advanced electronic devices. However, its high oxygen ionic conductivity and wide band-gap energy pose limitations on its suitability for commercial applications. In this respect, this study aims to investigate the morphological, structural, electric, and optical properties of 0.99NBT-0.01BCW and 0.985NBT-0.015BCW perovskite ceramics. The research also explores the impact of Cu^{2+} and W^{6+} substitution on the perovskite structure and its potential applications. Morphological analysis revealed well-defined grains with cubic shapes, influenced by Cu^{2+} and W^{6+} incorporation. Structural analysis confirmed a rhombohedral lattice with R3c space group. Electric analysis demonstrated a semiconductor behavior with activation energies, suggesting inhibited conduction loss at high temperatures due to BCW doping. Optical analysis revealed direct bandgap energies suitable for applications in optoelectronics and photonics. These findings highlight the potential of these perovskite ceramics in applications such as capacitors, sensors, and optoelectronic devices.

Synthesis and Spectroscopic Characterization of a New 4-Dimethylaminopyridine (DMAP){*meso*-tetrakis(4*α*-o-pivalamidophenyl) porphyrin} Iron (III) complex. Crystal structure of [Fe^{III} (TpivPP)($C_7H_{10}N_2$)$_2$] (SO_3CF_3).

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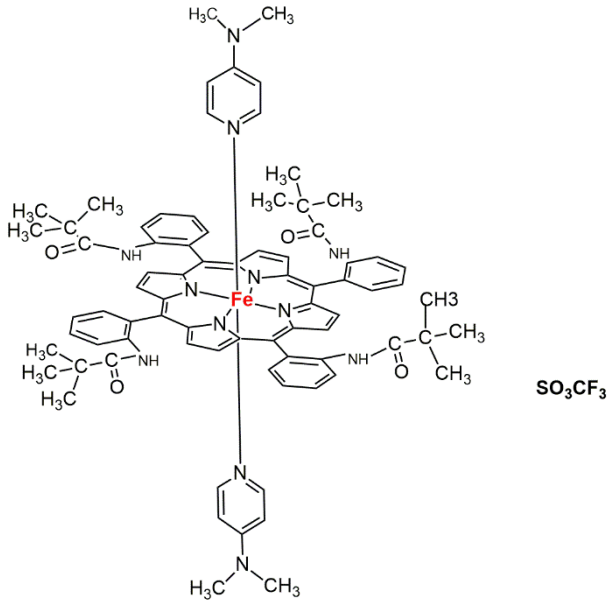
Iron (III) porphyrins are widely used as synthetic substitutes for hemoproteins, due to their structural and electronic similarity to the active sites of many biological macrocycles. Over the decades, porphyrins and metalloporphyrins have been discovered in many fields of application. The main use of iron (III) porphyrin complexes remains catalysis in organic chemistry (epoxidation, oxidation, cyclopropanetrione reactions, formation of pyrrolines, furans, etc.) [1]. In this work, we have focused on the synthesis, crystal structure and spectroscopic characterization of a novel 4-Dimethylaminopyridine (DMAP){meso-tetrakis(4α-o-pivalamidophenyl) porphyrin} Fer (III) complex of formula [Fe^{III} (TpivPP)(DMAP)$_2$] (SO_3CF_3) The compound in question crystallizes in the triclinic crystal system (space group P-1) with cell parameters: a = 12. 3400Å, b =17.9800Å, c = 21.0740, β =98.881(7) °, Z = 2

Keywords: Fer (III) porphyrin complexes; X-ray molecular structure; UV-visible, Cyclic voltammetry, mass spectrometry, NMR



Structure of the [Fe^{III} (TpivPP)($C_7H_{10}N_2$)$_2$] (SO_3CF_3) complex.

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A High-Performance Electrochemical Sensor Based on Ni and Pt Nanoparticles Doped Metal-Organic Framework ZIF-8 for Detection of Dopamine

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Abstract

An ultra-sensitive electrochemical sensor for dopamine quantification is introduced. In this report, nickel (Ni NPs) nanoparticles doping metal organic framework (ZIF-8) composites (Ni-ZIF-8) were prepared by ultrasonic treatment of ZIF-8 and reduction of metal precursor (Ni NPs) in ZIF-8 material. Then, platinum nanoparticles (Pt NPs) were deposited on Ni-ZIF-8. The as prepared Pt-Ni-ZIF-8 composite was deposited on applied as a glassy carbon electrode (GCE) as sensor which presents superior sensing properties for dopamine (DA) detection. Benefting from the synergy of ZIF-8 and nanoparticules of Pt-Ni, Pt-Ni-ZIF-8 displayed the developed sensor is highly sensitive towards dopamine with low detection limit of 1.0 nM.

Use of Crab Shell Chitin in Portland Cement Matrices

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The escalating consumption of crustaceans in human food has led to the accumulation of substantial residues, notably shrimp and crab shells, which are often disposed of in the environment. This study aims to address this issue by exploring the potential of utilizing chitin extracted from crab shells for biotechnological applications in civil construction, particularly in Portland cement matrices. Incorporating crab shell biopolymers into cement can mitigate environmental impacts associated with cement production, including reduced CO2 emissions, and other environmental damages. The research focused on producing chitin from crab shells and integrating it into Portland cement at a proportion of 1 to 3% (w/w). Physical and chemical properties of the resulting material were characterized. The addition of crab shell biopolymers induced changes in consistency and increased axial compressive strength of the cement paste. These alterations are attributed to the hydrophilic nature of chitin, which enhances the density and homogeneity of the cement matrix by providing additional nucleation points. Consequently, the incorporation of biopolymers serves as a multifunctional additive, improving the performance of the cement while simultaneously addressing environmental concerns associated with the disposal of crab shells. This research not only offers a sustainable solution for utilizing a by-product of the food industry but also presents an avenue for economic enhancement.

Key words: Portland cement, cement composition, chitin, biopolymer, compresive strength

Development of an environmentally-friendly water-repellent process for cotton-based textile materials

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Today, increasing efforts are being made to ban and significantly reduce the use of harmful substances in waterproofing treatments for textile materials. The main aim of this study is to replace toxic fluorinated resins, which have harmful medium- and long-term effects on human health and wildlife, with other natural resins. For this purpose, a natural wax was used for finishing cotton fabric using ecological process. This paper is devoted to study the composition of this wax using FTIR and GC-MS. The main coating process parameters (Concentration of wax, drying temperature and polymerization temperature) were studied and optimized by using the Box-Behnken experimental design.

Obtained results confirm the effectiveness of this ecological treatment and show that the treated cotton fabric presents excellent water repellency with a contact angle exceeding 120°. Therefore, this fabric can be used to manufacture textile products, for examples for biomedical fields.

Key words: Natural wax, Contact angle, hydrophobic surfaces, Box-Behnken design.

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Polysaccharides from Moringa Seeds Pomace: Physico-chemical characterizations and biological evaluation

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Abstract

Moringa oleifera Lam. (*M. oleifera Lam*) is a perennial tropical deciduous tree that belongs to the Moringaceae family [1]. Almost all parts of *M. oleifera Lam* can be utilized as a source of edible food and medicinal resources, including the leaves, roots, seeds, flowers, and barks [2]. Polysaccharide was isolated from the pomace of Moringa oleifera Lam. seeds for this investigation. Moreover, the characterization was performed via Fourier transform infrared spectroscopy (FT-IR), size exclusion chromatography (SEC), Nuclear Magnetic Resonance (NMR) and Gas Chromatography-coupled with mass Spectrometry (GC–MS). Results revealed that the polysaccharide was composed of arabinose, rhamnose, xylose, mannose, glucose, and galactose in molar percentages of 46.11%, 16.64%, 19.09%, 7.85%, 5.80% and 4.48% respectively. The isolated biopolymer will be evaluated to assess its antioxidant, cytotoxicity, and gastroprotective capacities in rats, antiradical properties.

Key words: Moringa oleifera Lam, Polysaccharide, Physicochemical characterization, biological evaluation

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Synthesis and characterisation of porous hybrid materials for the adsorption of hexavalent chromium

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Abstract

The purpose of this study was to eliminate Cr(VI) ions from an aqueous solution through the synthesis of PEG-templated ZIF-67 at room temperature using a specific process. ZIF-67 was produced by reacting Co salt with 2-methylimidazole, demonstrating exceptional removal efficacy. The optimization of ZIF-67 adsorption parameters was based on maximal Cr(VI) uptake, aiming to enhance both its structural characteristics and adsorption capacity. The unique features of ZIF-67 nanoparticles were evaluated through various techniques, including thermogravimetric analysis, Fourier-transform infrared spectroscopy, X-ray powder diffraction, transmission electron microscopy, and N_2 adsorption (Brunauer-Emmett-Teller) measurements. These assessments revealed outstanding characteristics such asultramicropores with a size of 0.64 nm, a high surface area of 1891 m^2/g, and a total pore volume of 0.86 cm^3/g.The adsorption process was investigated concerning the effects of adsorption pH, adsorbent mass, starting concentration, and contact time. Findings indicated that at 35 °C, a pH of 5.9, an adsorbent mass of 10 mg, and an initial concentration of 50 mg/L, Cr(VI) exhibited a maximum adsorption capacity of 26.27 mg/g. The equilibrium period ranged from 180 minutes at a low starting concentration of 10 mg/L to 240 minutes at a high initial concentration of 60 mg/L for Cr(VI) adsorption. The Langmuir and Freundlich isotherm models elucidated the equilibrium results, with the Freundlich model performing better at various temperatures. The experimental data were more fitting to a pseudo-second-order model than a pseudo-first-order one. According to adsorption thermodynamics, the process was endothermic and spontaneous.

Keywords: Zeolitic Imidazolate Framework, Specific Surface Area, Adsorption, ZIF-67, Chromium (VI).

Design and synthesis of a novel N-substituted pyrrole derivatives as an anti-diabetic agent: optical and *in Silico* studies

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Diabetes mellitus is a major health problem worldwide with a high incidences and significant social costs. Various drugs have been used to treat diabetes and improve insulin sensitivity[1]. Among several enzymes, α-amylase have been explored as potential antidiabetic agent for the treatment of type 2 diabetes mellitus[2].

In this present work, a novel series of *N*- substituted pyrrole derivatives were designed and synthetized from various aromatic primary amines which then converted into formyl-pyrroles. Several modifications have been established on this formyl-pyrroles to synthesize unsaturated α-β nitriles and 3-pyrrolylpyrimidines. These synthesized pyrrole derivatives were evaluated in terms of their α-amylase inhibitory potential using *in silico* studies. The majority of these compounds exhibited different hydrogen bonds with the active site of the Human pancreatic Alpha-amylase (PDB: 3baj) and showed promising potential for future development as α-amylase inhibitors. In another term, an optical study was carried out by UV-Visible in order to valorize these synthesized compounds as conductive materials and test their ability to complex metals. The results reveal that the unsaturated α-β nitriles have a selectivity towards Cu^{2+} cation.

Key words: Pyrrole derivatives, antidiabetic activity, α-amylase, optical study, complexation.

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Extraction, Characterization, and Packaging Applications of Pectin and Essential Oil Derived from Lemon Peel

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Utilizing food by-products presents an opportunity to harness high-value compounds for the development of innovative and environmentally sustainable food packaging materials [1]. In this study, films were fabricated employing chitosan and pectin incorporating citrus lemon essential oil. Physical properties, Fourier-transform infrared spectroscopy (FTIR), thermal analysis, and scanning electron microscopy (SEM) were conducted to evaluate the suitability of various film formulations for food packaging applications. Pectin was extracted from lemon (Citrus Limon) peel through High-Pressure Processing (HPP). The structural characterization of the polysaccharide was performed using UV, FT-IR, (NMR), (SEC), and (GC-MS) analyses. Steam distillation with a Clevenger-type apparatus was employed to extract essential oil from Citrus Limon peels, yielding 18 identified chemical compounds in the lemon essential oil, prominently including Limonene (57.67%), alpha-Terpineol (9.37%), and β-Pinene (6.14%). The objective of this research was to develop and assess films comprising blends of chitosan and pectin with incorporated essential oil via casting method, aiming to enhance the functional properties of the resulting films for potential food packaging applications.

Key words: Packaging films, Film characterization, Pectin films; Citrus Limon; Essential oil

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Utilization of natural deep eutectic solvent for extracting polysaccharides from bergamot peels: assessing NADES as film plasticizer and its antimicrobial potential

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In this investigation, we isolated CLPN, a pectic polysaccharide extracted from bergamot peels, using Natural Deep Eutectic Solvent (NADES). The extracted CLPN underwent thorough characterization employing various analytical techniques, including FT-IR, UV, DSC, SEC/MALS/VD/DRI, NMR (1D and 2D), and GC/MS analyses. Acknowledging the inherent drawbacks associated with the mechanical strength and barrier properties of pure pectin-based films, particularly in the realm of food packaging, we propose a novel approach for crafting pectin films incorporating NADES and glycerol (Gly) as plasticizers [1]. Subsequent analysis of these films encompassed assessments of physical properties such as moisture content, solubility, thickness, and colorimetry, alongside FTIR, DSC, and scanning electron microscopy examinations.Additionally, the impact of NADES and glycerol on the resulting films was scrutinized through antimicrobial activity assays.

Key words: Bergamot, polysaccharides, deep eutectic solvent, Characterization, films plasticized.

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Improving Heat Transfer using Nanoparticles in a Solar Collector

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The use of innovative materials is essential these days to improve the performance of solar heat exchangers. In the agricultural sector, the possibility of increasing the production of greenhouse crops out of season in winter requires heating to reach a temperature that is favourable to the development of the plants. The use of a renewable energy such as solar energy, which is free, clean and non-polluting, seems to be of vital importance.The aim of this work is to increase the heating temperature of the agricultural greenhouse during the winter night period by adding nanoparticles of Al2O3, Cu2O, TiO2 and FeO to the solar collectors. This addition of particles improves heat transfer to the solar collectors during the day and significantly increases the temperature of the water in the storage tank, especially when the overall solar flux is at its maximum. To achieve this objective, we developed a theoretical model based on the energy and material balances at the level of this solar hot water loop. The simulation results show that the temperature and thermal conductivity of water increase with increasing nanoparticle concentration. The validation of the established model was done by comparing the theoretical results with those of the experiment. This comparison shows good agreement between these results.

Key words : Nanoparticles, solar collector, heating, modelling, simulation.

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Experimental study of The Application of Biomaterial: Interest in Bone Filling in Adult Wistar rats

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Abstract:

Nowadays, filling bone defects is based on two aspects: the provision of bone tissue or bone graft, whether autologous or heterologous, or the use of non-osseous tissue capable of replacing bone structures. This second part emerged with the advent of biomaterials. In the quest to find the ideal biomaterial, the scientific community began to develop products of synthetic or natural origin and to improve their characteristics to serve as bone substitutes. Our study focused on a natural biomaterial of marine origin based on hydroxyapatite. The aim of our study is to evaluate the effect of a new natural marine hydroxyapatite as a bone substitute. Our biomaterial was implanted in the condyles of female rats ovariectomized (with bone loss) then the samples were studied using the same techniques as the *in vitro* study to which we added a histological study and a radiological study. This *in vivo* study was carried out compared used as positive control (ovariectomized with bone loss and none implanted). We chose 4 stations after the implantation of biomaterials. Then the rats were sacrificed after 15 days, 30 days, 60 days, 90 days. The histological study showed a mild chronic and specific inflammatory reaction was observed after 15 and 30 days with moderate bone regeneration. We noted that fibrocartilage appeared after 60 days of implantation with significant bone regeneration. The difference between the implanted and non-implanted groups is the abundance of fibrosis in the non-implanted rats after the bone less. Our study showed that the biomaterials used is adequate to be introduced as bone substitutes.

Designing of new palladium (II) halide complex as bio-active material: Synthesis, physico-chemical studies, DFT-computations and evaluation of anti-inflammatory, antioxidant and anti-gastric damage activities

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Colorless single crystals of the 0D organic-inorganic hybrid perovskite-like system, $(C_6H_{10}N_2)_2[PdCl_6]\cdot 2H_2O$ was obtained using the slow evaporation method from an aqueous solution of 3-(aminomethyl) pyridine and palladium chloride at room temperature. Single-crystal X-ray diffraction was used to characterize the crystal structure. X-ray investigations demonstrate that the material crystallizes in the centrosymmetric space group $P\bar{1}$ of the triclinic system. The density functional theory method at the B3LYP/Lan2mb basis set level was employed to establish the optimized geometry and vibrational frequencies of the title compound. A satisfactory agreement was observed between the calculated results and the experimental data, including the structure, and IR spectra. The optical characteristics reveal a direct band gap energy of 2.35 eV, confirming the semiconductor nature of this new material. The results show good consistency with the experiment and confirm the contribution of metal orbitals to the HOMO-LUMO boundary. Simultaneous TGA-DTA shows that this material remains stable up to 210 °C. Beyond these temperatures, a gradual decomposition process occurs, extending up to 440 °C and unfolding in several steps. This process involves the release of various compounds, including organic molecules, and the volatilization of chlorine ions, ultimately leading to the formation of palladium oxide (PdO) as the final product. When given to rats with gastric ulcers at a dose of 100 mg/kg, these compounds inhibit the key enzyme responsible for lynphocytaire infiltration as myeloperoxidase (MPO) by 38.7%. They also lessen the damage done to gastric tissues by free radicals, as demonstrated by a 48.3% decrease in the rate of thiobarbituric acid reactive substance rates (TBARS) compared to untreated rats, and they cause a 30.6% decrease in the ulcer's surface.

Keywords. 0D materials, optical properties, electric conductivity, electrochemical properties, DFT, Ulcer, inflammation, stress.

Novel Hybrid Complex $Cu(hfac)_2(Me_3TTF\text{-}CH{=}CH\text{-}Pyr)$ and Mixed-Valence Radical Ion Salt $(Me_3TTF\text{-}CH{=}CH\text{-}Pyr)_2(PF_6)_3$: Synthesis, X-ray Characterization, and DFT Investigation

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Tetrathiafulvalene (TTF) and its derivatives are valued for their lower oxidation potential and strong electron-donating properties. They can undergo reversible oxidation to form $TTF^{\bullet+}$ and TTF^{2+}. These compounds were used in various technologies like conductive materials [1], and smart porous materials [2]. This work delves into the detailed investigation of two recently synthesized compounds: a hybrid mix-ligand complex $Cu(hfac)_2(Me_3TTF\text{-}CH{=}CH\text{-}Pyr)$ and a mixed-valence radical ion salt $(Me_3TTF\text{-}CH{=}CH\text{-}Pyr)_2(PF_6)_3$. These compounds are particularly intriguing as they incorporate ligands derived from tetrathiafulvalene (TTF) donors, which are known for their unique electronic properties. Through the SCXRD analyses, the structural characteristics of these compounds were unveiled, revealing their arrangement within the monoclinic crystal system and providing specific lattice parameters. Notably, the complex showcases a noteworthy five-coordinate behavior, adopting a slightly distorted pyramid geometry with a square base. Moreover, the electrochemical properties of these compounds were investigated, shedding light on their redox behaviors through CV experiments conducted in CH_2Cl_2 solvent. Beyond experimental investigations, the study employs sophisticated theoretical tools such as TD-DFT and AIM analysis to deepen the understanding of the compounds' reactivity and elucidate various types of interactions present. Furthermore, this work explores the conductivity of the compounds, estimating it through the analysis of HOMO and LUMO molecular orbitals and gap energies.

Key words: Hybrid Complex, Cyclic Voltammetry, Single-Crystal, DFT.

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Self-assembly of new cobalt thiocyanic complex based on Histamin, Synthesis, Empirical, Antioxidant activity, and Quantum theory investigations

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The cobalt complex has been synthesized from the reaction of the histamin with metallic salt $CoCl_2.6H_2O$ and thiocyanate ion (SCN^-) as a ligand in H_2O/ethanolic solution and processing by the evaporation crystal growth method at room temperature to get crystals. The synthesized complex has been fully characterized by single-crystal X-ray diffraction. UV-visible, FTIR spectroscopy, TGA analysis, and DFT circulations were also performed. The crystal structural analysis reveals that the solid $\{[Co(SCN)_4](C_5H_{11}N_3)_2\}\cdot 2Cl$ crystallizes in the monoclinic space group $P2_1/m$.

Metal cations are joined into corrugated chains parallel to the b-axis direction by four thiocyanate anions. Different interactions pack the system into a ring formed by N-H···Cl and N-H···S hydrogen bonds. Hirshfeld surface analysis cum 2D fingerprint plots visualize the main intermolecular interactions with their contributions in the solid-state phase. The molecular geometry of the complex was used for quantum chemical calculation. Here, frontier orbital analysis and electrostatic potential illustrate the chemical reactivities of metal-organic complexes. QTAIM and NCI analysis reveal the strength of interactions at the electronic level.

Keywords: Metal complex, Cobalt thiocyanate, Crystal structure, Physico-chemical study, Hydrogen bonds, Hirshfeld surface analysis, DFT studies.

A new 2D lead-free halide perovskite material for energy conversion: Structural, vibrational, optical, and thermal properties

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ABSTRACT:

The slow evaporation method was used to synthesize a new two-dimensional lead-free halide perovskite in a 1:1 (organic/inorganic) stoichiometric ratio, with the structural formula $(C_4H_{14}N_2)[CuCl_4]$. This compound underwent comprehensive characterization through single crystal X-ray diffraction, vibrational spectroscopy, UV−Vis−NIR diffuse reflectance spectroscopy, and thermal analysis. X-ray investigations demonstrate that the hybrid crystallizes in the monoclinic phase with the centrosymmetric space group $P2_1/c$. The vibrational spectra are presented to identify the principal vibration modes and their assignments. The optical Kubelka-Munk equation was used to determine the conduction type, and it revealed a direct allowed band gap transition, exhibiting an energy level of 2.47 eV, proving that the unique hybrid material is a semiconductor. The TGA-DTA analysis reveals that the compound under study remains stable up to 200°C. It describes a gradual decomposition process that occurs up to 576°C, involving multiple steps and the release of various compounds such as CH_4, NO_2, CO_2, and Cl_2. This process ultimately leads to the formation of copper oxide (CuO), as the final product.

Key words: halogenated organic-inorganic perovskites, 2D perovskites, Cu^{2+}, semiconductor

Preparation of phenylalanine-based polyesteramides nano-drug delivery system with high cell-viability and chemical stability

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Abstract

At the end of the nineties, nanomedicine as it involves the use of nano-sized materials, arose as a panacea for the diagnosis and treatment of diseases [1]. Among the diverse range of drug delivery systems using nano-sized materials, biodegradable polymeric nanoparticles PNPs have captured increasing attention due to their numerous benefits [2]. Herein, we report the synthesis of a series of phenylalanine-based polyesteramides derived from ε-caprolactone (CL) and L-phenylalanine (L-Phe) via melt polycondensation with a wide range of molar compositions. Their performance as drug delivery systems was studied. The emulsion-solvent evaporation method has been successfully used to produce nanoparticles based on this copolymer, with sizes below 230 nm. They were found to be non-cytotoxic with high cell-viability and chemical stability demonstrating with that its suitability for biomedical applications, notably as long-term drug delivery systems.

Key words: Polyesteramide, drug delivery system, non-cytotoxic, cell-viability, chemical stability

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Synthesis and Characterization of Novel Thermotropic Liquid Crystalline Poly(ether-ketone)s based on cycloalkanone moiety

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Abstract: A series of new mesogenic poly(ether- ketone)s were successfully prepared by solution polymerization between various dihaloalkanes and 2,5-bis(3-ethoxy-4-hydroxy benzylidene)cyclopentanone (I) or 2,6-bis(3-ethoxy-4-hydroxybenzylidene)cyclohexanone (II). The structures of these monomers and polymers were confirmed by CHN, FT-IR, Mass, ^{1}H-NMR spectrophotometer. The resulting polymers had inherent viscosities in the range of 0.69-1.12 dl/g and the obtained polymers are easily soluble in aprotic organic solvents. All polymers have very good thermal stability and 10% weight loss occurred above 195 °C. Their thermotropic liquid crystalline behavior was studied using differential scanning calorimetry (DSC) and polarizing optical microscope (POM). The melting transition temperature *(Tm)* and isotropization transition temperature *(Ti)* of poly(ether- ketone)s in liquid crystalline state were have exhibit a typical nematic mesophase (marbled texture).

Keywords: thermotropic liquid crystal; nematic phase; poly(ether- ketone)s.

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Polyphenol content and antioxidant activities of solvent extracts from *Rhanterium suaveolens*

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Abstract:

The plant *Rhanterium suaveolens* is traditionally used in herbal therapy. Among its many bioactive compounds are polyphenols, which are natural antioxidants. The polyphenols have a potent antioxidant effect that help protect tissues and cells from oxidative damage. Our aim in this work is to extract the bioactive components from the Tunisian *R. suaveolens* using a variety of extraction methods. In this study, the potential of Rhanterium suaveolens as a source of stimulating bioactive compounds was evaluated by analysing the phenolic content and antioxidant activities of extracts from the flowers and stems of the plant. The appropriate analytical technique was used to quantify the polyphenols. In addition, the DPPH and ABTS tests were used to determine the antioxidant activity.

The investigated *R. suaveolens* extracts were found to be rich in polyphenols, and exhibited strong antioxidant and free radical scavenging properties, the flower extracts showed slightly higher activity compared to the other extracts.

These findings shed light on the plant's potential bioactive components and the efficacy of various extraction methods. The polyphenol content and antioxidant activity of the plant will help to better understand its potential health benefits and use in the development of natural antioxidants.

Keywords: *Rhanterium suaveolens*, extraction, polyphenols, antioxidant activities, DPPH, ABTS.

Essential oils from medicinal plants as anti-biofilm agents against microbial pathogens

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Biofilm formation poses a global challenge, enabling bacteria to evade conventional antibiotics and establish persistent infections, particularly on medical devices, thereby contributing to nosocomial infections. In recent decades, there has been increasing evidence supporting the antimicrobial and chemopreventive properties of medicinal plants, offering potential in modulating biofilm formation. Essential oils (EOs) have emerged as promising candidates for anti-biofilm activities against various microbial pathogens. Our investigation focuses on exploring the anti-biofilm activities of select EOs against Gram-positive bacteria, particularly *Staphylococcus aureus* and *Staphylococcus epidermidis*[1]. Essential oils exhibited significant antiadherence activities, surpassing 50%, and eradication activities exceeding 60%. To elucidate the molecular mechanisms underlying these activities, molecular docking analysis was conducted to reveal interactions between EO components and bacterial receptors, including transcription factors, highlighting the involvement of specific energies and amino acids in these interactions. Furthermore, our study examined the inhibition of virulence factors associated with the pathogenicity of *Staphylococcus aureus* strains. The collective findings suggest that essential oils may offer a promising alternative to address biofilm-related challenges and microbial resistance. Overall, our research underscores the potential of EOs as effective agents in combating biofilm formation and microbial infections, paving the way for innovative strategies in infectious disease management.

Key words: Biofilm, EOs, antivirulence activity, Quorum Sensing

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Antioxidant and antiproliferative effects of *Teucrium polium* extract *in vivo* study in rats

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The current study aimed to assess the antioxidant and antiproliferative effects of *Teucrium polium* extract: computational and *in vivo* study in rats. Three groups of animals: Group (i) constitute the control group; Group (ii) HeLa group received an intrafemoral inoculation of HeLa cells and Group (iii) constitute the combination between HeLa þ *T. polium*. The plant was administered by gavage. Our results revealed that HeLa cell injection showed an elevation in aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP), total bilirubin (TB), creatinine, urea, calcium and phosphorus. The pretreatment with the plant extract reduced the level of these parameters. Injection of HeLa cells showed a significant decrease in phosphorus and calcium respectively. However, the pretreatment by *T. polium* modulated the level of these two minerals. Rats treated with HeLa cells line showed an increase in the level of lipid peroxidation as evaluated by the TBARS substances, at the same time, a significant decreases in SOD, CAT and GPx activities were noted in the HeLa group compared to the control. On the other hand, pretreatment with the plant improved the level of these enzymes. Our results revealed that *T. polium* has therapeutic effects on some health problems. HeLa cell line induced a small infiltration in liver and kidney. *T. polium* reduced the damage in both liver and kidney, but did not reveal any proliferation of tumor cells from trabecular bone tissue.

Exploring the promising virtues of *Syzygium aromaticum*: Chemical composition, antioxidant and antistaphylococcal activities

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Widespread staphylococcal infections present global challenges, with current treatments hindered by adverse effects and drug resistance. This prompts the exploration of novel therapeutic options such as plant-derived compounds, valued for their natural origin and promising biological properties. Accordingly, the study aimed to analyze *Syzygium aromaticum* essential oil (SA-EO), aqueous (AE-SA) and ethyl acetate (EAE-SA) extracts for antioxidant and antistaphylococcal effects against sensitive and resistant clinical isolates. The antioxidant activity was assessed via Phosphomolybdate, FRAP, DPPH, and NO tests, while antimicrobial activity was evaluated through disk diffusion and microdilution assays. Results of chemical composition showed that Eugenol was the EO's major compound. The AE presented the highest content of phenolic (521.171 ± 1.34 mg GAE/g) and flavonoid compounds (624.63 ± 2.15 mg QE/g). Through phosphomolybdate and FRAP, the antioxidant activity of SA-EO showed IC_{50} of 84.63 ± 1.94 and 52.88 ± 1.44 µg/mL, respectively. The scavenging effect of DPPH and NO of SA-AE presented an EC_{50} of 266.52 ± 50.62 and 140.67 ± 44.36 µg/mL, respectively. The antistaphylococcal activity revealed that SA-EO exhibited a significant sensitivity with diameters ranging between 11.8 ± 0.10 and 27. 80 ± 0.34 mm, the MIC and MBC values ranged from 0.316 to 1.266 mg/ml. Overall, these findings highlight *S. aromaticum*'s potential in combating multidrug-resistant bacteria and its role as a source of bioactive molecules due to its antioxidant properties.

Key words: *Syzygium aromaticum*, GC-MS, Antibacterial activity, *Staphylococcus aureus*, Antioxidant activity.

Effect of hydrodistillation duration of *Rosmarinus officinalis* on its chemical composition and antioxidant activity

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The main objective of this research was to conduct a comprehensive investigation of the effect of hydrodistillation time on the chemical composition and antioxidant activity of *Rosmarinus officinalis* essential oils.The aerial part of this species was collectedfromthe Sfax region at the flowering phase. The plant material was then hydrodistillatedfor45 and 90 min. The obtained essential oils were analyzed by GC/MS. Based on the obtained mass spectraand NIST data, thirty compounds,ranging from 93.5 to 96.4% of the total essential oils, were separated based on their chemical class into three principal groups (monoterpenes, sesquiterpenes, and others). Themain compounds were α-pinene (13.2%; 21.6%), eucalyptol (18%; 10.7%), camphor (13.1%; 8.3%), borneol (9.8%; 9.4%), and verbenone (12%; 12.6%). Furthermore, the antioxidant activity of the two essential oilswas evaluated by two complementary methods: radical scavenging activity DPPH and ferricreducing powerassays. Thus, we concluded that antioxidant activity does not depend on the extraction duration. The same antiradical activity (IC_{50} = 0.05mg/mL) is due to the similar chemical composition, and not to the difference in relative intensity of α-pinene and eucalyptol.

Key words: GC/MS,Antioxidant activity, *Rosmarinus officinalis*, Chemical composition, Essential oil.

Nitroalkanes and 1,2-oxaphosphol-4-yl derivatives: Synthesis, Computational studies and molecular docking analysis

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Phosphorus compounds play a crucial role in organic synthesis due to their abundance and diverse applications in various industries, including agrochemicals, medicines, fire retardants and they are used in further organic transformations. They are pivotal in organic transformations and serve as intermediates for the synthesis of biologically active compounds with antimicrobial and antimalarial properties. Consequently, we present a practical and stereoselective approach for the synthesis of novel phosphorus compounds. The computational aspect of this work involves correlating all compounds using Density Functional Theory (DFT). Furthermore, the molecular docking studies, investigate their potential antibacterial and anti-Alzheimer effects. Various pharmacological and computational assays were employed to understand the interaction energy between the selected ligands and the behavior of small molecules in the binding site of target proteins.

Key words: Phosphorus compounds, Computational studies, Antibacterial evaluation, anti-Alzheimer agent, Molecular Docking.

Effet de l'extrait aqueux du romarin pour contrôler *Tuta absoluta* (Meyrick) au laboratoire

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Tuta absoluta est le ravageur clé de la tomate. Il cause des dégâts très importants chaque année depuis son apparition en Algérie en 2008. Les pertes peuvent atteindre jusqu'à 80% de la récolte si aucune mesure de contrôle n'est prise. Cette situation a conduit à une utilisation abusive et irrationnelle des insecticides pour contrôler ce bio-agresseur. Malgré, les effets néfastes de ces produits chimiques sur la santé humaine, l'environnement et la faune auxiliaire. Il est donc impératif et urgent de trouver des méthodes de lutte alternatives afin de faire face à ce bio-agresseur. Dans le but de prévenir ce problème et de valoriser les plantes médicinales disponibles dans la région de Batna, cette étude vise à explorer les possibilités offertes par l'utilisation de l'extrait aqueux du romarin sur la mineuse de la tomate à quatre doses différentes (0,5% ; 0,75%; 1% et 1,5%), comparé au saccharose de laboratoire (100ppm) et un témoin non traité, au laboratoire. Les pulvérisations foliaires des différentes modalités ont été appliquées sur des plants de tomate en pots tous les 15 jours, tôt le matin, du 06/05/2023 au 01/07/2023, à l'aide de pulvérisateurs manuels. Nos résultats révèlent que l'utilisation de l'extrait aqueux du romarin diminue significativement le taux d'infestation quel que soit la dose, par rapport au témoin non traité (98,14%) et le saccharose de laboratoire (99,44%). L'extrait aqueux offre aussi une meilleure efficacité arrive jusqu'à 37,20 %. Ce résultat ouvre une voie prometteuse en tant que technique de lutte biologique pour contrôler le redoutable ravageur de la tomate.

Key words : Plantes médicinales, Mineuse de la tomate, Méthode alternative, Extrait aqueux, *Rosmarinus officinalis*

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Etude phytochimique et *in silico* de la phase acétate d'éthyle d'une plante médicinale

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Dans la présente étude, nous visons à évaluer le profil phytochimique ainsi que les propriétés biologique d'une espèce endémique de la famille Cistaceae et du genre *Helianthemum* cultivée dans le Sud-Est de l'Algérie. L'extraction a été réalisée par macération à l'aide d'éthanol. Le profil phénolique a été déterminé par chromatographie liquide ultra-haute performance couplée à un détecteur à barrette de diodes $ABTS^{\cdot+}$ (HPLC-$ABTS^{\cdot+}$) qui a permis l'identification et la quantification de 7 composés.

L'activité antioxydante a été évaluée on line par HPLC-$ABTS^{\cdot+}$ et off-line par les deux méthodes TEAC et ORAC. La phase acétate d'éthyles a montré une bonne activité antioxydante ainsi que ses produits isolés. Les résultats ont clairement montré que la mort cellulaire est caspase-indépendante et confirment l'implication de RIPK1 et de la voie de la nécroptose dans la toxicité induite par l'extrait d'*I. viscosa*. L'impact de l'extrait éthanolique d'*I. viscosa* sur la morphologie des cellules AGS et A549 a également été exploré. Les résultats indiquent qu'aucun trait morphologique auquel on pourrait s'attendre en cas d'apoptose n'avait lieu. Les résultats de la présente étude suggèrent que l'espèce *I. viscosa* pourrait être considérée comme une source potentielle pour le développement de nouveaux médicaments anticancéreux.

Dans ce travail les études ADME/T sont présentes et l'activité antioxydante de ces composés phytochimiques a été démontrée par des études d'amarrage moléculaire (Docking moléculaire, DFT).

Key words: Cistaceae, *Helaintehmum*, HPLC-$ABTS^{\cdot+}$, Docking moléculaire, DFT, ADME/T

Evaluation of antioxidant, biocompatibility, and anti-inflammatory activity of *Caralluma europaea*.

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Caralluma europaea (Guss.) N.E.Br. (*C. europaea*), is a wild medicinal plant within the Apocynaceae family. It has a rich history in traditional medicine for its therapeutic properties in treating various diseases. This study aims to assess the antioxidant, cytotoxic, and anti-inflammatory effects of the hydroethanolic extract of *C. europaea* through both *in vitro* and *in vivo* experiments.

The phytochemical characterization of the hydroethanolic extract revealed the presence of numerous metabolites. Quantitative analysis indicated significant levels of phenolic compounds (8.838 ± 0.408 mg GAE/g of dry extract), flavonoids (6.617 ± 0.496 mg QE/g of dry extract), and tannins (282.941 ± 10.036 mg CE/g of dry extract).

In vitro antioxidant activity was evaluated using the Ferric Reducing Antioxidant Power assay (FRAP), yielding an EC_{50}value of 8.856 ± 1.128 mg/mL. Additionally, the extract demonstrated antioxidant activity in the Phosphomolybdenum assay (EC_{50} = 2.014 ± 0.187 mg/mL) and scavenged NO radicals with an IC_{50} value of 9.642 ± 1.273 mg/mL.

Biocompatibility assessment was conducted through a hemolytic assay against human red blood cells, revealing non-hemolytic behavior at lower doses (<0.2 mg/ml), slight hemolysis at doses between 0.2 and 0.8 mg/mL, and significant hemolysis at concentrations exceeding 1 mg/ml.

Anti-inflammatory properties were evaluated through assays including BSA denaturation, hemolytic inhibition, and a Carrageenan-induced rat paw edema model. The hydroethanolic extract demonstrated IC_{50} values of 11.397 ± 0.332 mg/mL for BSA denaturation and 0.935±0.062 mg/mL for hemolysis inhibition. In the Carrageenan-induced inflammation model, the extract at the two doses 1g/kg and 2 g/kg significantly inhibited rat paw edema compared to the control group, with a maximum inhibition of 68.15% observed at a dose of 2g/kg.

In conclusion, the hydroethanolic extract of *C. europaea* exhibited potent antioxidant activity *in vitro* and significant anti-inflammatory activity *in vivo*, supporting its potential therapeutic utility.

Keywords: *Caralluma europaea*, Phytochemical composition, Antioxidant activity, Biocompatibility, Hemolytic assay, Inflammation, and BSA denaturation.

Identification of the phenolic and aromatic compounds in fermented *Salvia aegyptiaca* tea by kombucha

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Kombucha is conventionally produced from the fermentation of sugared tea by a symbiotic culture of bacteria and yeast (SCOBY). The discovery of new bioactive substances by fermentation of plant extracts has increased nowadays. Many *Salvia* species (sage) are aromatic and medicinal plants, known for their curative effects. This study aims to identify the aromatic and phenolic compounds in fermented *Salvia aegyptiaca* tea from Tunisia. The aerial parts of this plant were dried and grounded for the preparation of infusions. Then, the unfermented and fermented aqueous beverages were subjected to liquid-liquid extraction with ethyl acetate and n-butanol, respectively. The aromatic and phenolic compounds were analyzed by GC-MS (gas chromatography-mass spectrometry) and HPLC (high-performance liquid chromatography), respectively. 33 aromatic compounds were identified using GC-MS without derivatization, whereas 44 compounds were detected after derivatization. 19 phenolic compounds were identified using HPLC. Different classes of volatile or phenolic compounds were found in unfermented and fermented extracts. Overall, the fermentation influences not only the phenolic compounds profile of plant extracts but also their volatile compounds profile.

Keywords: Kombucha fermentation, *Salvia aegyptiaca*, aerial parts, extracts, aromatic and phenolic compounds, GC-MS, HPLC

Sesquiterpenes from *Pistacialentiscus*L. as potential antibacterial, antifungal and allelopathicAgents

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ABSTRACT

The present study investigated the antibacterial, antifungal and allelopathic activities of *Pistacia lentiscus* essential oils (EOs) extracted at the vegetative, flowering and fructification stages. Thechemical composition of EOs varied according to both the phenological stages and the used mix plant parts. The main chemical class was sesquiterpene hydrocarbons with the predominance of germacrene D, δ-cadinene and *β*-caryophyllene. The antibacterial activity was evaluated against five collection strains. At the vegetative stage, *P. lentiscus* EO was the most effective against *Listeria monocytogenes* and *Escherchia coli* as compared to the other stages. *P. lentiscus* EO also exhibited significant antifungal activity against the phytopathogenic strain *Botrytis cinerea*. Microscopic observation showed that EO induced swelling and crumbling of *B. cinerea* conidia. Moreover, *P. lentiscus* EO at the vegetative stage possessed significant allelopathic activity by inhibiting low concentration the germination and radical elongation of *Raphanus sativus* and radical elongation of *Lepidium sativum*.

Keywords : *Pistacia lentiscus*; sesquiterpenes; antimicrobial activity; grey mould; allelopathic activity

Effect of two wild edible fruits on intestinal dysmotility and modulation of spontaneous intestinal contraction *ex vivo*

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Arbutus unedo and *Crataegus monogyna* are commonly used in folk medicine to treat a wide variety of illnesses, including gastrointestinal problems. Our main objective was to evaluate the effect of aqueous fruit extract of *Arbutus unedo* (AUAE) and *C. monogyna* (CMAE) on physiological gastrointestinal (GI) motility and intestinal dysmotility. *Wistar* rats were given loperamide (LOP, 3 mg/kg, b.w.) and AUAE or CMAE (75, 150 and 300 mg/kg, b.w.) or yohimbine (YOH, 2 mg/kg, b.w.). Gastrointestinal transit was assessed using the charcoal meal test. The action of aqueous fruit extract on intestinal secretion was assessed using the Ussing chamber technique and intestinal motility using an isometric transducer. The bioactive components of AUAE and CMAE were analyzed by liquid chromatography-high resolution electrospray ionization mass spectrometry (LC-HRESIMS). LOP delayed gastrointestinal transit. AUAE and CMAE showed a significant increase in gastrointestinal transit speed in a dose-dependent manner. Both extracts (AUAE and CMAE) induced an increase in the amplitude of spontaneous intestinal contraction with an EC_{50} of 90.47 µg/mL and 22.98 µg/mL, respectively. Furthermore, no effect of the aqueous extract of arbutus and hawthorn fruit was observed on the electrogenic transport of intestinal fluid. These results suggest that the AUAE and CMAE candidates could exert a laxative action and modulate spontaneous intestinal contraction.

Key words: *Arbutus unedo*, *Crataegus monogyna*, spontaneous intestinal contraction, rats, gastro-intestinal transit, intestinal contraction

Comparative study of two medicinal plants from the Tipaza region, Algeria

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This work was focused on the use, extraction and study of the biological activity of the essential oils of two medicinal plants: *Lavandula stoechas* L. and *Rosmarinus officinalis* L. These herbaceous and perennial plants are widespread along the Mediterranean coast of Algeria. Several ethno-pharmacological studies have demonstrated their use in the treatment of various diseases; because they possess anti-inflammatory, antioxidant, antispasmodic, sedative, insecticidal, antimicrobial and antifungal activities.

In this study, essential Oils were extracted from *L. stoechas* and *R. officinalis* which were harvested in the regions of Chenoua and Nador (Tipaza). Extraction by hydrodistillation gave an oil yield of (0.145%) and (0.364%) for lavender and rosemary, respectively. The study of antioxidant activity of the essential oils of *L. stoechas* showed a remarkable power of scavenging of the free radical DPPH (CI_{50} = 180 mg/L) compared to that of *R. officinalis* (IC_{50} = 306.3 mg/L) and their mixed oils (IC_{50} = 253.75 mg/L). Evaluation of the antibacterial activity of the essential oils tested showed moderate inhibitory activity against all pathogenic bacteria (*Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Escherichia coli*). The EO of *L. stoechas* and *R. officinalis* are endowed with interesting biological properties and could be used in different fields such food and pharmaceutical.

Keywords: Extraction, essential oil, *Lavandula stoechas*, *Rosemary officinalis*, biological activity.

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Antioxidant Potential of Algerian Lentisk Oil and its Extracts

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The objective of this study is to determine the bioactive content of the fruit and vegetable oil of Pistacia lentiscus sourced from Collo, primarily utilizing two techniques: traditional and Soxhlet extraction. The total polyphenol contents of the oil extracted *via* Soxhlet and traditional methods show significant proximity. The presence of carotenoid pigments and the possession of antioxidant activity attest to the oil's antioxidant potential. Analysis of total polyphenols in lentisk fruits revealed that extraction is most effective with 80% acetone (2.90 ± 0.07 g GAE/100g DW). Total flavonoid extraction indicated water (1.56 ± 0.04 g EQ/100g DW) as the optimal solvent. Furthermore, the presence of other antioxidants (anthocyanins, proanthocyanidins, and carotenoids) confirms substantial antioxidant activity in the extracts. Notably, the aqueous extract demonstrated promising reducing and antiradical activity. Thus, Pistacia lentiscus merits attention from the scientific community and support from the economic sector to evolve beyond its role as a fundamental component of Algeria's floral heritage.

Key words: *Pistacia lentiscus*, lentisk fruit, fruit, oil, antioxidants, Soxhlet, traditional extraction.

Étude de la biodiversité du phytoplancton de la lagune de Oualidia et son potentiel pour la valorisation de sa biomasse

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La biodiversité du phytoplancton lagunaire est essentielle pour maintenir l'équilibre des écosystèmes aquatiques côtiers. Son étude revêt un intérêt crucial pour comprendre les dynamiques écologiques et les processus biogéochimiques. Dans cette étude, nous avons exploré la diversité du phytoplancton dans la lagune de Oualidia et évalué son potentiel pour la valorisation de sa biomasse. Nous avons collecté des échantillons de phytoplancton en utilisant des techniques de prélèvement standardisées. Les échantillons ont été analysés au laboratoire pour identifier les espèces de phytoplancton présentes et évaluer leur abondance relative. Nos résultats révèlent une grande diversité d'espèces de phytoplancton dans les lagunes côtières étudiées, avec une variabilité saisonnière significative. Ce phytoplancton est dominé par les diatomées qui constituent 91% de l'abondance totale et représentées par 60 taxons. Cette dominance s'explique par l'entrée d'eau marine riche en sels nutritifs issue de l'upwelling. Les faibles densités sont notées en hiver, avec un minimum de (51.104 cell.L-1). En été les densités s'accroissent et atteignent leur maximum (1292.104 cell.L-1) pour s'affaiblir de nouveau en hiver. L'évolution de la diversité du phytoplancton, estimée par l'indice de Shannon-Weaver (H') et l'indice d'équitabilité de Pielou (J'), est importante. La température moyenne de l'eau était de 16,10 ± 0,33°C en hiver et a atteint son maximum au printemps (22,5 ± 1,04°C). La salinité de l'eau oscillait entre 38 PSU au printemps et 26,70 PSU en été. Le pH variait de 7,70 en hiver à 8,82 au printemps. Pour la chlorophylle a la teneur la plus basse était de 0,07 mg.m3 en hiver qui a augmenté à 5,20 mg.m3en été.

Keywords : phytoplancton, structure des communautés, biomasse, lagune de Oualidia, diversité spécifique.

Genetic Identification, Chemical Profiling, and *In Silico*/*In Vitro* Biological Assessment of Moroccan *Cannabis sativa* L. Seed Extracts

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For centuries *Cannabis sativa L*. was an illegal plant in Morocco. However, the Moroccan government has recently legalized and decriminalize its medical use under law no. 13-21 on the legal use of *Cannabis* [1]. This has prompted an increased interest among scientists and the pharmaceutical industry. *Cannabis* is a subcosmopolitan dioecious flowering plant belonging to the Canabaceae family [2]. The number of species in the genus *Cannabis* has been controversial. Some authors have proposed *Cannabis* as a polytype includes three species which are *Cannabis sativa, C. Indica*, and *C. Ruderalis* [3]. In this context and in order to explore the potential of this plant, our study was conducted on Moroccan *Cannabis* seeds as valuable raw materials for nutritional, cosmetical, and medicinal purposes, through a deep investigation encompassing molecular, phytochemical, and biological aspects. Ten seed samples of the local traditional landrace, collected from various regions in northern Morocco, were subjected to analysis. Firstly, we have conducted an analysis of genetic polymorphisms utilizing DNA barcode determination. This involved the utilization of both universal and specific markers to compare sequences from the ITS and RBCL gene regions. Two disparate molecular profiles were unveiled. The initial set of eight out of ten samples displayed a genetic profile consistent with "*Cannabis, species sativa, subspecies indica*," whereas the subsequent set of two samples exhibited a genetic composition resembling "*Cannabis, species sativa, subspecies sativa*." Subsequently, we have conducted targeted sequencing of the THCA synthase coding gene on a sample selected from the first group using AMSD1. As a result, we have obtained a new sequence that has been registered in GenBank with the accession number "BankIt2726356 Cannabis OR372636". AMSD1 was then chosen for phytochemical and biological screening and maceration extraction using seven ascending polarity organic solvents. HPLC-ESI-FULL-MS and GC-MS-MS (TQ) chemical profiling found 13 non-volatile chemicals, including three inactive cannabinoids and three polyphenols, and 24 intriguing volatile compounds, including 7 molecules originally reported in Cannabis seed extracts. I*n-silico* analysis was used to examine biological activities such antioxidant potential, antibacterial effects, cytotoxicity, and antiviral activity was assessed *in vitro*. All extracts showed antioxidant activity, particularly ethanolic and methanolic, with DPPH-IC_{50} values of 31.63±0.53 and 20.28±3.25 µg/mL, respectively. *In-silico* analysis Cannabisin A, B, and C are the best polyphenolic antioxidants, with slip scores of -9.681, -9.709, and -9.083 kcal/mol against NADPH oxidase. All extracts showed limited antibacterial activity and no antiviral impact against SARS-CoV-2. The findings give a comprehensive understanding of Moroccan *Cannabis* seeds' molecular, phytochemical, and biological characteristics and provide useful insights for future study. The research shows that *Cannabis* seeds may be used in many businesses as a source of nutritious components with antioxidant characteristics.

Keywords: *Cannabis sativa L., Seeds, genetics, ITS gene, THCAS gene, Cannabisin, antioxidant, NADPH oxidase.*

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Effect of Clove *(Syzygium aromaticum) and* Bay Laurel *(Laurus nobilis)* Essential Oils on human neutrophils Degranulation and Oxidative Burst

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Syzygium aromaticum (cloves) and *Laurus nobilis* (bay laurel) are two plant species widely utilized in traditional North African medicine due to their therapeutic effects against various diseases, particularly those involving inflammation [1,2]. Neutrophils, playing a crucial role in the inflammatory responses, employ two primary mechanisms for pathogen elimination: degranulation and oxidative burst [3]. Therefore, we investigated the potential of cloves and bay laurel essential oils and their main compounds eugenol and eucalyptol, to influence these functions, namely degranulation and oxidative burst, *in vitro*.

Essential oils were extracted using the hydrodistillation method. Human neutrophils were isolated from freshly drawn whole blood through Ficoll-Paque centrifugation. These were then pre-treated with varying concentrations of essential oils of cloves, and laurel (50- 200 µg/ml), as well as eugenol and eucalyptol (5-20 µg/ml) at 37°C for 30 minutes, followed by stimulation with fMLP (10^{-6}M). degranulation was evaluated based on the release of lysozyme, which was quantified by measuring the lysis of the substrate *Micrococcus lysodeikticus* at an absorbance of 450 nm. Additionally, the oxidative burst activity was assessed through the reduction of Nitroblue Tetrazolium (NBT) at 580 nm.

Human neutrophils pre-treatment with essential oils from cloves and laurel, as well as their active compounds eugenol and eucalyptol, significantly and dose-dependently inhibited their fMLP-induced degranulation, showing inhibition rates of 59%, 50%, 75.41%, and 74.26% respectively ($p < 0.001$). Similarly, this treatment also substantially reduced the fMLP-induced oxidative burst activity, with inhibition percentages of 52.81%, 61.07%, 57.54%, and 51.29% respectively ($p < 0.001$).

These results open up promising avenues for future research into the mechanisms of anti-inflammatory treatments, underscoring the potential of these natural compounds in developing novel therapeutic strategies.

Key words: Human neutrophils; Degranulation; Oxidative burst; *Syzygium aromaticum*; *Laurus nobilis*; Essential oil.

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Assessement of larvicidal and pupicidal activities of *Mentha piperita* essential oil and effects in biomarkers against *Culex pipiens*

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Over the past few years, there has been a growing interest in essential oils as potential bioactive substances for combating pests and as a viable alternative for mosquito larvicides [1]. The aim of this study was to determine the larvicidal and pupicidal effect of the essential oil of *Mentha piperita* against the mosquito species *Culex pipiens.*

Different concentrations of *M. piperita* essential oil between 10 and 200µL/mL were tested on fourth instar larvae and pupae of the species *C. pipiens* for 24 h. The effects were examined on mortality, energy reserves and on biochemical biomarkers (AChE and GST).

The toxicity results showed a strong larvicidal and pupicidal activities against the species *C. pipiens* with LC_{50} values of 49.01 µL/L and 115µL/L for larvae and pupae respectively. This essential oil significantly affects biomarkers; it shows neurotoxic effects by reducing acetylcholinesterase (AChE) activity and activating the detoxification system, as evidenced by increased glutathione S-transferase (GST) activity. The biochemical composition showed that the essential oil affected the energy reserves with a marked effect on proteins and lipids.

Key words: *Mentha piperita*, *Culex pipiens*, Energy reserves, Biochemical Biomarkers.

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A comparative study of the performance of two TiO_x Magnéli Phase Anodes in the degradation of PFAS using advanced electrooxidation

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Abstract

Perfluoroalkyl and polyfluoroalkyl substances (PFAS) constitute a large family of more than 4,700 synthetic chemicals. PFAS are among the most persistent synthetic chemicals known today; they degrade very slowly in the natural environment. An effective method for their elimination is electrochemical degradation through electro-oxidation. This work evaluated the performance of two sub-stoichiometric titanium oxide anodes $TiO_{1,72}$ and $TiO_{1,62}$ in the electrochemical degradation of perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS). The two anodes were used in an electrolytic cell associated with a carbon felt as cathode to evaluate the degradation of PFOA and PFOS by electro-oxidation and electro-oxidation combined with electro-Fenton. Two concentrations, 2ppm and 0,2ppm, were studied. At 2ppm, and using the $TiO_{1,72}$ electrode, electrolysis leads to the removal of, 98,76 % of PFOA ($k= 0,014\ min^{-1}$) and 99.39 % of PFOS ($k= 0,017\ min^{-1}$) were degraded. Whereas with the $TiO_{1,62}$ electrode, only 52% of PFOA ($k= 0.006\ min^{-1}$) was degraded, and for PFOS, the degradation rate was 82% ($k= 0.0083\ min^{-1}$). To further validate the performance of the $TiO_{1,72}$, both anodes were characterized by Raman, DRX, XPS and SEM in surface and cross-section and their compositions were compared with each other. Additionally, the impact of organic matter on the degradation efficiency of PFOA at the 2ppm concentration level was examined to determine if it would impede the electrochemical decomposition process when using the $TiO_{1,72}$ anode or not.

Keywords: Electro-oxidation (EOX), Electro-Fenton (EF), Perfluorooctanoic acid (PFOA), Perfluorooctanesulfonic acid (PFOS), titanium oxide anodes, Organic matter

Valorisation of Chicken Egg Shells for Calcium Supplementation : Treatment Process, Physicochemical Characterization and Microbiological Analysis.

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Abstract

In order to enhance the quality of eggshells for consumption, this study aims to valorize eggshells as a calcium supplement in the diet of laying hens. Beyond the beneficial properties of the product, our solution provides an alternative to calcium carbonate sourced from limestone quarries, which incurs certain costs. Additionally, the inherent properties of our eggshells are more advantageous. Exploring an alternative source of calcium to effectively supplement the calcium requirements of hens would be advantageous for both the hens themselves and their breeders. When dietary sources of calcium are insufficient, calcium is withdrawn from the medullary bone of the laying hen. Calcium deficiency can result in the production of eggs with poor shell quality, leading to lower-grade products and financial losses for breeders. Globally, the poultry industry plays a critical role in meeting the demand for animal calcium.

From an environmental perspective, our project gives a second life to waste material that holds significant potential for valorization, while also contributing to a circular and local economy. Furthermore, the physicochemical and microbiological analyses of both the raw material and the final incorporated feed meet the standards, with a calcium content of approximately 7.58%, far exceeding the values obtained with rocky calcium bicarbonate, which does not exceed 3.5% with the same percentage in the formulation, while respecting the appropriate granulometry. The microbiological analyses conducted on the shells are satisfactory and allow for safe incorporation into the formula. However, we still need to optimize the calcium-enriched formulas to meet the needs of the industry.

Keywords: Eggshells valorization, Calcium supplement, Decontamination process, Physicochemical and microbiological analyses.

Enhancing the performance of proton exchange membranes : Incorporating layered double hydroxides into low sulfonated polyether sulfone octyl sulfonamide composite membranes

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Abstract

A novel approach was employed to develop ion exchange membranes suitable for fuel cell applications. This method involved the blending of Low Sulfonated PolyEther Sulfone Octyl Sulfonamide (LSPSO) with Layered Double Hydroxides (LDH) clay at different weight ratios (1 %, 3 % and 6 %). The resulting composite membranes underwent comprehensive characterization using various techniques; including Fourier transform infrared spectroscopy, X-Ray diffraction, scanning electron microscopy, and thermogravimetric analysis to assess their surface morphology and thermal stability. Significantly, the thermal performance of the composite membrane exhibited notable improvements when compared to the pristine LSPSO membrane. The incorporation of 6 wt % Layered Double Hydroxides to the composite membrane led to enhanced proton conductivity in comparison to the LSPSO membrane alone. This finding highlights the potential of the LDH/LSPSO composite membrane as an electrolyte membrane for fuel cells operating at temperatures exceeding 100 °C.

Keywords: Composite membrane, Proton conductivity, Spectrocopy analysis, Fuel cells.

Treatment of chlorpheniramine by using an advanced oxidation process : Boron doped diamand electrode

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Abstract

Over the years, the production of medicines has significantly increased, resulting in water pollution by pharmaceutical substances. This pollution has harmful effects on the ecological system and living beings. As a result, removing these contaminants from aqueous effluents has become a major concern. Anodic oxidation processes have shown potential in eliminating these contaminants due to the high oxidation capacity of hydroxyl radicals (OH°) generated in aqueous environments. In this study, we aim to investigate the treatment of chlorpheniramine (CLP), an antihistamine drug, in an aqueous solution by anodic oxidation on boron-doped diamond. The performance of this process depends on various operating parameters such as the initial concentration of chlorpheniramine, the electric current density (J), the duration of the treatment, and the temperature of the reaction medium. We conducted a Doehlert experimental design to determine the optimal conditions for the treatment of chlorpheniramine by anodic oxidation on a boron-doped diamond (BDD) electrode. We found that the optimal conditions for the treating chlorpheniramine were a concentration of 40.810^{-5} M, electrical density of 87 mA cm^{-2}, treatment time of 8 hours at 37 ºC. Under these optimal conditions, we observed a 98% elimination of chemical oxygen demand (COD) and a 95% formation of nitrate ions. These results demonstrate the efficiency of the anodic oxidation on boron-doped diamond process in eliminating chlorpheniramine as a water waste in an aqueous medium.

Keywords: Electrochemical treatment, Chlorpheniramine, BDD, COD determination.

Adsorption performance of tartrazine dye from wastewater by raw and modified biomaterial: Kinetic, Isotherm and Thermodynamic studies.

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Abstract

The massive generation of dye waste leads to environmental, social and ecological problems. The use of biomass-derived activated carbon as an adsorbent is a versatile approach that has attracted more attention due to the production of value-added products with lower environmental risk. Application of raw sawdust (SD) and activated sawdust (ASD) for the removal of tartrazine has been investigated. Both materials were characterized via elemental analysis, BET, Thermogravimetry, pH of zero charge, Boehm titration, fourier transform infrared spectroscopy and scanning electron microscopy. The effects of various parameters such as pH, contact time, agitation speed, adsorbent mass, initial dye concentration and temperature on the removal of the dye were studied. The highest removal percentages were found to be 47.88 % for SD and 99.52 % for ASD. Langmuir saturation adsorption capacities were equal to 0.8 mg/g for SD and 127 mg/g for ASD at 298 K. Even if SD shows a more limited efficiency in tartrazine removal, it can be used as it is, without any activation step, therefore it can be a convenient alternative to the activated material. In conclusion, SD and ASD are promising, biodegradable, eco-friendly, cost-effective and efficient adsorbents for the removal of tartrazine from wastewater effluents.

Keywords: Activated sawdust, Biosorption, Tartrazine, Isotherm modelling, Kinetic.

Caractérisation quantitative et physico-chimique des sous-produits issus de l'industrie halio-alimentaire tunisienne * Cas des conserveries de poisson

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En Tunisie, le tissu de l'industrie de mise en conserve des produits de la pêche comporte une quarantaine d'unités spécialisées principalement dans la transformation du poisson. Les espèces de poisson les plus transformées sont la sardine et le thon [1]. L'évolution du tissu industriel pour cette filière a été couplée à une explosion des quantités transformées de poisson et par la suite des déchets générés par cette activité en termes de quantités et de surcoût à payer [2]. Ce constat se justifie par un rendement industriel relativement faible et une consommation énergétique marquée par la hausse. La situation environnementale et énergétique fait confronter la Tunisie, depuis plus de trois décennies, à plusieurs défis [3]. En effet, les sous-produits générés par les conserveries tunisiennes de poisson, difficilement quantifiés, sont actuellement gérés par un simple broyage mécanique en farine de poisson estimé annuellement à 1000 tonnes. Toutefois, au vu de sa composition physico-chimique et nutritive complexe [4], cette biomasse peut avoir d'autres pistes de valorisation dont celle de la digestion anaérobique ou la biométhanisation permettant de générer ainsi un biogaz qui est le biométhane [5]. Ce travail de recherche a permis de réaliser une quantification des sous-produits issus des conserveries tunisiennes de poisson ainsi que leur caractérisation physico-chimique. Les résultats qui en découlent démontrent que l'activité de mise en conserve de thon et de sardine génère durant les dernières années des quantités importantes de biomasse [6] fluctuantes entre 22 et 32 mille tonnes par an et que les sous-produits organiques issus de la transformation de thon sont supérieurs à ceux de la sardine, soit un rapport moyen de 90/10. En ce qui concerne la détermination des paramètres physico-chimique des déchets de thon, de sardine et de leur mélange, les résultats prouvent que les sous-produits analysés représentent un rapport C/N inférieur au ratio optimal indiqué dans d'autres études et que le mélange de déchets donne le rapport C/N le plus important. Il est à noter également que la co-digestion avec d'autres co-substrats, riches en C ou pauvres en N, s'avère nécessaire pour avoir un potentiel biométhanogène BMP élevé [7] et par la suite une quantité optimale de biogaz dégagé.

Key words: sous-produits, conserveries de poisson, biométhanisation, caractérisation physico-chimique, potentiel biométhanogène

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MODELISATION DE L'ACTIVATION DE L'ARGILE VITREUSE ET SON APPLICATION POUR LA DEFLUORATION DE L'ACIDE PHOSPHORIQUE

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Résumé :

L'acide phosphorique industriel tunisien produit par voie humide contient des impuretés organiques et inorganiques. Plusieurs utilisations de cet acide nécessitent l'élimination de ces impuretés. Le développement d'un adsorbant efficace à cout réduit pour minimiser la teneur des matières organiques, du fluor et la décoloration de l'acide est l'objectif de ce travail. Une étude d'adsorption sur argile naturelle et activée est faite en variant deux paramètres opératoires : la température et la dose d'argile.

L'activation acide d'une argile récemment exploitée ; l'argile vitreuse provenant de la région de Gafsa par la méthodologie de surface de réponse dont le but de l'appliquer dans l'élimination des plusieurs impuretés, tels que le Fluor

L'étude de l'activation de l'argile en utilisant un plan d'expérience suivie et de sa modélisation en utilisant le logiciel de planification Design Expert afin de voir l'effet des facteurs : Le rapport (liquide/solide), la température d'activation, le temps d'activation.

L'analyse de l'effet d'activation et de la variation des paramètres opératoires nous a renseignés sur les conditions les plus adéquates qui ont amélioré le pourcentage d'élimination qui atteint 42% de matières organiques, 83,72% de fluor, et un pourcentage de décoloration de 58,83%.

Mot clés : Acide phosphorique, matières organiques, fluor, adsorption et argile activée.

Extraction et caractérisation de l'extrait fibro-protéique des noyaux de dattes tunisiennes « Deglet Nour »

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Depuis des années, la production et l'exportation des dattes constituent un pilier de l'agriculture tunisienne [1]. Toutefois, les noyaux issus de la transformation technologique des dattes sont souvent considérés comme déchets malgré leur richesse en fibres et en protéines [2]. De ce fait, une réflexion stratégique doit être poser afin de valoriser ces déchets et d'assurer la viabilité de cette chaine de valeur dans le cadre d'une économie circulaire durable. Cette étude vise à caractériser les noyaux de dattes tunisiennes « Deglet Nour » et à déterminer les propriétés fonctionnelles de la fraction fibro-protéique obtenue précipitation isoélectrique à pH 4,5 [3].
La poudre de noyaux de datte contient 10,61 g/100 g d'eau, 5,00 g/100 g de protéines, 1,48 g/100 g de cendres, 5,39 g/100 g de matières grasses et 77,50 g/100 g de glucides. L'extrait fibro-protéique des noyaux contient 18 g/100 g de protéines ce qui lui confère des propriétés techno-fonctionnelles intéressantes. La capacité de rétention d'huile et la capacité de rétention d'eau sont respectivement de 3,23 g/ml et 3,04 g/ml. La capacité émulsifiante et la solubilité des protéines de cette fraction dépendantes du pH sont significativement plus élevées à pH 10 (174,04 m2 /g) qu'à pH 7 (149,30 m2 /g) et pH 4 (143,13 m2 /g). Cependant, une émulsion plus stable dans le temps a été observée à pH 7. L'effet du pH sur les protéines des noyaux de dattes a été aussi prouvé par la spectroscopie de fluorescence qui a montré des changements dans la forme des spectres en fonction des valeurs de pH.
L'analyse de la fraction fibro-protéique par la spectroscopie infrarouge moyen à transformée de Fourier (FTIR) a montré la présence de protéines à 1 300-1 400 cm−1, 1 615 à 1 652 cm-1 (Amide I), 1557–1437 cm-1 (Amide II) et 1212–1340 cm−1 (Amide III) et fibres (771 cm-1, 820 cm-1, 1066 cm-1 et 1110cm-1.
Les résultats obtenus ont révélé que l'extrait fibro-protéique de noyaux de dattes présente de bonnes propriétés techno-fonctionnelles et pourrait être d'intérêt comme additif naturel pour diverses applications alimentaires.

Mots clés: noyaux de dattes, proteines, spectroscopie infrarouge, fluorescence

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Evaluation of the environmental impact of pollution on the Moroccan Coast using a Multi-biomarker Approach

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The Moroccan coast is well known for its diversity. At 2,500 km in length, it is ranked as one of the coasts with the highest abundance of fish and species richness. Unfortunately, the Moroccan ecosystems are facing a high and sometimes irreversible degradation rate, particularly around cities where expansion and economic development take priority.

Our study is based on applying a battery of biomarkers to diagnose the quality of the Moroccan coast using a sentinel species, the mussel Mytilus galloprovincialis. The biochemical responses of AChE, GST, CAT, and MTs were utilized in this multi-biomarker battery, where each biomarker gives information about the exposure and/or the effect of a specific pollutant in the environment.

Results show a seasonal variation in biomarker responses with variability between sites. Using the integrated biomarker response (IBR), we could estimate the degree of impact of pollutants at the studied sites, reveal all the interactions between biomarkers, and classify sites via the integrated approach.

Key words: Biomarkers, ecotoxicity, biomonitoring, Environment, IBR.

DFT study of C-H…N and C-H…π charge transfer interactions between nitrogen derivatives and chloroform

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Abstract

Non-covalent interactions, called charge transfer interactions, are crucial for understanding the molecular behavior of the chemical system under study. 1-3 In the current work, nitrogen compounds and chloroform have been thoroughly studied using the DFT method at WB97XD/6-31G+(d,p) in the gas phase and PCM solvation model. The optimization of the geometries of the various nitrogen compounds and chloroform, and the associated complexes that are generated in the gas phase was observed to determine the complexation energy of the hydrogen bond. Second, spectroscopic investigations (IR and UV-visible) and NBO analysis were done to prove charge transfer. The impact of the solvent was considered to examine the charge transfer of complexes, including chloroform and bromoform, in various settings.

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Chemical processing of *Rosa canina* hydro-distilled waste for the extraction of cellulose

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The hydro-distillation of *Rosa canina* produces a huge quantity of waste, causing environmental and economic concerns. Valorizing these undervalued wastes will not only alleviate these challenges, but will also supply an appealing and sustainable raw material for green chemistry and energy generation. Therefore, the purpose of this study is to use these wastes for the first time in the extraction of cellulose. Cellulose was extracted using chemical pretreatments that included defatting, hot water extraction, alkaline treatment, and bleaching. Chemical study of the untreated material showed that it contains 23.55 % cellulose, 30.91 % hemicelluloses, and 34.21 % lignin. Physical techniques including colorimetry, scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FTIR), X-ray diffraction (XRD), Nuclear magnetic resonance (NMR), and thermogravimetry (TGA, dTG) were used to demonstrate the elimination of lignin and hemicelluloses from the fiber surface. The yield, cellulose content and average diameter of the isolated cellulose were 23.34 %, 80.42 %, and 9.66 μm, respectively. Compared to the raw material, the extracted cellulose showed an excellent whiteness index (75.72), moderate crystallinity (51 %) and improved thermal stability (T_{max}= 350.41°C). The findings suggest that extracted cellulose has a prospective application in the manufacture of biomaterials.

Key words: Hydro-distilled wastes, *Rosa canina*, Valorization, Chemical pretreatments, Cellulose extraction

Safran-enriched cheeses: Physicochemical, antioxidant and sensory evaluation

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The incorporation of safran into various food products has attracted attention. However, its use in cow's milk cheese remains an under-researched area.The aim of this study was to investigate the bioactive potential and functional properties of safran and to optimise its incorporation into cheese formulations. Three different doses of safran, 0.25, 0.5 and 0.75%, were used to fortify cow's milk cheese. The sensory characteristics of the cheese were then evaluated to assess its quality. Safran powder showed a high water retention capacity (WRC) of 449.3±1 g water/100 g and oil retention capacity (ORC) of 270.62±2 g oil/100 g, indicating a remarkable absorption capacity, and a solubility index of 213.87%, highlighting the potential of safran to expand in liquids and affect product texture. The safran extract showed various phenolic compounds. Cheese formulations enriched with safran exhibited increased dry matter content and sensory analysis showed that cheese enriched with 0.5% safran scored highest in overall acceptability, showing significant improvements in colour, flavour and overall preference compared to other formulations. Enrichment with safran powder significantly improves the physico-chemical properties of cheese and has a remarkable effect on a wide range of sensory attributes, suggesting that the enrichment of various food products with safran offers a remarkable opportunity to improve both product quality and consumer acceptance.

Key words: Safran, cheese, sensory evaluation, bioactive potential

Synthèse et étude de l'activité photocatalytique d'un nanomatériau de type spinelle pour l'élimination d'un colorant anionique

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Résumé

La protection de l'environnent est devenue un enjeu économique et politique majeur et même sociale, notamment quand il s'agit de l'eau et de l'air. Beaucoup d'industries comme la chimie, la pétrochimie, l'agro-alimentaire, le textile, la papeterie, les tanneries, etc…, produisent des effluents très dangereux comme les colorants [1,2]. Le présent travail présente l'étude de l'activité photocatalytique de $CuAl_2O_4$ et $CuAl_2O_4$/K pour l'élimination d'un colorant acide choisi comme modèle ; en l'occurrence le Rose Bengale(RB). Toutes les nanoparticules préparées au cours de cette étude ont été caractérisées par diffraction des rayons X, spectroscopie infrarouge.

L'étude de la cinétique d'adsorption a montré qu'elle est très rapide dès le début du processus (5 min) pour le kaolin et $CuAl_2O_4$, l'équilibre est rapidement atteint pour le kaolin) avec un taux de rétention de 40 % pour une quantité adsorbée de 8.02 mg/g. Par contre pour le catalyseur $CuAl_2O_4$, l'évolution continue pour atteindre d'équilibre à 120 min, avec un taux de rétention de 80.44 % et une quantité adsorbée égale à 16.087 mg/g. pour $CuAl_2O_4$/K l'équilibre est rapidement atteint avec un taux de rétention de 3.05 % pour une quantité adsorbée de 0.62 mg/g seulement.

Pour les tests photocatalytiques, $CuAl_2O_4$/K a montré une efficacité remarquable pour la dégradation d'une solution de Rose Bengale, sous irradiation solaire.

En effet, l'élimination du RB était presque totale (98.53%) après 60 min d'exposition au rayonnement solaire, alors que pour spinelle massique $CuAl_2O_4$, le taux d'élimination atteint 89% après 180 min.

Mots Clés: Spinelle supporté, adsorption, DRX, MEB, BET, Photocatalyse, Rose Bengale.

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Characterization of new hybrid material based on 5-amino-3-methyl-1-phenyl-1H-1,2,4-triazole and bismuth: hydrothermal synthesis, structural analysis, thermal behavior, vibrational and optical properties, and Hirshfeld surface calculations

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Abstract

The new interesting organic-inorganic hybrid compound with the title $(C_9H_{11.5}N_4)_2[BiBr_6].5H_2O$ was synthesized and grown using the hydrothermal method. Single-crystal X-ray diffraction analysis revealed that the new supramolecular compound adopts the non-centrosymmetric space group $Pmn2_1$ in the orthorhombic system. The unit cell parameters are as follows: a = 20.1193 (2) Å, b = 10.7704 (10) Å, c = 7.8356 (10). The analysis using single-crystal X-ray diffraction revealed that the structure consists of one anionic entity, $[BiBr_6]^{3-}$, which creates a polyhedral structure in an octahedron shape. Additionally, it contains two cationic entities, $(C_9H_{11.5}N_4)^{1.5+}$, and five water molecules. The crystalline structure of the new compound was solved using Direct methods and refined using the least squares method to achieve final values of R_1 = 0.0558 and wR_2= 0.1476. The structure consists of an alternating arrangement of organic cations and inorganic anions. Hydrogen bonds ensure structural cohesion forming a 3D network. The purpose of conducting Hirshfeld surface analysis was to investigate the interactions between molecules and the 2D fingerprint plots associated with them. This analysis confirmed the existence of hydrogen bond interactions and revealed the relative contribution of these interactions in the crystal structure, with Br···H/H···Br interaction being the most dominant. FTIR spectroscopy, Raman scattering, UV-Vis and fluorescence properties, DFT calculations, and thermogravimetry analysis were conducted to study the functional and molecular groups, energy gap, and thermal behavior of the compound.

Synthesis, Molecular Structure, DFT Calculations and *In Silico* Drug Evaluation of the novel (4-phenylpiperazin-1-ium) Hydrogenfumarate as a Tyrosinase Inhibitor

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Through the successful combination of fumaric acid (FA) and 1-phenylpiperazine (1 PP), a new organic crystal called (4-phenylpiperazin-1-ium) hydrogenfumarate, abbreviated 4PPHFUM, has been created. This newly discovered crystal is presented in this work. The crystal stacking is supported by O-H···O, N-H···O and C-H···O hydrogen bonds, also assisted by C-H···π interactions between organic cations. The influence of these interactions on the construction of our latest crystal is quantified by the Hirshfeld surface analysis. These non-covalent interactions, which provide supramolecular attachment, have also been analyzed in detail using a quantum chemical computational study. Using the docking-based drug design strategy, we examined the therapeutic effect of this collaborative outcome between fumaric acid and 1-phenylpiperazine to highlight the potential of this new non-covalent compound as a tyrosinase inhibitor.

Keywords: 1-phenylpiperazine; Fumaric acid; Single-crystal X-ray diffraction; Hirshfeld surfaces analysis; DFT calculations; Molecular docking.

Posidonia Oceanica Balls: Autohydrolysis effects and nanocellulose fibers production.

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Abstract : Seagrass balls called Posidonia oceanica balls (POB) are a major environmental problem since they are yearly dumped onto beaches. Their current utility increases the environmental problem and reduces interest in their management. As a result, this study examined the potential of this lignocellulosic biomass from a comprehensive biorefinery perspective. An extensive investigation was conducted in order to determine the optimal course for the integral valuation of POBs. Initially, an autohydrolysis method was examined in order to extract oligosaccharides. After that, a delignification stage was used, during which the impact of the autohydrolysis pre-treatment was examined as well as several delignification techniques. Finally, a chemo-mechanical process produced cellulose nano-fibers (CNFs). The outcomes demonstrated that autohydrolysis enhanced both the delignification process and its byproducts and made it possible to valorize hemicelluloses. In terms of lignin and cellulose characteristics, acetoformosolv delignification turned out to be the most effective method. The greatest quantity of lignin, while with low purity, was nevertheless extracted by alkaline delignification. From bleached solids, CNFs were also effectively generated. Consequently, the viability of POB as a feedstock for a biorefinery has been established, and the optimal pathway ought to be selected based on the demands of the intended final products.

Keywords : Posidonia Oceanica, Cellulose nanofibers, bioreffinery.

Synthesis, crystal structure, vibrational studies, optical properties and DFT calculation of a new Bi(III) halide complex: $(C_9H_{14}N_3)_4[Bi_2Cl_{11}][BiCl_6].4H_2O$.

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This work reports the synthesis, structural characterization, Infrared spectroscopy and optical properties of the new chlorobismuthate(III) hybrid compound involving discrete binuclear Bi_2Cl_{11} and mononuclear $BiCl_6$ anions coexisting together in the same structure with 1-(2-pyridyl)piperazine-based ligand. The compound structure was determined by single-crystal X-ray diffraction and crystallized in the triclinic space group P-1 with cell parameters: a = 14.7757(2) Å, b = 14.7799(2) Å, c = 23.1633(4) Å, α = 89.016(2), β = 84.0080(10), γ = 74.0400(10) and v = 4836.57(13) $Å^3$, Z = 4 at 296 K. The vibrational spectrum measured at room temperature by FT-IR spectroscopy (4000-400 cm^{-1}) on polycrystalline samples shows the presence of organic cation. The optical study revealed the absorption and photoluminescence properties of the compound. Theoretical studies were investigated by means of DFT and TDDFT calculations. A good agreement was found between theoretical data and experimental results. Furthermore, the intermolecular interactions were examined using Hirshfeld surfaces analysis. The thermal analysis shows that this compound is stable below 380 K.

Key words: X-ray diffraction, DFT calculation, Spectroscopy, Optical study, Hirshfeld surface.

Comparative Study on the Adsorption Efficiency of CTAB-Surfactant-Coated Functionalized Magnetite and Maghemite Nanoparticles for Chromium Removal from Wastewater

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Abstract

The efficient removal of chromium from wastewater is crucial due to its harmful effects on both the environment and human health. Nanoparticles functionalized with surfactants have shown promise as effective adsorbents for this purpose. In this study, we focus on the comparative adsorption efficiency of maghemite and magnetite nanoparticles functionalized with cetyl trimethyl ammonium bromide (CTAB) surfactants, highlighting their potential for chromium removal.

Maghemite and magnetite nanoparticles were functionalized with CTAB surfactants to enhance their adsorption properties for chromium removal. Characterization of the functionalized nanoparticles was conducted using X-ray diffractometry (XRD), transmission electron microscopy (TEM), and Fourier-transform infrared spectrophotometry (FTIR).

Batch experiments were performed to evaluate the chromium removal efficiency under various conditions, including pH, initial chromium concentration, added salt, and adsorbent dose. The results revealed a synergistic relationship between adsorbent dose, pH, and the chemical/electrostatic interactions between the cationic surfactant and negatively charged Cr(VI) ions.

Both types of functionalized nanoparticles exhibited efficient chromium removal at low pH values, with CTAB-functionalized magnetite nanoparticles demonstrating superior performance. However, the efficiency of chromium removal decreased with an increase in pH for both types of nanoparticles.

Interestingly, Fe3O4@CTAB primarily adsorbed chromium through chemical reduction, while γ-Fe2O3@CTAB exhibited predominantly physical adsorption. This difference in adsorption mechanisms contributed to the superior performance of magnetite nanoparticles compared to maghemite.

For instance, at pH = 2, with an adsorbent dose of 5 g/L and an initial chromium concentration of 1 mg/L, maghemite@CTAB achieved a high chromium removal efficiency of 95%. In contrast, magnetite@CTAB achieved a chromium removal efficiency of 95.77% in just 7 minutes and 30 seconds, with a pH of 4, an adsorbent dose of 12 g/L, and an initial chromium concentration of 98 mg/L.

This study underscores the potential of CTAB-functionalized magnetite nanoparticles as efficient adsorbents for chromium removal from wastewater, highlighting the importance of understanding the adsorption mechanisms and optimizing conditions for enhanced performance.

Key words: *Maghemite nanoparticles, Magnetite nanoparticles, Cetyl trimethyl*

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12 May 2024

Extraction et Caractérisation des Composés Phénoliques contenus dans la Pellicule et le Pépin du Marc de Raisin

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Le présent travail porte sur l'extraction et la caractérisation des composés phénoliques contenus dans la pellicule et le pépin du marc de raisin extrait par solvant. L'extraction a été réalisée par l'appareil Soxhlet. En raison de la richesse de pépin de raisin en matière graisse; il est nécessaire de réaliser une opération de délipidation et ce afin d'éliminer les lipides. Le dosage par chromatographie liquide haute performance (HPLC) a été réalisé à l'aide d'un appareil d'analyse de marque YL-9100. La détermination des principales liaisons chimiques a été réalisée par la spectroscopie infrarouge à transformée de Fourier (FTIR). L'évaluation de l'activité antioxydante est basée sur la mesure de pouvoir de piégeage du radical DPPH. Les résultats obtenus montrent que le rendement le plus élevé a été obtenu pour l'extrait de pépin (64.85% mass) par rapport à celui de la pellicule (59.09% mass). Les teneurs en poly phénols de la pellicule et du pépin sont respectivement 103,1 mg EAG/g et 112,59 mg EAG/g. L'analyse par chromatographie en phase liquide à haute performance HPLC, a permis de mettre en évidence de nombreux composés phénoliques dans les deux extraits. Dans le pépin on a principalement identifié : l'acide ascorbique, l'acide gallique, l'acide vanilline, l'acide Trans-cinnamique et l'acide trans 2,4-dimétoxycinnamique, par contre dans la pellicule la molécule principale est l'acide trans 2,4-dimétoxycinnamique. Grâce au spectre FT-IR, il est possible d'identifier les groupes fonctionnels susceptibles de prouver la présence de composés polyphénoliques.

Keywords: Polyphénols, marc de raisin, Pellicule, Pépin, Extraction

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Phytochemistry of *Euphorbia* Plants from the Flora of Algeria: Extraction, Isolation and Structure Determination of Natural Molecules and Biological Evaluation

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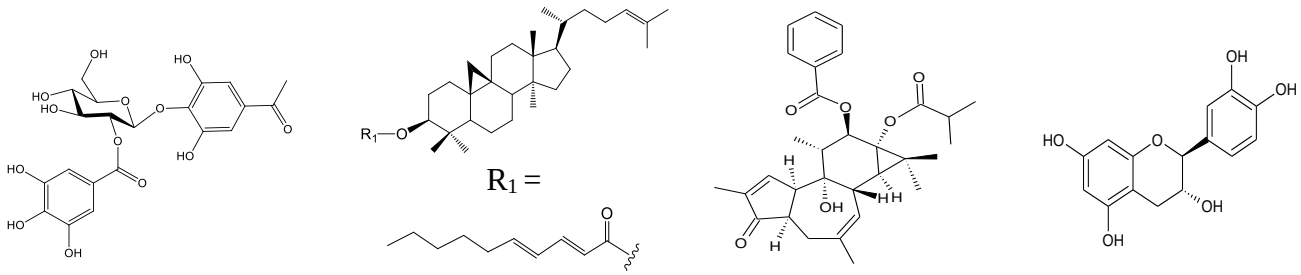
Euphorbia plants of the family Euphorbiaceae grown in Algeria are used in folk medicine for the treatment of several diseases such as skin, ophthalmologic, migraines, warts, snakebites, cancer and intestinal parasites. In our ongoing program of research on new natural molecules from Algerian medicinal species of genus *Euphorbia* like *E. guyoniana, E. bupleuroides, E. pteroccoca, E. atlantica, E. gaditana, E. luteola* and *E. retusa*, we were interested in the extraction, isolation of new phytochemical using VLC, CC, TLC and HPLC, and structure detremination of triterpenoids, diterpenoids, lignans, coumarins, phenolic acids, flavonoids, tannins and an α-pyrone derivative. The structures of the isolated compounds (Figure 1) were determined mainly by 1-D (^{1}H, ^{13}C and DEPT) and 2-D NMR (COSY, HSQC, TOCSY, HMBC, NOESY, ROESY), UV-Vis, FT-IR, mass spectrometry HR-ESI-MS, measurement of optical rotation $[\alpha]_{D,}$ acid and alkaline hydrolysis and comparison with the literature data. Furthermore, the antioxidant activity of the crude extracts, fractions and some compounds was performed using different assays such DPPH, ABTS, FRAP, PPM, CUPRAC, and metal chelate and ferrous-ions chelating activities. Moreover, tyrosinase inhibitory activity of some extracts and new biomolecules was assessed. The extracts of *Euphorbia bupleuroides, E. retusa, E. guyoniana* and *E. atlantica,* were tested against five bacterial strains by the agar disk diffusion assay. The new cycloartane-type ester triterpenes have been evaluated for cytotoxicity, trypanocidal effects and on enzymes involved in endocannabinoid degradation, and one of them exhibited selective inhibition of α/β-hydrolase 12 with an IC_{50} of 11.6 ± 1.9 µM.



Tannin
Acetophenone glycoside

Triterpene
Cycloartane

Diterpene
Phorbol derivative

Flavonoide
Flavane

Figure 1. Structures of **s**ome isolated natural molecules.

Keywords: Medicinal plants, *Euphorbia*, Biomolecules, NMR, Biological activities.

Characterization of Bioactive Compounds in Leaves and Roots of Rare Date Palm Cultivars (*Phoenix dactylifera* L.): Insights and Potential Applications

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The date palm tree (*Phoenix dactylifera*) by-products have been utilized for various medicinal purposes throughout history, although they are not as widely studied as the fruit.In this research, our primary objective was to comprehensively investigate the bioactive compounds present in the leaves and roots of two exceptional and rare date palm cultivars. By applying alkaline hydrolysis to dry residues, we successfully extracted phenols bound to the cell walls of both the roots and leaves, following a prior extraction of soluble phenolic compounds using a reflux device. The quantification of the total phenolic content was accomplished using the Folin-Ciocalteu method. In addition, we tested the antioxidant activity of the extracts with the DPPH (2,2-diphenyl-1-picrylhydrazyl) test.An HPLC-DAD analysis was conducted to identify and characterize the individual phenolic acids present in the samples. The results revealed remarkably high concentrations of phenolic compounds in both date palm roots and leaves, it reached up to 825,63 mg (GAE)/100 g dry weight.The extracts showed significant antiradicalefficacy compared to vitamin C.Notably, a total of twelve cell wall-bound and soluble phenolic acids were identified. Some of them, which had not been previously isolated from this tree. The leaves showcased a predominance of phenolic acids linked to the cell walls, including ferulic acid, p-coumaric acid, and sinapic acid, while the roots were distinguished by the prevalence of p-hydroxybenzoic acid.These phytochemical constituents can reduce the risk of developing diseases and improve functionality. In this way, they are responsible for antioxidant and antimicrobial activities, anti-inflammatory properties, and other health benefits against cancer, diabetes and cardiovascular diseases. Additionally, our scientific inquiry led to the discovery of several hydrobenzoic and hydrocinnamic acids implicated in plant defense mechanisms. In conclusion, this research has not only advanced our understanding of date palm chemistry but alsoshed light on the abundance of phenolic compounds and their potential applications of these bioactive compounds in various scientific fields.

Keywords: Bioactive compounds; HPLC-DAD; antioxidant activity; *Phoenix dactylifera* L.; by-product.

Extraction, GC/MS Analysis, and Antidiabetic Activity Study of Essential Oils from Two Medicinal Plants of Southern Algeria

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The utilization of medicinal plants for therapeutic purposes has been deeply rooted in traditional medicine practices. In this study, we focus on the extraction, Gas Chromatography-Mass Spectrometry (GC/MS) analysis, and evaluation of antidiabetic activity of essential oils derived from two indigenous medicinal plants native to the southern region of Algeria. The extraction process employs hydro-distillation technique to ensure optimal yield and preservation of bioactive compounds. Subsequently, GC/MS analysis is conducted to identify and quantify the chemical constituents present in the essential oils, providing insights into their phytochemical composition.

Furthermore, the antidiabetic potential of these essential oils is investigated through in vitro assays utilizing UV-Vis spectroscopy. The assay methodology is designed to assess the ability of the essential oils to modulate key parameters associated with diabetes. Complementing these experimental analyses, computational studies are performed using induced fit docking and Molecular Dynamics Simulation (MDS) techniques, spanning a simulation period of 100 nanoseconds. Through in silico simulations, we aim to elucidate the molecular interactions between bioactive components of the essential oils and target proteins implicated in diabetes pathogenesis.

The integration of experimental and computational approaches provides a comprehensive understanding of the therapeutic potential of these medicinal plants in managing diabetes. This multidisciplinary investigation contributes to the advancement of natural product-based drug discovery and underscores the significance of traditional knowledge in modern scientific research.

Key words: Medicinal Plants, Essential Oil Extraction, GC/MS Analysis, Antidiabetic Activity

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Antioxidant, antibacterial and immunomodulatory effects of *Lavandula angustifolia*

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Medicinal plants used to and still are generating a deep therapeutic interest around the world, especially in immunomodulation situations. Indeed, immunomodulatory plants could act on one or several axes of the human immune system, through the release of immune cells' enzymes, to the activation of specific genes and receptors. The plant *Lavandula* genus, especially *Lavandula angustifolia* (*L. angustifolia*) is described for its anti-inflammatory potentials; nevertheless, the effect of this plant on immune cells especially polymorphonuclear neutrophils (PMN), being among the first cells to react in case of a danger, is still not well defined.
Our study aims to evaluate the biological activities of the aqueous extract of *L. angustifolia* (LAAE), such as its antioxidant, antibacterial and immunomodulatory activities on human PMN. The antioxidant effects were examined using three antioxidant methods DPPH•radical scavenging assay, nitric oxide radical inhibition, and total antioxidant capacity methods. The antibacterial effect was assessed using three different bacterial strains namely *Escherichia coli* (*E. coli*) ATCC 25922, *Staphylococcus aureus* (*S. aureus*) ATCC 43300 and *Pseudomonas aeruginosa* (*P. aeruginosa*) ATCC 27853.The extract at 20mg/mL was tested by agar plate diffusion method and compared to tetracycline and erythromycin antibiotics. The immunomodulatory effect of LAAE on human PMN isolated from freshly drawn whole blood through Ficoll-Paque centrifugation was studied by the measurement of PMN degranulation. Indeed, isolated PMN were pre-treated with varying concentrations of LAAE (250, 500, and 2000 µg/mL) at 37°C for 30 minutes, followed by fMLP (10^{-6}M) stimulation. PMN degranulation was monitored by measuring the lysis of the substrate *Micrococcus lysodeikticus* at an absorbance of 450 nm by the lysozyme, an enzyme known to be stocked in PMN granules. The aqueous extract of *L. angustifolia* showed a significant dose-dependent antioxidant effect for all the tested methods, with IC_{50} varying from 0,809 mg/mL, 0,864 mg/mL and 2,73 mg/mL for nitric oxide radical inhibition, total antioxidant capacity and DPPH•radical scavenging assay, respectively. Whereas, the three used bacterial strains (*E. coli, S. aureus and P. aeruginosa*), are not sensitive to the extract at the used concentrations. Interestingly, LAAE inhibits the release of lysozyme from human PMN in a dose-dependent manner, reaching 53,53% of inhibition.
The antioxidant and immunomodulatory effects obtained with LAAE on PMN, allow the initiation of other more in-depth studies on the mechanisms of action and signaling pathways exerted by the bioactive molecules of *L. angustifolia*.

Keywords: Medicinal plants –*Lavandula angustifolia*– antioxidant effect – immunomodulatory effect – polymorphonuclear neutrophils.

Nouvelles perspectives dans la culture d'une algue rouge : une stratégie prometteuse pour une production contrôlée d'une algue ayant des bienfaits écologiques et nutritionnels.

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Les macroalgues, organismes photosynthétiques, revêtent une grande importance biologique et économique du fait des services écologiques qu'elles fournissent. En tant que producteurs primaires, elles contribuent au maintien de la qualité de l'eau et offrent un habitat à la flore et à la faune marines. De plus, elles renferment des composants bioactifs ayant un impact sur la santé des animaux marins **(1)**. Les métabolites secondaires synthétisés par les algues marines ont démontré diverses activités bénéfiques, notamment antioxydante, anti-inflammatoire et anticancéreuse **(2)**. Reconnues par l'industrie comme un superaliment en raison de leur valeur nutritionnelle, les macroalgues peuvent être exploitées comme source alternative de protéines végétales, de fibres, de vitamines et de minéraux. En 2019, la récolte sauvage de macroalgues atteignait 1,1 million de tonnes, témoignant d'une demande industrielle croissante **(3)**. Cependant, la surexploitation des stocks sauvages présente des risques écologiques majeurs, menaçant directement l'industrie. Des efforts ont été déployés pour mieux gérer et exploiter ces ressources, notamment par le biais de méthodes de culture basées sur des fragments végétatifs. L'approche adoptée dans ce projet se base sur la culture des spores visant à optimiser la croissance et la production de phycocolloïdes en sélectionnant soigneusement les souches et en favorisant la libération des spores à partir de thalles fertiles dans des conditions appropriées.

Mots clés: Biodiversité marine, Aquaculture, Gestion des ressources marines, Conservation de biodiversité

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Studying the residual effect of agricultural pesticides on vegetables and their impact on human health (southeastern Algeria as a model)

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Abstract :

Pesticides are defined as a group of compounds that are originally chemical substances or a mixture of several substances used mainly to eliminate and control harmful target organisms[1], its use varies greatly between parts of the world in terms of types and quantities [2], due to the active biological nature of pesticides, they cause serious damage to the environment in general and to humans in particular [3].

Where direct field observations and the answers to the questionnaire distributed to farmers, which covered 200 samples,showed that the most commonly used pesticides in the south – eastern region of Algeria include herbicides by 39.5% and fungicides by 28.3% and insecticides by 25.7%, among these pesticides, many of them have been classified as very dangerous by the world health organization. the study showed that the factor responsible for the deterioration of the agricultural reality is a lack of awareness on the part of the competent authorities, as the results indicate that most of the farmers 96.7% almost who were included in the study did not receive training on the safe and proper use of pesticides, as well as the contribution of the educational level of the farmer to this, where the percentage of farmers who did not receive an education 35%. Farmers suffer from several inconveniences due to the indiscriminate and improper use of these pesticides, ranging from skin irritation 80.6% to nausea 78.4% to headache 82.7% and problems in the respiratory system 84.9%

The results warn of an environmental disaster that threatens the health of farms and various ecosystems, and therefore there must be stricterapplication of the current regulations and guidelines related to pesticides to avoid threats to both humans and the environment.

Key Word : Pesticides, chemical substances, questionnaire, environnemental disaster

IDENTIFICATION OF FATTY ACIDS IN *MOMORDICA BALSAMINA* PLANT LEAVES

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Abstract

Momordica balsamina is a plant widely used in traditional African medicine. It is recommended for the treatment of dermatological diseases, including pimples, skin spots, allergies, infections and edema. It is also an excellent skin moisturizer. [1-4]

These different properties of the plant can be correlated to its very rich and diverse phytochemical composition. These include fatty acids, which are very important lipids for the body, and are involved in the treatment of dermatoses, skin and mucous membrane hydration, burns and sunburns, skin barrier degradation and acne.

The aim of this study was to determine the fatty acid (FA) composition of the leaves of the *momordica balsamina* plant. To this end, the plant's leaf powder is extracted by soxhlet. The fatty acid extract is esterified in the presence of methanolic BF3 and sulfuric acid (10%) is used as a catalyst. The esters obtained were analyzed by GC-FID and 4 fatty acids were identified, two of them monounsaturated (palmitoleic acid and vaccenic acid) and two polyunsaturated (linoleic acid and ϒ-linolenic acid).

Key words: *Momordica balsamina*, soxhlet, fatty acids, esterification

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Flavone c-glycoside et un nouveau tannin isolés des feuilles de *Neocarya macrophilla* (Sabine) Prance (Chrysobalanceae)

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Résumé : *Neocarya macrophylla* (sabine) Prance est une plante de la pharmacopée traditionnelle sénégalaise. Ses feuilles sont utilisées dans le traitement de diverses maladies. L'étude phytochimique de ses feuilles a permis d'isoler un nouveau tanin (1), le 1-O-galloyl-6-O-lutéoyl R-glucose (2) et l'Isoorientine (3). Leurs structures ont été isolées et caractérisées en utilisant une combinaison de chromatographie de partage centrifuge (CPC), de spectroscopie RMN (1D et 2D) et de spectrométrie de masse (ESI-MS), ainsi que par comparaison avec les valeurs de la littérature. Cette étude constitue le premier examen phytochimique des feuilles de *N. macrophylla*.

Mots-clés: *Neocarya macrophylla*, feuilles, chromatographie de partage centrifuge, chromatographie préparative, tanin, flavone C-glycoside, RMN (1D et 2D).

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ANTIMICROBIAL ACTIVITY OF ESSENTIAL OILS FROM NINE MEDICINAL PLANTS

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Abstract

Skin infections are a common reason for consultation in primary care and in dermatology practice.Amongthe bacterial skin infections seen by the family physician;cellulitis, impetigo, and folliculitis are the most commonin hospitalized patients.The objective of the present work is to highlight the antibacterial activity of the essential oils ofnine aromatic plants (*Lavandula stoechas, Rosmarinus officinalis, Eucalyptus radiata,Thymus vulgaris, Menthapiperita* L., *Pistacia lentiscus* L., *Origanum vulgare* L., *Syzygium aromaticum, Melaleuca alternifolia*) on four bacterial strains (*E. coli, K. pneumoniae, P. aeruginosa* and methicilline resistant *Staphylococcus aureus (MRSA)*). This antimicrobial activity is demonstrated by the agar diffusion method and the determination of minimum inhibitory concentrations (MICs) and minimum bactericidalconcentration (MBCs). The experimental results show that clove, oregano and thymeessential oilsshow a strong antibacterial activity. It is also noted that *Thymus vulgaris* is active against all the tested strains, especially *P. aeruginosa* (34 ± 0 mm). Theresults obtained showed that the best bacteriostatic inhibitory effects are obtained by thymeand oregano (MICs =50 µg/mL) and that an interesting bactericidal effect is observed withthyme against *K. pneumoniae* and MRSA (MBC = 50 µg/mL). These results promote essential oils of thyme, oregano and cloves which can be used as an alternative for thetreatment of infectious diseases such as skin infection.

Key words: antibacterial activity, essential oils, skin infections, medicinal plants.

Exploration du Potentiel Thérapeutique des Plantes Médicinales Spontanées : Résultats d'une Étude dans l'Est de l'Algérie (W. Batna)

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Les plantes médicinales spontanées, souvent méconnues mais d'une importance capitale, sont au centre de nombreuses études ethnobotaniques. L'enquête menée dans la région Est de l'Algerie (wilaya de batna) s'inscrit dans une démarche scientifique rigoureuse, impliquant la distribution aléatoire de 160 fiches d'enquêtes, aussi bien sur support papier qu'électronique, à travers divers segments de la population. L'objectif central de cette recherche était d'évaluer de manière précise l'efficacité médicinale des plantes spontanées et de recueillir des données empiriques sur leurs effets thérapeutiques.

Les résultats obtenus ont révélé une richesse de connaissances tant pour la région étudiée que pour l'ensemble de la flore médicinale nationale. L'étude met en lumière le rôle essentiel des femmes dans la transmission des savoirs traditionnels et dans l'usage des thérapies naturelles, soulignant ainsi l'importance de la transmission intergénérationnelle des connaissances. De plus, elle identifie les préférences quant à l'utilisation des parties aériennes et des sommités fleuries des plantes, ainsi que les différentes méthodes de préparation propres à chaque espèce végétale.

Cette recherche contribue significativement au corpus scientifique sur l'ethnobotanique et les médecines traditionnelles. J'ai hâte de partager ces découvertes lors du séminaire à venir.

Evaluation of antiproliferative activity and antioxidant potential of Ethanolic Extracts of tow fabaceaes : *Adenocarpus decorticans* and *Ebennus pinnata*

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Oxidative stress, characterized by an imbalance between the production of free radicals and the antioxidant capacities of cells, plays a crucial role in the development of chronic pathologies, in particular cancer.
This relationship highlights the close interweaving between antiradical activity and antiproliferative activity. Antioxidants, present in abundance in medicinal plants, neutralize these free radicals, thus offering protection against oxidative stress and in addition to their antioxidant potential, medicinal plants are also rich in bioactive compounds with antiproliferative properties.
The objective of this work is to evaluate the antiradical and proliferative properties of ethanol extracts from flowers, leaves, and stems of two medicinal plants from the North-eastern region of Morocco, including Adenocarpus decorticans and Ebennus pinnata. The antiproliferative activity of the ethanolic extract of each part of the two species was evaluated in vitro on a murine cancer cell line (P3X63Ag8.653) and on the splenocyte cells originating from the spleen of mice. The antiproliferative activity was measured by assaying MTT at different concentrations of extracts (125, 250,500 and 1000 ug/ml). While the antiradical activity was evaluated according to the FRAP technique by measuring the ability to reduce iron (Fe^{3+}) to its ferrous form (Fe^{2+}), different concentrations of plant extracts were studied (125, 250,500,1000 and 2000 ug/ml). Ascorbic acid was used as a positive control for this test.
The ethanolic extracts of the stem part of the two plants showed considerable antiproliferative activity compared to the other parts. These extracts also showed a remarkable antiradical activity compared to the extracts of the leaves and flowers part.
Research on the antioxidant and antiproliferative activity of medicinal plants remains a promising path that opens up favorable prospects for new treatments based on natural compounds and complementary medical approaches.

Key words: *Adenocarpus decorticans, Ebennus pinnata,* Antioxidant, Antiproliferatif, MTT, FRAP.

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Optimization of extraction of essential oil of *Anacyclus clavatus* (Desf.) from Algeria and evaluated the antioxidant activity

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Anacyclus clavatus (Desf.) is an annual herb, belonging to the Asteraceae family, people use the different parts of this plant in nutrition and in various treatments and applications. The aim of this work was to improve the extraction yield of essential oil by Box Behnken Design (BBD) By choosing three variables, Where the results show the highest yield (R=1.0120%) under the following experimental conditions: Extraction time (180 min), drying time (8-9 days), and the volume of water (1400 m). Essential oils were obtained by hydrodistillation and analyzed by gas chromatography-mass spectrometry (GC/MS). The antioxidant activity was determined by using two complementary assays; namely inhibition of 2,2-diphenyl-1,1-picrirylhydrazil (DPPH) radical and Total Antioxidant Capacity (TAC).

According to the GC/MS results, *A. clavatus* EO consists of 49 components, the main of them were: (*Z*)-en-yn-dicycloether, sabinene, β-pinene and α-thujene. A considerable degree of the antioxidant activity was found in essential oil evaluated in this study. Our results clearly demonstrate that the essential oil of *A. clavatus* can well present an interesting alternative natural, which it can be useful for food preservation pharmaceutical treatment and aromatherapy products.

Design of a new functionalized polymer with heterocyclic compound

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We are interested in polymer functionalization in order to improve or modify their properties for specific applications, such as increased reactivity or interactions with other materials.[1] In this approach, we involved the chemical synthesis of a polymer containing N-2-benzimidazoyl imidate as functional groups. Once synthesized, the polymer is treated with barium ions, in order to adsorb this metal from wastewater at an acceptable cost before its distribution into the environment.[2] The characterization of the obtained modified polymer was carried out using the following techniques: Infrared spectroscopy, X-ray diffraction, differential thermal analysis and elemental analysis. The Impedance of the resulting polymer-barium complexes was studied, revealing an activated thermal electrical conduction mechanism. Additionally, conductivity analysis led to the conclusion that this compound exhibits semiconducting polymer properties.

Key words: Polymer, Functionalization, Impedance, Conductivity, Wastewater

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Protective effect of *Olea europaea* and *Ficus carica* leaf extracts on human embryonic kidney cells

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This work was undertaken aiming at the valorization of agri-food sector byproducts. A particular attention has been paid to the huge mass of green leaves from olive (*Olea europaea*) and fig (*Ficus carica*) as probable sources of bioactive molecules. The main tasks consisted in the phytochemical evaluation of aqueous extracts from olive and fig leaves with a focus on the quantification of total polyphenols and flavonoids, a qualitative analysis by HPLC and an assessment of the *in vitro* antioxidant activity through DPPH, ABTS and FRAP assays. A second part of our work was devoted to investigating the effect of the studied extracts on HEK-293 renal cells with a view to screening a potential nephroprotective effect against cisplatin induced toxicity. The preliminary results showed a considerable richness of the studied extracts in polyphenolic compounds endowed with convincing antioxidant activity. These data were supported by those obtained following the cell model assay. In fact, through the cytotoxicity assessment, we showed that olive and fig leaves extracts were able to protect HEK-293 cells against cisplatin induced toxicity. This hypothesis was consolidated by the observed decrease in the level of reactive oxygen species as well as the thiobarbituric acid reactive substances expressed in cells treated with cisplatin in combination with leaves extracts.

Key words: Valorisation, Leaves extract, Olive, Fig, Nephrotoxicity.

Extraction of cellulose from pruned wood of *Citrus Aurantium*

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Tunisia stands out as a significant citrus producer globally, with an estimated annual production of 380.000 tons in 2024 covering approximately 29,000 hectares. Nearly all Tunisian citrus-producing regions are home to bitter orange (*Citrus aurantium*) trees, which adapt well to the local environmental conditions. This plant is known for the benefits of its essential oil and its several applications, especially in the medical field. To ensure optimal production quality and facilitate the harvesting process, citrus trees are pruned at least once a year, producing from 0.5 to 2.0 tons\ha of wood waste, typically discarded through incineration or soil crushing, leading to several environmental issues. Thus, discovering new routes for the valorization of citrus pruning waste can turn the unexplored biomass into new valuable by-products [1,2].
The objective of our research is to investigate the possible use of *Citrus auruntium* tree pruning as an innovative source of cellulose in order to meet the increasing need for sustainable management of agricultural waste and the promotion of a circular economy. In this context, the chemical composition of the lignocellulosic biomass was studied, and cellulosic fibers were successfully extracted using a chemical approach that involved delignification and bleaching of the raw material.

Key words: Citrus Aurantium, Biomass, Cellulose, Agricultural waste.

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Catalytic activity of Cu/η-Al2O3 catalysts prepared from aluminum chips in the NH3-SCO in presence of water vapor

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Abstract: Copper-loaded η-Al_2O_3 (Cu(x)-Al_2O_3, with x: 1; 2; 3; 5 and 7 wt. %) catalysts with different copper contents were prepared by impregnation/evaporation method. The catalysts were characterized by XRD, FTIR, BET, UV-Vis, TEM and H_2-TPR and evaluated in the selective catalytic oxidation of NH_3 (NH_3-SCO) in the presence of 3.5% water vapor. The characterization techniques showed that the impregnation/evaporation technique permits to obtain highly dispersed copper oxide species on the η-Al_2O_3 surface when a low amount of copper is loaded (1 wt.% and 2 wt.%). XRD showed that the introduction of an additional amount of copper leads to the destruction of the η-Al_2O_3 structure when copper content exceeded 3% wt.%. Thus, Cu(3)-Al_2O_3, Cu(5)-Al_2O_3 and Cu (7,5) -Al_2O_3 catalysts contain mainly large CuO particles. For all catalysts, it is noted that ammonia oxidation increases with the increase of temperature. For the Cu(3)-Al_2O_3, Cu (5)-Al_2O_3 and Cu(7.5)-Al_2O_3 catalysts, a gradual increase in NH_3 oxidation from 200 °C to 400 °C was recorded. But above 400 °C, the oxidation of NH_3 decreases slightly. On the other hand, for Cu(1)-Al_2O_3 and Cu(2)-Al_2O_3 a gradual increase of the NH_3 conversion was recorded from 250 °C to 550 °C and NH_3 conversion to N_2 reached 100% at T > 500 ° C. This high conversion could be attributed to CuO nanoparticles highly dispersed on the support and easily reduced at low temperature (T = 130 °C).

Keywords: Cu/η-Al_2O_3, impregnation/evaporation technique, H_2-TPR; TEM, NH_3-SCO.

Electrospun Cactus Mucilage/Poly(vinyl alcohol) Nanofibers as a Novel Wall Material for Dill Seed Essential Oil (*Anethum graveolens* L.) Encapsulation

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In this study, lasting carriers with electrospun nanofibers containing dill seed essential oil (DSEO) were created using cactus mucilage (CM) and polyvinyl alcohol (PVA). Atomic force microscopy topographic images revealed that the electrospun nanofibers had a tubular morphology. Thermogravimetric curves of the material used and the nanospun fibers produced show that the loaded electrospun nanofibers have effective chemical connections. The water contact angle results demonstrate that the nanofibers produced are hydrophilic. Electrospun nanofibers consistently achieve a remarkable encapsulation efficiency of 100% DSEO. Because DSEO-loaded electrospun nanofibers show promise as an active inner coating for biomedical and food packaging applications due to their long-term sustained release and bactericidal activities against food-borne pathogenic bacteria (*Staphylococcus aureus* and *Pseudomonas aeruginosa*).

Key words: cactus mucilage, dill seed essential oil, electrospinning, nanofibers.

Valorization of Used Vegetable Oils: Physico-Chemical Characterization and Potential of Methyl Esters for Sustainable Biodiesel Production

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The study on the valorization of used vegetable oils is of paramount importance both environmentally and energetically. Indeed, the reuse of these used oils constitutes an effective strategy for environmental protection by reducing waste and limiting the harmful impact on aquatic and terrestrial ecosystems. In addition to its environmental benefits, the valorization of used oils also offers a valuable opportunity in the production of methyl esters, particularly for biodiesel production. This renewable biofuel offers multiple advantages, such as reducing greenhouse gas emissions and decreasing dependence on fossil fuels. However, to ensure the quality and efficiency of biodiesel produced from used oils, it is imperative to establish limits on the use of these oils based on their degree of degradation. Setting these usage thresholds helps prevent excessive oil deterioration and ensures optimal yields during methyl ester production. Thus, this study underscores the crucial importance of valorizing used vegetable oils not only in environmental preservation but also in the sustainable production of biofuels. By setting appropriate usage limits, we can fully exploit the potential of used oils while minimizing their impact on our ecosystem, thereby contributing to a cleaner and more sustainable energy future.

Key words: used vegetable oils, ecosystems, renewable biofuel, biodiesel.

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CHARACTERIZATION OF LESCHATE FROM HOUSEHOLD WASTE OF SOUK AHRAS CITY

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Abstract

The amount of household and similar waste produced in the city of Souk-Ahras is about 100 tons by day, this waste which is hazardous to public health and the environment, requires their treatment. Algeria has adopted the strategy of the technical burial of this waste. This makes it possible to valorize energy resources (biogas) but also generates leachates (waste juice) which present risks of pollution of water, soils... etc.

The objective of our work is to carry out a physicochemical characterization of the leachate coming from the waste storage center of the city of Souk-Ahras, in order to determine the polluting load, to verify the efficiency of the biological treatment by lagooning on the one hand, and plan appropriate treatment methods on the other.

The results obtained show that these leachates have a high concentration of organic and inorganic pollutants. They contain high levels of nitrates, phosphates and chlorides, reflecting their high electrical conductivity and turbidity.

This study has allowed us to highlight the pollution generated by leachates from waste storage, which is characterized by an average biodegradability of organic matter and a high mineral load content and matter in suspension, because waste landfilled are not at source and mixed with other special waste. This leads us to check the inadequacy of biological treatment and the need for more effective treatment to ensure better environmental protection.

Keywords: Solid waste, households, waste storage center, treatment, leachate (sorted waste juice), physicochemical, characterization.

Promoting Eco-Friendly Biodiesel Production

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The synthesis of biodiesel from frying oil and bio alcohol involves a sustainable process that transforms used cooking oils into a viable alternative fuel. This process usually begins with the collection and purification of used fryer oil, followed by a transesterification reaction, where the oil reacts with bio-alcohol, in the presence or absence of a catalyst. This reaction produces biodiesel as the main product, with glycerol as the by-product. The resulting biodiesel can be used in diesel engines with little or no modification, providing a sustainable and eco-friendly substitute for conventional diesel fuels derived from petroleum. In addition, the use of used cooking oils reduces environmental pollution and contributes to the circular economy by turning a waste stream into a valuable resource. The physico-chemical properties of the produced biodiesel were determined and compared to American Standards (ASTM).

Key words: Waste cooking oil, transesterification, biodiesel, bioethanol, ASTM.

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Investigation on innovative materials for photovoltaic panels

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Innovative materials play a crucial role in the development of more efficient and cost-effective photovoltaic (PV) panels. Traditional silicon-based solar cells dominate the market, but research is underway into alternative semiconductor materials that are more efficient and less costly to manufacture. Materials such as thin-film solar cells based on cadmium telluride (CdTe), copper indium gallium selenide (CIGS) and perovskite are being investigated for their potential to improve performance and reduce production costs, while perovskite solar cells have also received particular attention for their high efficiency potential, low-cost manufacturing processes and versatile form factors. Perovskite materials offer the potential for flexible, lightweight and transparent solar panels, opening up new applications in building-integrated photovoltaics and consumer electronics. Organic photovoltaic materials are lightweight, flexible and potentially low-cost alternatives to traditional silicon-based solar cells. OPVs can be manufactured using solution-based processes on flexible substrates, making them suitable for applications such as portable electronics, portable chargers and integration into building materials. Transparent conductive films: Transparent conductive materials are essential for the manufacture of silicon-based photovoltaic cells, in this context, a detailed study on them was exposed and well detailed.

Key words: Photovoltaic panel, Silicon, innovative materials.

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THE INVESTIGATION OF BONE REGENERATIVE EFFECTS OF MELATONIN LOADED PLGA COMPOSITE NANOFIBERS IN AN EXPERIMENTAL CRITICAL CALVARIAL DEFECT MODEL IN RATS*

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Non-union large bone defects are one of the challenging issues in humans. Due to several options (xenograft, allograft etc.) for bone regeneration and innovations in bone tissue engineering, autografts are still the gold standard in this field. However, autografts have drawbacks such as non-union or delayed regeneration, inflammation at the donor, and limited availability. For this, we aimed to investigate the effects of melatonin (Mel)-loaded polylactic-co-glycolic acid (PLGA) composite nanofibers on bone regeneration in an experimental critical calvarial defect model in rats.

For that purpose, 54 Wistar Male rats were used and randomly divided into three groups (n=18 in each groups); SHAM, PLGA, PLGA-MEL. Critical calvarial defects (6 mm diameter) were established and autografted in all groups. The SHAM group did not receive any composite nanofibers. Autograft areas were covered with a PLGA matrix (1x1cm) in the PLGA group) and melatonin-loaded PLGA matrix in the PLGA-MEL group. Following surgery, on days 7., 14., and 28., rats were sacrificed and calvarial bone specimens were harvested for histopathological analysis. Hematoxylene&Eosin (H-E; for evaluation of new bone regeneration), Masson's Trichrome (M-T; for evaluation of collagen deposition), Periodic Acid Schiff (PAS; for evaluation of angiogenesis), and Von-Kossa (for evaluation of mineralization) stainings were performed to evaluate bone regeneration.

Melatonin-loaded PLGA composite nanofibers application significantly enhanced new bone growth, stimulated collagen and mineral deposition, and increased vascularity on days 7., 14. and 28. compared to SHAM group ($p<0.05$ or $p<0.001$).

Our results indicated that Mel-loaded PLGA nanofibers facilitated the union of autograft to host bone and accelerated bone healing. Furthermore, the bone regenerative effects of melatonin-loaded PLGA may be obtained on day 7. Therefore, we suggested that Mel-loaded PLGA nanofibers could be a candidate for bone tissue engineering and provide new insights into clinical practice.

Key Words: Calvarial defect, autograft, melatonin, polylactic-co-glycolic acid, nanofiber

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A zinc oxide-modified black gold employed in electro-Fenton for the degradation of Congo red

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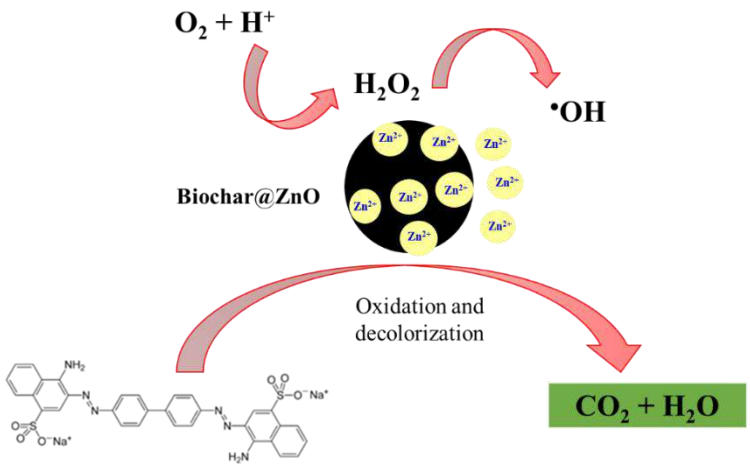
In this work, we report the agricultural biomass waste (*Moringa oleifera*) valorisation via its conversion from trash to "black gold" treasure. *Moringa oleifera* biomass powder was impregnated with zinc acetate salt followed by their pyrolysis at 500 °C under inert atmosphere. This has resulted in ZnO nanoparticles homogeneously distributed over biochar surface. The prepared composite materials were characterized by several techniques such as XPS, Raman, FESEM and XRD. The applicability of the composite catalyst was demonstrated by the electrochemical degradation of Congo Red dye (model pollutant). The process involved employing a platinum anode and a carbon felt cathode, enabling the generation of H_2O_2 through the reduction of O_2. The use of biochar-ZnO as a heterogeneous catalyst in the electrochemical process proved highly effective, leading to the near-complete mineralization of the Congo red solution (with a 98% removal of total organic carbon) after 300 minutes. The ZnO-decorated biochar has shown 10 times more efficiency than the unmodified biochar for CR dye degradation.

Key words: Biochar, Biomass, Electro-Fenton, Mineralization

Graphical abstract:



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R. Rahmani, S. Sassi Aydi, D. Ben Hassine, T. Ben Khadher, M. Debouba, J. Bouajila, S. Aydi *FSG - Gabès* Phytochemical characterization and bioactivities of different fruit parts of *Cupresus sempervirens* combined with multivariate analysis	**PC-174**
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S. Salhi, L. Kadri, A.S. Schuller, L. Ionut Atanase, C. Delaite, H. Ammar *FSS - Sfax* Preparation of phenylalanine-based polyesteramides nano-drug delivery system with high cell-viability and chemical stability	**PC-180**
S. Salhi, Y. Chatti, L. Kadri, L. Ionut Atanase, H. Ammar *FSS - Sfax* Amino acid-based biosourced poly(ester-amide)s: Synthesis, characterisation and drug-loaded nanoparticles production.	**PC-181**
W. Sassi, S. Ammar, J.Y. Hihn *FSG - Gabès* New B@Xenes structure in toxic metal removal using ADOX process	**PC-182**
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M. Sfar, M. Itaimi Dammak, Z. Mzoughi, H. Lazreg, J. Hafsa, D. Le Cerf, H. Majdoub *FSM - Monastir* Microwave-assisted extraction of polysaccharides from apricot seeds: antioxidant, antiglycation and α-amylase inhibitory activities	**PC-184**
A. Souadia, A. Djemoui, L. Souli, K. Haiouani, D. Djemoui *University of Djelfa, Algeria* Chemical composition and antioxidant activity of the essential oil of Thymus lanceolatus Desf.	**PC-185**

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A. Souadia, A. Djemoui, L. Souli, K. Haiouani, D. Djemoui *University of Djelfa, Algeria* Optimization of sonic extraction using maceration method for phenolic content and antioxidant activity of Thymus lanceolatus Desf.	**PC-186**
A. Tahraoui, Z. Ghiaba, N. Zobeidi, A. Tabchouche *Kasdi Merbah University, Ouargla, Algeria* Craft new polymers through structural alterations of PVC	**PC-187**
J. Taleb, L. Mabrouki, L. Zourgui *ISBAM - Médenine* Optimization and cytoprotective potential of Opuntia ficus indica cladode extract against cadmium toxicity using surface methodology as an optimizing tool	**PC-188**
N. Tamma *University of Eloued, Algeria* A phytochemical and biological study of Thymus capitatus plants growing in Algerian high plains	**PC-189**
N. Touj, N. Hamdi *ISSTE - Borj Cédria* Chemical composition and in vivo efficacy of the essential oil of Mentha piperita L. in the suppression of crown gall disease on tomato plants	**PC-190**
N. Touj, C. Bruneau, N. Hamdi *ISSTE - Borj Cédria* Cross-metathesis transformations of terpenoids in dialkyl carbonate solvents	**PC-191**
E. Toumi, N. Elleuch, S. Shova, M. Boujelbene *FSS - Sfax* A new luminescent chiral hybrid compound: [((R)-C8H12N)4](Sb2Cl10) with antimony dimers	**PC-192**
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F. Younsi, Y. Zouali, M. Boussaid, C. Messaoud *INSAT - Tunis* Etude des activités biologiques des métabolites secondaires de deux espèces du genre Pistacia	**PC-197**
L. Zenkhri, N. Babaami, G. Ben azia, M. Bassa *Université Kasdi Merba, Ouargla, Algérie* Synthesis of hybrid materials with NH3[Cd(C2O4)2].2H2O for water depolution	**PC-198**
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I. Zguir, A. Kechiche, L. Baouab, F. Loiseau, H. Nasri *FSM - Monastir* Synthesis and spectroscopic characterization of a new cobalt(II) meso-aryl porphyrin complex. Crystal structure of [CoII(TTMPP)(3-A-2Clpy)].2H2O	**PC-200**

Authors, Institution and Title of Abstract	Ref
T. Zorgui, A. M'nassri, S. Abid-Essefi, M. Romdhane *ENIG - Gabès* Cleome amblyocarpa Barratte & Murb induced cytotoxic effects in HCT116 cells by generation of ROS, Rh123 and DNA damage	**PC-201**

Abstracts of Poster Communications

Essential oil composition and antioxidant activity of *Brocchia cinerea* growing wild in Eastern Algeria

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The essential oil of the aerial parts of *Brocchia cinerea*, obtained by hydrodistillation, was analyzed by a gas chromatography coupled to mass spectrometry (GC/MS) method, in order to determine its chemical composition. Twenty-Five (25) components were identified in the oil of *B. cinerea*. The findings showed that the major components of the essential oil were β-Thujone (32.01%), Isobornyl acetate (16%), 1,8-Cineole (15.31%), Santalina triene (9.35%), Camphor (3.92%), Terpinen-4-ol (2.91%), p-Cymene (2.27%).

It is the first report on the chemical composition of the essential oil extracted from the *B. cinerea* cultivated in Algeria, as well as an original study on the antioxidant activity of *B. cinerea* essential oil.

After investigating the antioxidant properties of *B. cinerea* essential oil with 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging method, the results showed that this oil is of a low efficiency; nevertheless it can be considered as an important natural source of antioxidants in comparison with other medicinal plants.

Key words: *Brocchia cinerea*, Lamiaceae, Essential oil composition, GC, GC/MS, antioxidant.

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Annealing effect on the photocatalytic properties of Sm doped ZnO nanocrystals

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Rare earth metal (Sm)-doped zinc oxide, ZnO-Sm (0, 1, 3, 5, and 6% at.) were synthesized via an aqueous precipitation route using $ZnCl_2$, $SmCl_3.6H_2O$, NaOH, and the surfactant PVP. The effects of doping and thermal treatment on the structural and photocatalytic properties of the prepared nanoparticles were studied. The samples were characterized using X-ray diffraction (XRD), infrared (IR), UV-visible spectroscopies, and scanning electron microscopy (SEM). The XRD diagrams show that powders possess the hexagonal wurtzite phase with the formation of two minor secondary phases of $Sm(OH)_3$ and $Zn_5(OH)_8Cl_2.H_2O$ for respectively, ZnO-Sm(5%) and ZnO-Sm(6%).

The photocatalytic activities of the samples were investigated by evaluating the degradation of methyl orange (MO) dye in aqueous solutions under UV irradiation. The photocatalytic efficiencies (PE) of the samples were 51, 54, 36, 17, and 7% during 180 min of illumination, for respectively ZnO, ZnO-Sm(1%), ZnO-Sm(3%), ZnO-Sm(5%) and ZnO-Sm(6%). The reduced PE values of 17% and 7% are, most probably, due to the presence of auxiliary phases. In order to promote the photocatalytic properties, the samples were annealed in air at 350 °C for 3 hours [1, 2]. The XRD patterns of the calcined samples present the ZnO wurtzite phase without any impurities: $Sm(OH)_3$ and $Zn_5(OH)_8Cl_2.H_2O$ disappeared. The obtained photocatalytic efficiencies at 180 min were 51, 30, 31, 74 and 42% for the annealed ZnO, ZnO-Sm(1%), ZnO-Sm(3%), ZnO-Sm(5%), and ZnO-Sm(6%), respectively. It should be noted the significant improvement of the photocatalytic activity of ZnO-Sm (5%) and ZnO-Sm (6%) after annealing. Our results show that the doping Sm of 5%at. represents the optimal concentration, with a better PE value of 74% at 180 min and 94% at 300 min of the UV irradiation time. Compared with the literature, ZnO-Sm(5%) exhibits one of the best photocatalytic performances among samarium-doped ZnO nanomaterials.

Keywords: ZnO, Sm doping, UV Photocatalysis, Annealing temperature.

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New g-C_3N_4 Derived Schiff Bases: Optimized Synthesis, Structural and Optical Properties

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Abstract:

In this study, we describe the conceptualization, optimized synthesis, structural, thermal and optical characteristics of four modified g-C_3N_4 (A-D). The synthesized g-C_3N_4 Schiff bases were synthesized following a new protocol. The synthesized samples have been investigated by Fourier transform infrared (FTIR) spectroscopy, X-ray diffraction (XRD), thermogravimetric analysis (TGA), scanning electron microscopy (SEM) and UV-Visible spectroscopy. Obtained results proved successful structural modification.

Keywords: g-C3N4, new synthesis procedure, characterization, Optical Properties.

New g-C_3N_4 Derived Schiff Bases Metallic Complexes: Optimized Synthesis, Structural and Optical Properties

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Abstract:

In this study, we describe the conceptualization, optimized synthesis, structural, thermal and optical characteristics of a library of g-C_3N_4 metallic complexes. The synthesized g-C_3N_4 Schiff bases were synthesized using several metals (Ni, Zn, Cu and Co). The synthesized samples have been investigated by Fourier transform infrared (FTIR) spectroscopy, X-ray diffraction (XRD), thermogravimetric analysis (TGA), scanning electron microscopy (SEM) and UV-Visible spectroscopy. Obtained results proved successful structural modification.

Keywords: g-C_3N_4 metallic complexes, characterization, Optical Properties.

Effect of recent chemical treatments on the physical and mechanical properties of luffa cylindrica

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The properties of a natural fiber composite such as tensile strength, flexural strength, impact, compression, hardness, and physical properties like water absorption, density is critical for ensuring its suitability for use in industrial sectors. Luffa is one of natural fibers which achieve these properties in this regard much research has been focused on developing its utility on a large scale. Water absorption and moisture retention are detrimental to composite material fiber/matrix adhesion. Furthermore, because they are naturally hydrophilic, luffa fiber has high moisture absorption properties. This work presents the recent developments carried out on luffa, namely the different chemical treatments (alkalinization, acetylation, KMNO, silanization,.etc.) thus compare their effectiveness on the final properties of the fiber, and also other types of treatment that have not been experimentally used as radiografting.

Key words: Acytilation, Alkalinization, Luffa cylindrica, Moisture absorption, Treatment

The effect of alkaline treatment as chemical treatment and compared with srearic acid on the chemical property of sponge gourd (luffa cylindrica) fiber

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Over the years, several ways of processing lignocellulosic fibers have been developed, due to the hydrophilic nature of natural fibers due to the presence of hydroxyl groups and their polarity which makes them incompatible with most hydrophobic polymers leading to a reduction in mechanical properties of composites (difficulties in dispersing fibers in the matrix, water absorption, aggregation phenomenon, etc.) and therefore this treatment or modification has made it possible to obtain products with varied characteristics depending on the type and uniformity of the distribution of substituting groups, thus opening a wide field for the design of new materials.

Key words: Alkalinization, Luffa cylindrica, Moisture absorption, Treatment

Dinucleating N,S and N,O-donor ligands: a simple route to Novel dinuclear cationic η^3-methallyl palladium complexes

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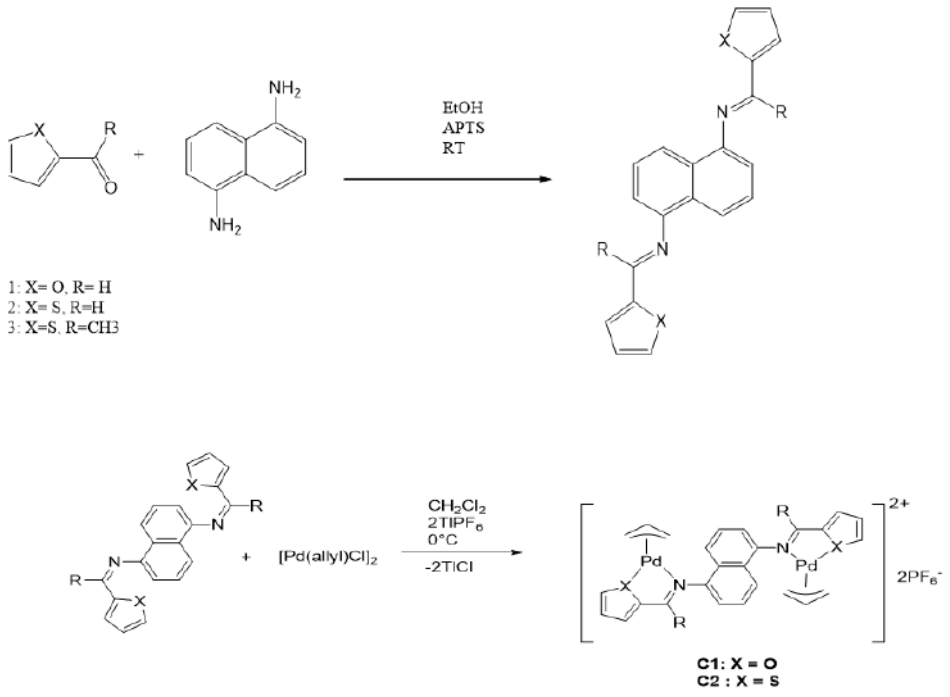
A series of α,α'-diimine ligands were prepared by condensation reactions of furfural, thiophenecarboxaldehyde or 2-acetylthiophene with primary diamines. The synthesis of ligands L1, L2 and L3 is carried out in a single step by condensation of two equivalents of aldehyde with a single equivalent of an aromatic diamine in ethanol at room temperature. These ligands react with Pd(dba)2 in the presence of the salt methallyloxytris(dimethylamino)phosphonium hexafluorophosphate $[C_4H_7OP(NMe_2)_3]^+$ PF^-_6 to give the novel cationic dinuclear η3-methallylpalladium(II) complexes C1 and C_2. These new compounds have been characterized by IR and NMR spectroscopy.



Key words: α,α'-diimine,NMR, IR spectroscopy.

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Phytochemical study and phytotherapeutic evaluation of prickly pear vinegar against obesity

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Research is currently focusing on medicinal plants, which are considered to be as potential sources of a wide range of phytotherapeutic substances. These substances have proved to be the most effective weapons in the fight against a number of diseases. The present study falls within this framework and aims, on the one hand, to study the effects of obesity in Wistar rats, and to demonstrate the corrective effect of fig vinegar on corrective effect of prickly pear vinegar.

The results obtained show firstly that in vitro Opuntia stricta vinegar is rich in secondary metabolites and has an inhibitory effect on pancreatic lipase (a key enzyme in obesity). Secondly, in vivo our results show that the increase in body weight in rats disrupted biochemical parameters including liver liver parameters (AST, ALT, ALP), lipid parameters (TG, T-ch, LDL-ch and HDL-ch) and oxidative stress. It has also been shown to cause liver and heart damage (TBARS, DC, AOPP, thiol groups, GSH, SOD, GPx, CAT). However, Opuntia stricta vinegar was able to reduce overall body weight and modulate the biomarkers studied compared to a drug recommended for the treatment of obesity (fluvastatin).

Key words: Opuntia stricta, polyphenols, flavonoids, liver, heart, vinegar.

Highly Fluorescent Substituted Boranils: Optimized Synthesis, Structural and Photophysical Properties

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Abstract:

In this contribution, we report the design, optimized synthesis, structural, thermal and photophysical characteristics of a library of six conjugated Boranils ((A-F) -BF_2). The Boranils ((A-C) -BF_2) were synthesized at low temperature. whereas Nitro and Pyridine substituted Boron Difluoride derivatives were collected after 3 days at 80°C. Energy dispersive X-ray diffraction proved each corresponding elemental composition variation. Tert-Butyl and Chloro substituted Boranil exhibits a relative excellent thermal stability. All synthetisized Boranils are fluorescent in solution and their optical properties were tuned through phenyl groups' substitution and Boron Difluoride complexation. The calculated energetic gap of Nitro and Chloro substituted Boranil (D-BF_2) is relatively the highest among fluorescent Boranils. A noticeable red shift in the absorption spectra compared to the parent Boranil A-BF_2 is coupled with efficient electronic interaction between the donor (Chloro) and acceptor (Nitro) units in D-BF_2.

Keywords: Boranils, Optimized synthesis procedures, Fluorescence, Optical Properties.

Structure and Charge Delocalization in Pentavalent Halosiliconates: A Theoretical Study

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Abstract

Structures of pentavalent halo-siliconate R-O-Si(CH3)3X- (X = F; Cl; Br) and (R = CH3; CH3-CH2-; -CH(CH3)2; -CH=CH2; -C6H5) are investigated using density functional theory (DFT) calculations at b3lyp-6-31G(d) level to understand the structure bonding characteristics and the delocalization of electronic density. Our results indicate that pentavalent fluoro-siliconate R-O-Si(CH3)3F- are stable intermediates for all substitutions with a trigonal bipyramidal geometry, the substituents prefer the axial position and the loss of alkoxy group is detected via the electronic charge transfer. In the case of X = Cl-; Br- intermediates adopt a structure in which the alkoxy group is nearly double bonding with silicon atom. The loss of Cl- and Br- detected by their negative charge (-0,941) and distance of (3,89) from the silicon center. Besides, the halotrimethylsilyloxyfurane (X-TMSOF) structures are also investigated at the same level of calculations. GIAO method permits to calculate δ29Si NMR shifts for the R-O-Si(CH3)3X- systems. A correlation between (Si–X) distance, Si-O-C angle and δ29Si NMR shifts has been drawn.

Keywords: DFT, pentavalent halo-siliconate, X-TMSOF, charge delocalization, GIAO, ^{29}Si NMR shifts.

Extraction d'huile essentielle à partir des feuilles de Myrte Commun

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Myrtus communis L., connu sous le nom de Myrte, est l'une des espèces aromatiques et médicinales importantes de la région méditerranéenne [1, 2]. Il est utilisé dans divers domaines tels que les applications culinaires, cosmétiques, pharmaceutiques, thérapeutiques et industrielles [2, 3, 4, 5].

Le myrte est une plante aromatique de la famille des Myrtaceae utilisée en médecine traditionnelle comme remède contre de nombreuses maladies courantes. Ses fruits, feuilles, graines et huiles essentielles sont d'importantes sources de nutriments, composés phytochimiques, et antioxydants avec des bienfaits prometteurs pour la santé [6, 7].

L'objectif de cette étude est la valorisation des plantes aromatiques de la région telle que le Myrte commun par extraction et caractérisation de l'huile essentielle à partir des feuilles de cette plante par la méthode d'hydro distillation à l'aide d'un appareil type Clevenger avec un rendement de 0,32%. Plusieurs tests de caractérisation ont été réalisés sur l'huile essentielle extraite tels que l'activité anti microbienne, le criblage des métabolites secondaires et les indices physiques et chimiques.

Les principaux résultats obtenus ont montré que notre huile essentielle est bien conservée, riche en divers métabolites secondaires et une bonne sensibilité de l'*Escherichia coli* par rapport à l'huile essentielle contrairement à la staphylococus aureus.

Pour conclure, l'huile essentielle de *M. Communis*, peut être considérée comme un agent antimicrobien prometteur pour l'industrie pharmaceutique. Ce qui fait que le Myrte Commun est un patrimoine à préserver et à valoriser.

Key words: Plantes arômatiques, Huiles essentielles, Hydro-distillation, Activité anti-microbienne.

Effect of Opuntia ficus indica extract on methotrexate-induced testicular injury: A biochemical, docking and histological study

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Methotrexate (MTX) is a chemotherapeutic medicine used in the treatment of several types of cancer and inflammatory diseases. It exhibits several drawbacks especially on highly dividing and developing cells. This study aimed to assess the role of *Opuntia ficus indica* ethanolic extract on testicular damage induced by MTX in rat. MTX was administrated for 10 days (20 mg/kg). Extract of cactus cladodes (*Opuntia ficus indica*) was given to MTX-treated rats (0.4 g/kg). Spermatozoa were collected from caudae pididymis and analyzed for sperm count and motility. Testis samples were used for histopathologicaland oxidative stress studies (assessment of malondialdehyde (MDA) levels, protein carbonyls (PCs), catalase (CAT) glutathione peroxidase (GPx) and superoxide dismutase (SOD) activities). Moreover, levels of testosterone were measured in serum by radioimmunoassay. Our results showed that MTX had destructive effects on sperm count and motility associated with significant decrease in testosterone levels in MTX group. This effect was then confirmed by docking results. Testis of MTX group showed increased oxidative stress status. In fact, PCs and MDA were increased and CAT, GPx and SOD were decreased suggesting increased reactive oxygen species and deficiency in enzymatic antioxidant.
These findings were associated with disrupted testicular morphology as assessed by histological study. Cladodes extract had protective effects on rat's gonad histology, oxidative stress and improve both sperm parameters (count and motility) and serum testosterone levels. In conclusion, our results suggested that *Opuntia ficus indica* cladodes extract improved MTX-induced testicular injury and possess potent fertility boosting effects in rats.

Key words: Methotrexate; cactus cladodes; *Opuntia ficus indica*; oxidative stress; reproductive toxicity; sperm count and motility

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In silico Targeting of the FtsZ Cell Division Protein to Overcome Antimicrobial Resistance

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Antimicrobial resistance poses a global health threat, necessitating innovative strategies to combat drug-resistant pathogens. This study utilized *in silico* methods to identify potential compounds targeting the FtsZ protein, a critical component of bacterial cell division, to overcome antimicrobial resistance. Molecular docking and virtual screening identified four lead compounds with a strong binding affinity of -7.60, -7.26,-7.10, and -7.00 kcal/mol, respectively. Molecular dynamics simulations provided insights into complex stability and dynamics, with compound 1 showing an MMGBSA of -38.75 kcal/mol. In addition, these compounds showed an excellent ADME profile. These findings highlight the potential of targeting FtsZ as a strategy to combat antimicrobial resistance. Further experimental validation is needed to confirm the inhibitory activity and therapeutic potential of these compounds.

Keywords: AMR, Docking, MMGBSA, ADME,

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Synthesis and characterisation of porous hybrid materials for the adsorption of chromium VI

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Abstract

The purpose of this study was to eliminate Cr(VI) ions from an aqueous solution through the synthesis of PEG-templated ZIF-67 at room temperature using a specific process. ZIF-67 was produced by reacting Co salt with 2-methylimidazole, demonstrating exceptional removal efficacy. The optimization of ZIF-67 adsorption parameters was based on maximal Cr(VI) uptake, aiming to enhance both its structural characteristics and adsorption capacity. The unique features of ZIF-67 nanoparticles were evaluated through various techniques, including thermogravimetric analysis, Fourier-transform infrared spectroscopy, X-ray powder diffraction, transmission electron microscopy, and N_2 adsorption (Brunauer-Emmett-Teller) measurements. These assessments revealed outstanding characteristics such asultramicropores with a size of 0.64 nm, a high surface area of 1891 m^2/g, and a total pore volume of 0.86 cm^3/g.The adsorption process was investigated concerning the effects of adsorption pH, adsorbent mass, starting concentration, and contact time. Findings indicated that at 35 °C, a pH of 5.9, an adsorbent mass of 10 mg, and an initial concentration of 50 mg/L, Cr(VI) exhibited a maximum adsorption capacity of 26.27 mg/g. The equilibrium period ranged from 180 minutes at a low starting concentration of 10 mg/L to 240 minutes at a high initial concentration of 60 mg/L for Cr(VI) adsorption. The Langmuir and Freundlich isotherm models elucidated the equilibrium results, with the Freundlich model performing better at various temperatures. The experimental data were more fitting to a pseudo-second-order model than a pseudo-first-order one. According to adsorption thermodynamics, the process was endothermic and spontaneous.

Keywords:

Zeolitic Imidazolate Framework, Specific Surface Area, Adsorption, ZIF-67, Chromium (VI).

Detailed investigation of optical properties potential and biological activities' benefits of the new bismuth-based $(C_9H_{11.5}N_4)_2[BiBr_6]\cdot 5H_2O$ hybrid material

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Abstract

An investigation of the optical properties and biological activities of a new organic-inorganic hybrid compound, $(C_9H_{11.5}N_4)_2[BiBr_6].5H_2O$, was conducted and detailed in this report. The optical properties of the compound were measured at room temperature in the range of 200 to 1000 nm. The optical direct band-gap Eg was evaluated using reflectance data, absorbance data, or the Kubelka-Munk Tauc method, confirming that the compound is a weak semiconductor. Other interesting optical properties were also determined, showing a good overall optical property of the new hybrid material. The Density Functional Theory (DFT) method using the B3LYP function with the LanL2DZ basis set was used to compute the optimized molecular structure, Density of State, and band structure of the compound. A satisfactory agreement was found between the calculated and experimental optical analyses, including the Eg and the type of the transition, which was shown by the band structure to be direct.

The compound was also subjected to biological activities, including anti-Alzheimer, antioxidant, and antibacterial activities. The results revealed the potential of this compound to respond to these tests, which was shown as an example by its favorable activities against 1,1-diphenyl-2-picrylhydrazyl (DPPH) as well as the discoloration of b-carotene. The compound showed the most effective activity against all the tested bacteria.

Will Natural Products Overcome the Gatekeeper Mutation in HER2 : *In silico* Study

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Abstract

Cancer is one the most common health issues worldwide, with cancer-related mortality of 9.5 million in 2018, with an expectation to become 29.5 by 2040; among others, breast cancer causes 685000 deaths in 2020. The current chemotherapy for breast cancer that is targeting the HER2 kinase domine islosing activity due to mutation in the gatekeeper residue in $HER2^{T798I}$. Herein, we used natural products to overcome the resistance in $HER2^{T798I}$ kinase domine using *in silico* approaches. A database of 192513 natural compounds were HTVS against the mutated active site, and the best compounds resulted was further enhanced by slandered precision docking and followed by extra precision docking. Twenty-six compounds showed a promising activity compared to the Co-crystal ligand, with compounds CNP0089558and CNP0093037 showing an XP docking score of -14.601 and -14.246 kcal/mol, respectively, compared to -10.893 kcal/mol of the TAK-285.

Further molecular dynamic simulation for 100 ns was implemented, and the stability of the compounds inside the mutated active site of theHER2 kinase domine wasestimated. Finally, the MM-GBSA energies were calculated for the best compound and found to be 60.869 kcal/mol. These outcomes are promising in finding new natural therapeutic in breast cancer with $HER2^{T798I}$ kinase domine mutations.

Keywords: Breast Cancer, Lapatinib, HER2, MM-GBSA, Xtra precision docking.

The phytochemical study and biological activity of two plants of Asteraceae family

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Plants occupy a fundamental place in our world,they ensure primary production,build plant cover so they strongly participate in climate regulation and the water cycle,numerous active substances that they contain, used in particular in medicine.Indeed, most medicines are initially made from plants,more than 400 thousand species of land plants are already known to science,and each year brings its tribute of numerous new species discovered by researchers.
The objective of this work is the phytochemical study as well as the antioxidant activity, antimicrobial and anti-inflammatory activity of different extracts obtained from the two plants belonging to the Asteraceae family by Soxhlet using solvents of different polarities (hexane, dichloromethane and methanol).
The phytochemical screening was carried out by phytochemical tests and the results show that both plants are rich in flavonoids and tannins, in addition to saponosides, alkaloids and terpenes.The evaluation of the antimicrobial activity of the molecules by the well diffusion method showed very significant activity against certain bacterial and fungal strains. The evaluation of the antioxidant activity of the molecules by the DPPH free radical scavenging test gave significant antioxidant results compared to the references BHT and ascorbic acid,these results reveal the presence of bioactive compounds which are responsible for the antioxidant and antimicrobial activities.Evaluation of the anti-inflammatory activity of the extracts by the bovine serum albumin (BSA) protein denaturation test shows that these plants have pharmacological power.

Key words: asteraceae, phytochemical screening, antioxidant activity, antimicrobial activity, anti-inflammatory activity, Soxhlet.

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Study of the toxic effect of different concentrations of the new pesticide Exirel on the level of lipid peroxidation and the activity of antioxidant enzymes in rat liver

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The persistence of pesticide residues in the environment and in agricultural crops is a major problem worldwide. Exirel (cyantraniliprole) is a second generation anthranilic diamide insecticide that has biological efficacy against insect pests and can induce the formation of reactive oxygen species (ROS), making it an interesting subject. Our work consists of analyzing the cytotoxic effects of cyantraniliprole residues administered at different concentrations (0.025mg/kg/d; 0.05mg/kg/d; 0.075mg/kg/d; 0.1mg/kg/d) of body weight by route. orally for 90 days in an animal model, the wistar rats, the results obtained show a very highly significant increase in MDA levels (marker of lipid peroxidation) in rats treated with the doses (0. 075mg/kg/d and 0.1mg/kg/d) compared to the control rats, while the hepatic lipid level was observed to decrease very significantly in the batches treated with different concentrations compared to the control rats. For the oxidative stress parameters, the results show a significant decrease in the cytosolic GSH level and a highly significant decrease in the cytosolic GPX activity of liver cells and a highly significant decrease in the catalase activity. Microscopic examination of histological sections from the liver revealed minimal evidence of hepatic stasis, with congestion of the centrilobular veins and moderate enlargement of the sinusoids. Microscopic observation of the liver of rats treated with a concentration of (0.1mg/kg/d) shows major signs of hepatic stasis, with lobules with red centers, with congestive streaks joining the Centro-lobular lacunae of the neighboring lobules.

Key words: Anthranilic diamide, Exirel, lipid peroxidation, oxidative stress, rat

Low concentrations of Exirel cause toxic and behavioral and histological effects in wistar rats

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The persistence of pesticide residues in the environment and agricultural crops is a major problem worldwide. Exirel (cyantraniliprole) is a second generation anthranilic diamide insecticide that has biological efficacy against insect pests and can induce the formation of reactive oxygen species (ROS) which makes it an interesting subject. Our work consists in analyzing the cytotoxic effects of cyantraniliprole residues administered at different concentrations (0.025mg/kg/d; 0.05mg/kg/d; 0.075mg/kg/d; 0. 1mg/kg/d) body weight orally for 90 days in an animal model wistar rats, the results of classical maze test show that the administration of Exirel caused a very highly significant ($p \leq 0.001$) increase in arrival time in treated batches compared to controls and a very highly and highly significant decrease in exploration time in batches treated with various concentrations of Exirel compared to control rats and for the object recognition test The results show a very highly and highly significant decrease ($p \leq 0.01$; $p \leq 0.001$) in new object exploration time and familiar object exploration time in pesticide-treated rats compared to control rats. For oxidative stress parameters the results show A significant decrease in cytosolic GSH level and a very highly significant decrease in cytosolic GPX activity of brain cells and a very highly significant decrease in catalase activity, Analysis of the values obtained from the assessment of acetylcholinesterase activity showed a highly significant decrease in treated rats compared to controls. Microscopic examination of the histological sections of the brain revealed a normal structure in the control rats. On the other hand, histological alteration in the number of brain cells was observed in the histological sections of the brain of rats treated with different doses.

Key words: Exirel, neurotoxicity, Oxidative Stress, Wistar Rats

Conquering Breast Cancer Resistance by Targeting Allosteric Sites of Mutant HER2^{T798I} Kinase Through *In Silico* Approaches

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Cancer represents a multifaceted challenge on a global scale, encompassing clinical, financial, and social realms. Among cancers, breast cancer (BC) stands out as the most prevalent worldwide, posing a significant threat to women's health. Alarmingly, nearly 500,000 patients worldwide die from metastatic BC cancer annually. The HER2 kinase is a pivotal target in combating resistant BC. Despite the approval of lapatinib in 2007, the rapid development of drug resistance ensued, primarily attributed to a mutation occurring at the gatekeeper HER2^{T798I} residue. Herein, we attempted to identify novel rational approaches to design new therapy to overcome the resistance in HER2^{T798I} kinase domine using *in sillico* approaches. Herein, we endeavor to propose rational approaches for designing therapeutic interventions aimed at overcoming resistance mediated through the HER2^{T798I} kinase mutation, employing advanced *in silico* techniques.

We identified four potential allosteric sites located on the surface and within cavities of the HER2 kinase. Subsequently, we screened a database comprising 26,000 potential kinase allosteric modulators using High Throughput Virtual Screening (HTVS), followed by docking at both standard and extra precision against the newly identified allosteric sites."

The top ten compounds for each allosteric site underwent molecular dynamic simulations (MDS) for 1000 ns. The impact of the best docked hits “allosteric modulators” within the potential allosteric site(s) on the conformation of the orthosteric (ATP binding) site was investigated. These findings hold promise for the discovery of a novel therapy for aggressive, resistant BC, featuring a novel mechanism of action with potentially fewer off-target side effects. These outcomes are promising in finding a new treatment for BC with a novel mechanism of action.

Keywords: Breast Cancer, Lapatinib, HER2 kinase, docking, MDs

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Efficient Elimination By Adsorption of Cationic Dye from Water Using Low-Cost Adsorbent(Clay Mineral): Isotherm, Kinetic, Thermodynamic Study

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Abstract:
The objective of this work is to address the removal of pollutants from solutions aqueous by the adsorption process using clay from the Djelfa region as a more abundant and low-cost natural material. Initially, the clay was purified and separated to obtain clay minerals ux of a diameter less than 2µm, to study the physicochemical properties of clay by analyzing IR, XRD, SEM, the possibility of adsorption by clay of a cationic dye (methylene blue) and as pollutants in aqueous solutions has been studied. The dependence on Surface response modeling (RSM) under the change of the following factors: concentration, temperature and thermodynamic factors such as ΔG, ΔH ΔS and adsorption kinetics were determined.

Key words: Clay, Adsorption, Methylene Blue, Isotherm, Thermodynamics

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Synthesis and Water Stability of Copper-Based Metal-Organic Framework (Cu-MOF) for Methylene Blue Removal

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Abstract

A copper-based metal-organic framework (MOF) with a three-dimensional structure has been recently synthesized using a facile method, such as a gradual evaporation method. This MOF, denoted as $\{[Cu_2(L)(H_2O)_6]_4H_2O\}n$ (where L represents benzene-1,2,4,5-tetracarboxylic acid), underwent comprehensive analysis employing IR spectroscopy and single-crystal X-ray diffraction. Within this compound, the Cu(II) ions are coordinated in a five-fold manner, linking through BTC ligands and water molecules to generate blue crystals. The synthesized Cu-MOF exhibited good stability in water, making it suitable for adsorption applications. The adsorption capacity of the Cu-MOF for MB was evaluated through batch adsorption experiments, and the results demonstrated efficient removal of MB from aqueous solutions. Overall, the synthesized Cu-MOF shows great potential as an adsorbent for the removal of MB from wastewater.

Keywords: Cu-MOF, water stability, adsorption, methylene blue removal.

Heterogeneous Photo-Fenton degradation of Crystal violet dye in aqueous solution using synthesized catalyst: Fe_3O_4/MWCNTs

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The presence of organic pollutants in water is currently one of the most pressing environmental challenges, as these substances are harmful to human health and aquatic ecosystems. Their persistence in water and their ability to cause damage, even at low concentrations, underscore the crucial importance of deploying effective decontamination methods relying on straightforward materials. Composites made of carbon nanotubes (CNTs) combined with metal oxides prove to be promising candidates for removing organic pollutants from water, due to their catalytic, magnetic, and structural properties.

This work aimed to eliminate a basic dye which may be present in waste and industrial water, by using a heterogeneous photo-Fenton process. In this study, the MWCNT/Fe_3O_4 catalyst synthesized via the coprecipitation method was analyzed by X-ray diffraction techniques and infrared spectroscopy. The characterization of nanocomposite, magnetite and raw carbon nanotubes samples confirmed the functionalization of the MWCNT surface by iron oxide (Fe_3O_4). The mean particle size of MWCNT/Fe_3O_4 was estimated to ± 28.38 nm. The effect of the catalyst MWCNT/Fe_3O_4 on the degradation of the basic dye Cristal violet (CV) by the heterogeneous photo Fenton method was studied. The influence of certain systems was verified and compared, according to the degradation rate and rate constant calculated with that of nanocomposite.The MWCNT/Fe_3O_4 + H_2O_2 + UV system showed a very high degradation rate (over 90%) and rate constant (1.357. 10^{-2} min^{-1}) compared to the other systems during 180 min, at room temperature and an acidic pH equal to 2.5. These results reveal the importance of the MWCNT/Fe_3O_4 catalyst in water treatment using the heterogeneous photo Fenton process, and show the possibility of its use even at industrial scale.

Keywords: Nanocomposite; Magnetite; Carbon nanotubes; Crystal violet; heterogeneous photo Fenton; organic pollutants; degradation.

Prunus dulcis shell extracts: Chemical composition and biological activities

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Nowadays, fruits and their by-products are widely studied as a promising source of phytochemicals with various health benefits that have a high potential to be integrated into the pharmaceutical and cosmetic industries given their various pharmacological and pharmaceutical properties [1]. *Prunus dulcis* is one of the most widely cultivated species in the world. Its fruit is rich in various nutritious and bioactive compounds that exert several beneficial effects [2]. The present study aimed to assess the chemical composition and the *in vitro* biological activities of almond shell extracts. The chemical analysis of the extracts revealed the presence of 15 compounds through HPLC-DAD, with 11 compounds being newly identified within the almond plant. Additionally, the GC-MS analysis identified 26 volatile compounds, including seven were firstly detected in the studied plant. For the biological activities, the almond shell extracts demonstrated moderate inhibition potential towards the antioxidant, antidiabetic, and cytotoxic activities. The methanol extract at 50 µg/mL showed the highest antioxidant (45%) and antidiabetic activities (45% against alpha-glucosidase and 31% against alpha-amylase extracts), while the cyclohexane and dichloromethane at 50 µg/mL showed the highest cytotoxic activity towards Hela (32.2% with cyclohexane) and RAW 264-7 (45% with dichloromethane).

Key words: *Prunus dulcis* shell extracts, chemical composition, biological activities, GC-MS, HPLC-DAD

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HPLC-MS/MS Analysis and Biological Assessment of Extracts from the Endemic Plant *Ferula Tunetana*: *in Vitro* and *in Silico* Methods

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Ferula species have occupied great value in traditional medicine in various countries [1]. With the aim of valorizing the Tunisian endemic species *Ferula tunetana* Pomel ex Batt. (*F. tunetana*), we evaluate its phytochemical profiles in seed and leaf extracts by HPLC-MS/MS, as well as their antioxidant and anti-α-amylase activities. Therefore, total phenolic and flavonoid amounts of the studied extracts were determined and 38 compounds were detected and quantified. In addition of their antioxidant potential against 1,1-diphenyl-2-picrylhydrazyl (DPPH) and Ferric Reducing Antioxidant Power (FRAP) assays, *in vitro* and *in silico* studies were adopted to evaluate *α*-amylase inhibitory properties of *F. tunetana* extracts. Ethyl acetate seed extract showed the highest total phenolic content, antioxidant potential (IC_{50} = 19.00±0.37 μg/mL) in terms of free radical scavenging, also for *α*-amylase inhibition activity with IC_{50} values of 17.39±0.92 μg/mL. The molecular docking analysis of the major selected compounds explained the significant anti-*α*-amylase activity of the studied extracts. The obtained results suggest that *F. tunetana* extracts could be promising candidates to develop a new generation of efficient and especially safe antidiabetic treatments.

Keywords: *Ferula tunetana*, HPLC-MS/MS, antioxidant, anti-*α*-amylase, molecular docking.

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Evaluation de l'activité antifongique de l'huile essentielle du petit grain bigarade

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La recherche de l'activité antifongique de l'huile essentielle du petit grain bigarade consiste à estimer l'inhibition de croissance des micro-organismes en sa présence. L'objectif de ce travail est d'évaluer et de valoriser les propriétés antifongiques des feuilles du bigaradier ou oranger amer (*Citrus aurantium*) dans la région de Tlemcen, située au nord-ouest de l'Algérie. Dans un premier temps, nous avons réalisé l'extraction de l'huile essentielle du petit grain bigarade à partir des feuilles du bigaradier par hydro-distillation en utilisant un dispositif de type CLEVENGER qui a donné un rendement de 0,30% pour 600g de feuilles étudiées, par la suite nous avons procédé à la mise en évidence de l'activité antifongique de cette huile essentielle vis-à-vis de trois souches de *Candida Albicans* dont deux ATCC et une souche identifiée à partir d'une onychomycose au service de parasitologie du CHU Tlemcen en appliquant la méthode des puits et la méthode de micro-dilution.

Les résultats ont révélé des diamètres d'inhibition de l'huile essentielle de 23 mm en moyenne dans chacune des trois souches contre une moyenne de 17 mm pour le Fluconazol qui a été utilisé comme témoin positif. La concentration minimale inhibitrice CMI de l'huile essentielle est de 1/16ème de sa concentration initiale. Au vu des résultats obtenus, nous pouvons conclure que notre recherche peut contribuer à la valorisation de la plante testée dans le domaine pharmaceutique comme une source inestimable d'agents antifongiques.

Key words: activité antifongique, huile essentielle, petit grain bigarade, *candidas albicans*, Fluconazol.

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Evaluation physico-chimique de l'huile essentielle du petit grain bigarade obtenue par deux méthodes différentes : hydro-distillation et entrainement à la vapeur d'eau

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Reconnues pour leurs puissantes propriétés thérapeutiques les huiles essentielles (HE) ont percé leur place dans le domaine pharmaceutique. Elles sont obtenues avec des rendements très faibles ce qui en fait des substances précieuses. Plusieurs techniques d'extraction existent, elles sont choisies en fonction de la plante et de la fragilité de ses composants, ainsi, pour choisir une bonne HE de petit grain bigarade, il faut connaitre ses caractéristiques organoleptiques, physico-chimiques ainsi que sa composition chimique.

L'objectif de ce travail est de faire une analyse physico-chimique comparative de l'HE du petit grain bigarade obtenue par deux méthodes différentes : hydro-distillation (dispositif type Clevenger) et entrainement à la vapeur d'eau (appareil semi-industriel).

Les deux huiles ont présenté un aspect liquide limpide, de couleur jaune claire et d'odeur fraiche aux notes fruitées et fleuries avec un rendement de l'ordre de 0,3%, une densité relative à 20°C de 0,86 et un indice de réfraction de 1,46. Contrairement aux caractéristiques physiques qui sont identiques pour les deux huiles, les caractéristiques chimiques sont différentes, effectivement, nous avons noté un indice d'acide de 1,12, un indice de saponification de 96,55 et un indice d'ester de 95,43 pour l'HE obtenue par hydro-distillation alors pour l'HE obtenue par entrainement à la vapeur d'eau l'indice d'acide est de 1,96, l'indice de saponification 45,66 et l'indice d'ester 43,69. L'analyse CPG-SM (résultats en cours de publication) a révélé une composition chimique quasi-identique pour les deux huiles.

Après comparaison des résultats obtenus avec les données de la littérature nous pouvons conclure que l'HE obtenue par hydro-distillation a une meilleure qualité et présente une meilleure stabilité dans le temps.

Mots clés: huile essentielle, petit grain bigarade, hydro-distillation, entrainement à la vapeur d'eau, caractéristiques.

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A new chitosan functionalized by isoxazole modified screen printed electrode for the efficient detection of copper and mercury

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Toxic heavy metals are released into the environment in ever increasing quantities, endangering humanity as they build up in the soil and in human bodies due to their inability to disintegrate.

In recent years electrochemical sensors exhibit inherent effect to detect the toxic metals because it has more benefits such as high sensitivity, precision, simplicity and low cost compared to other traditional methods.

In this work, we propose a simple approach for fabrication of an electrochemical sensor modified by new chitosan functionalized by isoxazole for detection copper and mercury ions in aqueous solution. Chitosan is extracted from the shells of Tunisian shrimp "*Parapenaeus longirostris*" with 92 % deacetylation degree. We modified the chitosan obtained with isoxazole cycles to enhance the value of this material and test its ability to complex metals.

The electrochemical behavior of the modified screen-printed carbon electrode was investigated using cyclic voltammetry (CV) and differential pulse voltammetry (DPV) methods. The sensitivity of the Iso-Cs/ SPCE is much better than that of the bare SPCE and the CS- SPCE. The effects of deposition potential, pH of the solution, and deposition time were optimized. Moreover, the performance of the optimized heavy metal ions sensor in terms of sensitivity, linear range, limit of detection, and reproducibility was investigated. The detection limits were found to be 0.1µM and 1 nM for Cu^{2+} and Hg^{2+}, respectively. The results reported in this work showed good stability, high sensitivity, and reproducible response. Finally, the developed ion sensor was used for heavy metal determination in seawater.

Key words: Modified electrode, electrochemical detection, chitosan, heavy metal.

A fully eco-friendly colorimetric assay for Hg^{2+} detection using chitosan-stabilized Ag NPs : synthesis, performances and point of care application

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According to the US Government Agency for Toxic substances and Disease Registry (ATSDR), mercury ranked third of the most hazardous element. Even at ppm level, toxicological studies proved that the mercury under ionic form (Hg^{2+}) in drinking-water can cause serious damage to immune, renal, and endocrine systems. Even though available techniques (AAS, ICP-MS and 7473 EPA) methods offer excellent sensitivity, they still complex, are not cost-effective and unsuitable for in-site analysis. In response to these drawbacks, we propose an eco-friendly, low-cost, and sensitive colorimetric assay for Hg^{2+} detection based on silver nanoparticles (Ag NPs) stabilized by chitosan extracted from shrimp shells with a deacetylation degree of 92 % as an optical probe.

Beside a fully characterization of the chitosan extract by means of NMR, ATR-FTIR, DSC, SEC, and optimal green synthesis conditions (pH, temperature, and Ag^{+} precursor concentration) of the Ag-Chitosan nanocomposite were determined. Under the optimal experimental condition, the analytical applicability of the chitosan-stabilized Ag NPs to detect Hg^{2+} was firstly investigated by UV-visible spectrophotometry. Results proved high selectivity, wide range of detection (10^{-3} to 10^{-7} $mol.L^{-1}$) and high sensitivity (41.6 μM^{-1}) of the proposed probe to Hg^{2+}.

Owing to the high performances obtained using spectrophotometry method, an imaging method for colorimetric of mercury is planned. The approach uses a flatbed scanner as an imaging device and a color picker software to quantify the RGB color parameters changes of the Ag-Chitosan during the feedback titration of Hg^{2+}. The obtained results make the proposed conveniently applied to real time detection of ppm level Hg^{2+} ions for control quality of drinking water.

Key words: eco-friendly colorimetric, chitosan, Ag NPs, Hg^{2+} detection.

Conceivable upgrading of agricultural waste into activated biochar to remove organic and inorganic pollutants from contaminated water

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The fast increase registered actually in the industrial activities is accompanied by a growing production of wastewater that in turn need to be prior treated before rejecting. Treated wastewater could contain toxic biological, mineral, or organic, pollutants that require urgent treatment before reused or being returned to the environment. The reuse of agricultural waste as adsorbent may be both efficient and economical method to remove or reduce these environmental hazards. In this work, the methodically produced activated biochar synthesized from palm seeds showcases its impressive potential as a versatile adsorbent for the efficient removal of dyes and metallic cations from wastewater [1]. In-depth investigations into various influential parameters were meticulously conducted, encompassing pH, contact time, and initial cation concentration, employing a batch process configuration. Remarkably, the adoption of the pseudo-second-order kinetic model alongside the Langmuir isotherm model provided robust descriptions of the removal mechanism for these pollutants. The outcomes clearly demonstrated the establishment of a monolayer with impressive capacities reaching values that considerably exceeded those reported in the existing literature for similar materials utilized in the adsorption of these specific ions from aqueous matrices. The combination of high sorption capacity, efficient desorption, and environmentally conscious synthesis makes the produced biochar highly promising candidate for diverse applications in water treatment and pollution mitigation.

Key words: Valorization, Agricultural waste, Heavy metals, Methylene Blue.

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Synthesis and Characterization of Nano Composit organic clay used for Elimination of Chromium inons of industrial waste water of Algeria Manufactory.

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Text of the abstract This study based on modification of inorganic compounds named bentonite clay, after several treatment (purification, Intercalated by cationic surfactant), then These three samples complexes clays (raw bentonite, purified bentonite and organic bentonite) respectively were characterized by both$Xray$ diffraction (XRD) and Fluorescence (XRF)Scanning Electron Microscopy (SEM), Fourier transform infrared spectroscopy $(FTIR)$,textural measurements (BET specific surface areas and porosities) and the cationic exchange capacity (CEC).

Corresponding results obtained confirm the good purification of the raw bentonite, then the obtention of the Purified - bentonite indicated by P-Bt also the intercalation of the Pu$-Bt$ by two different cationic surfactant ($C_{19}H_{33}$-N-Br, $C_{27}H_{58}$N-Cl) at low concentrations ($0.06M$).

The results obtained give basal spacing values around 15.34A°;12.55A°and 15.90 A°,18.50 A°, respectively for verified two aims firstly: The originality of this research, secondly to decrease the cost production of the adsorbents.

Absorption kinetic study of Chromium (Cro^{-2}) anions on these matrices Pu-Bt, $C_{19}H_{33}$-N-Br, $C_{27}H_{58}$N-Bt respectively: Were carried out using kinetic models of pseudo-first, pseudo-second-order

Results obtained at the conditions studies (room temperature $T = 25^{o}C$), ($Alcalin\ medium\ pH = 8.63$) show clearly the good validity of the pseudo-second-order model which gives a better correlation coefficient both, for $C_{19}H_{33}$-N-Br, $C_{27}H_{58}$N-Bt ($R^2 = 0.959, 0.999$) respectively compared to that obtained results by Pu$-Bt(R^2 = 0.90)$.

Adsorption isotherms give adsorbed amounts of about 45.50 for $C_{19}H_{33}$-N-Br and 74 $mg.g^{-1}$onto $C_{27}H_{58}$N-Bt nano composite complex, respectively, and 40.33 $mg.g^{-1}$for Pu$-Bt$ as reference adsorbent.

These results indicated the adsorption of chromium ions from the waste water of the industrial manufactory by the Algerian organo-clays or (Cationic surfactant Hydroxy-phylosilicate-metallic) after our purification to eliminate of the impurities in the fist, and our modification by two organic surfactant for facilities the phenomenon of sorption mechanism of the iron ions of Algeria waste water manufactories, (through interactions by the chemisorptions) on the surface sites of each used modified organo clays or complexes clays).

Key words: Bentonite clay**,** purification, Cationic surfactant, chromiun ions, Characterization, Sorption.

X-ray Molecular Structure of a Bis(nitriro-*N*) Cobalt(III) *Meso*-arylporphyrin Coordination Compound

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Cobalt(III) porphyrin complexes have a range of applications, particularly in the field of catalysis and bioinorganic chemistry. For example, cobalt(III) porphyrin complexes have been investigated for their electrochemical properties, including their use as electrocatalysts for fuel cells and other electrochemical processes [1]. These complexes can facilitate electron transfer reactions and have potential applications in energy conversion and storage [2].
The present article describes the single crystal X-ray molecular structure of the bis(nitrito-*N*) cobalt(III) *meso*-tetraphenylporphyrin ion complex (complex **I**). This Co(III) metalloporphyrin crystallizes in the monoclinic space group with the space group *C2/c*. The cell parameters values are a = 56.988(11) Å, b = 28.048(6) Å, c = 23.276(5) Å, and β = 101.273(8)°. The volume is 36486(13) Å^3 and Z = 4. The asymmetric unit of structure is made by three $[Co^{III}(TPP)(NO_2)_2]^-$ ion complexes, three $[K(18\text{-C-}6)]^+$ counterions, one $[K(NO_3)(18\text{-C-}6)]$ molecule and three chloroform solvent molecules (Figure 1). These later solvent molecules are very disordered which could not be modeled, was removed from the lattice of complex **I** by using the squeeze procedure [3]. Therefore, the formula of complex **I** is: $6\{[Fe^{III}(TPP)(NO_2)_2][K(18\text{-C-}6)]\}\cdot 2\{[K(NO_3)(18\text{-}6\text{-}8)]\cdot 6CHCl_3\}$.

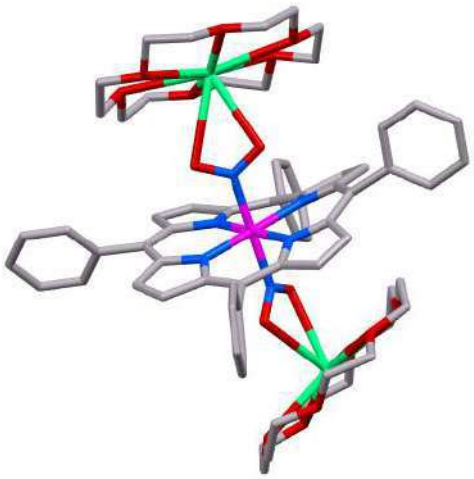

Figure 1. Structure of $[K(18\text{-C-}6)][Co^{III}(TPP)(NO_2)_2]$

Key words: Cobalt(III) porphyrin; X-ray molecular structure.

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Assessment of Public Awareness Regarding Toxicological Risks of Medicinal Plant Used During the COVID-19 Pandemic: Algerian Study

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The utilization of medicinal plants during the COVID-19 pandemic has witnessed a significant surge globally, with many individuals turning to these natural remedies either alone or in combination with conventional medications for preventive or therapeutic purposes. This study aims to assess the general population's knowledge regarding the toxicological aspects of medicinal plants employed amidst the pandemic, as well as to highlight the potential risks associated with their concurrent use with conventional drugs.
Conducted through online surveys in various regions of Algeria, the study involved 69 participants, with 31% having contracted Covid-19 and 67% considered suspects. Results indicate that 24.64% of the population solely used medicinal plants for Covid-19 protection. However, the majority (62%) employed these plants without knowledge of the exact dosage. Non-adherence to dosage, potential interactions between plants or with medications, as well as confusion in identification, predominantly contribute to toxicity. Clinical symptoms reported post-consumption of plant-based preparations are primarily gastrointestinal disturbances (21.7%), followed by dizziness (10.14%), anemia (8.7%), and headaches (5.8%).
Throughout the pandemic, numerous plants have been utilized for their preventive or curative properties against Covid-19. However, no natural therapy has yet scientifically proven its effectiveness. The general population must be educated regarding the dangers of anarchic and inadequate use of these products, as the incidences of intoxications linked to their use are not negligible.

Key words: Public Awareness, Medicinal Plants, COVID-19, Toxicological Risks, Algeria

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Comparative study of evaluation of biological activities of Algerian propolis from different location

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Abstract:

Propolis, known in folk medicine since ancient times, is produced from honeybees using collected extracts from leaves, buds and exudates of various plant flora. Hence, chemical composition of propolis depends on its floral origin with constituents varying widely due to its climate and geographical conditions.

All EEPs exerted antibacterial activity against Gram-positive bacteria and on Gram-negative bacteria. The antioxidant activity was measured using ferric-reducing power (FRAP), 1,1-diphenyl-2-picrylhydrazyl (DPPH) free radical-scavenging. During our investigation no work was found in the literature on the subject up to now, we focused on propolis as guests for inclusion complex. The aim of this study was the investigation of the effect of CD on antimicrobial, antifungal and antioxidant activities of different ethanolic extracts of propolis (EEP) collected from different region of Algeria. Our result showed that the best antibacterial activity was for propolis used as inclusion complex with cyclodextrin, this can be new method for extraction of active compound from the complex propolis.

Keywords: Algerian propolis, antibacterial activity, Cyclodextrin, encapsulation.

Preventive effect of a medicinal plant "*Ephedra* " on neuroleptic overdose in wistar rats

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This research concerns itself with studying the behavioral and neurological disturbance of a neuroleptic composed of an active ingredient "*chlorpromazine* " and the effect positive of *Ephedra* in this toxicity. This study aims at examining the effects of the repeated successive exposure on the chlorpromazine for 30 days on the behavioral responses, the oxidative status as well as the immune and biochemical changes on the Wistar rats.

The findings demonstrate that the chlorpromazine has a neurotoxic activity towards some persistent neuro- behavioral troubles described as memory disturbances and alterations on the activity level, modifications at the level of anxiety and depression, and body growth reduction, which basically, influences the biochemical parameters (TG, Alkaline phosphatase) along with other disturbances on protein. Further, the appearance of hepatic and anxi-oxidative stress, which was associated with negative cerebral effects (decrease in acetylcholinesterase activity), has been also closely and carefully scrutinized but we saw significant improvement in the *Ephedra* treatment groups finally, taking excessive doses of chlorpromazine may lead to serious brain problems and the treatment with ephedra plant is improve previous results.

Key words: chlorpromazine., Ephedra., rats, overdose

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Valorizing the olive oil quality of the eastern Algerian region *via* biocatalysis

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Algerian olive oil, especially in the Eastern region, enjoys a reputation and a positive image throughout the country. However, a significant quantity is qualified as low quality during extraction processes. Also, the duration and storage conditions can affect the quality of the oil [1]. Olive oil is mainly composed of triglycerides, fatty acid triesters of glycerol. Therefore, the sour taste of low-quality olive oil is generally due to free fatty acids in its composition [2]. In this work, which falls within the framework of the use of biocatalysts in the valorization of bioresources, we have been interested in the improvement of the quality of olive oil (classified as low quality) from the eastern Algerian region enzymatically, a series of commercial lipases and lipases formulated by immobilization was used. The results showed a significant improvement in the quantity of the product expressed by the decrease in acidity after reactions. Furthermore, using an immobilized enzyme improved our results compared to the native enzyme

Key words: Olive oil, Lipase, Esterfication, Biocatalysis

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Etude phytochimique d'une plante endémique d'Algérie

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Résumé :

Les substances naturelles suscitent un intérêt croissant pour leurs applications dans divers produits de consommation en raison de leur importance. Les plantes représentent une source inépuisable et renouvelable de principes actifs à exploiter dans un large champ d'application à l'avenir. La méthode d'extraction au soxhlet de l'huile (extraite à l'éther diéthylique) a donné un très bon rendement. L'évaluation des paramètres physicochimiques de l'huile selon les normes du Food Codex(1983) fournit des résultats satisfaisants et comparables aux normes tels que : l'indice de réfraction, l'hydrogène potentiel (PH= 7), l'absorbance ultraviolette, l'indice d'acidité. L'évaluation préliminaire de la composition phytochimique confirme la présence de certaines familles chimiques telles que les saponines, les huiles volatiles, les alcaloïdes, les flavonoïdes, les cardénolides, les tanins, les anthocyanes, les leucoanthocyanes.

Mots-clés : Criblage phytochimique, paramètres physicochimiques, huile végétale. plante endémique Algérienne

Type-II CdS/g-C_3N_4/$ZnFe_2O_4$ Heterojunction toward green hydrogen production

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Green hydrogen production is a promising technology for sustainable energy and environmental pollution [1, 2]. In this regard, a ternary nanocomposite CdS/g-C_3N_4/$ZnFe_2O_4$ was successfully synthesized using the sonication method. This photocatalyst demonstrates a high performance in generating hydrogen through a photocatalytic process. Various techniques such as XRD, SEM, HRTEM, XPS, FTIR, UV-Vis, PL, EIS, LSV, photocurrent measurements, and Tafel analysis were employed to characterize the samples. By incorporating a type II heterojunction between $ZnFe_2O_4$, g-C_3N_4, and CdS, the proposed mechanism leads to better separation photo-carriers. As a result, the ternary nanocomposite achieves higher hydrogen production rates than those reported for $ZnFe_2O_4$ (45.73 times), g-C_3N_4 (30.04 times) and CdS (6.46 times).

Key words: CdS/g-C_3N_4/$ZnFe_2O_4$, type II heterojunction, sonication method, photocatalytic hydrogen evolution

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Combined *Coriandrum sativum* and *Myrestica fragrans* essential oils as natural chicken meat preservatives: chemical composition, biological activities, synergy and shelf- extension potential

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This research aimed to enhance the biological properties (antioxidant and antimicrobial) of combined essential oils through a half-half formulation strategy. Specifically, we sought synergetic blends capable of achieving two primary objectives: firstly, preserving and extending the shelf life of chicken meat skewers over a period of 12 days under refrigeration; secondly, maintaining or improving the organoleptic qualities of the meat. Generally, we search to maximize the overall benefits while ensuring the safety and palatability of the final product. First, the studied essential oils were extracted, and characterized by GC/MS: *Coriandrum sativum* (Linalool, 85.31%), *Myrestica fragrans* (Sabinene, 31.81%). Beyond exploring binary mixture of essential oils, extensive antioxidant and antimicrobial assessments were conducted using standardized methods such as DPPH assay, ferric reducing power analysis, inhibition zone determinations, and minimum inhibitory concentration evaluations for both individual and combined essential oils. Remarkably, the findings revealed highly encouraging synergistic effects between *C. sativum* and *M. fragrans*, demonstrating enhanced antioxidant and antibacterial capabilities. In fact, the IC_{50} and EC_{50} of the crude samples were between 136.22±0.03 µg/mL and 595.12±0.04 µg/mL, while the combined essential oils seemed to be stronger with IC_{50} and $EC_{50,}$ respectively, 35.11±0.06 µg/mL and 40.03±0.04 µg/mL. Thus, crude essential oils showed a strong antibacterial activity against Gram+ bacteria (21±0 mm ≤IZ≤ 35±1 mm and 0.125 mg/mL ≤MIC≤ 0.500 mg/mL) that were more sensitive than Gram- bacteria where a moderate activity were demonstrated (15±2 mm ≤IZ≤ 21±1 mm and 0.500 mg/mL ≤MIC≤ 2 mg/mL). Therefore, combined essential oils seemed to be more efficient as antimicrobial agent where the inhibition zone reached 43±2 mm (gram+ bacteria) and 26±1 mm (gram- bacteria).The incorporation of *C. sativum* and *M. fragrans* combination in the marinated chicken meat demonstrated significant improvements in meat preservation compared to commercial meat. The application of this combination during refrigerated storage not only inhibited the proliferation of microbial flora but also decreased the pH, enhancing the biopreservation of chicken skewers. The shelf life of the treated skewers was estimated to be 9 days, compared to 6 days for the control, indicating a substantial improvement in shelf life.

Keywords: Essential oils, *Coriandrum sativum*, *Myrestica fragrans*, antioxidant, antimicrobial, synergy, combination, chicken meat, shelf-life, biopreservation.

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Caractérisation physico-chimique et phytochimique des huiles de noyaux de certaines variétés de palmiers dattiers (Sud-Est de L'Algérie)

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Ce travail porte sur la valorisation des noyaux de dattes de quatre variétés différentes par l'extraction d'huile à l'aide d'un extracteur Soxhlet en utilisant de l'hexane comme solvant d'extraction. Les teneurs en huile ont été déterminées, ainsi que les principaux indices physico-chimiques des huiles. Les valeurs trouvées se situent dans l'intervalle des huiles végétales alimentaires. L'analyse par chromatographie en phase gazeuse (CPG) des esters méthyliques d'acides gras révèle la présence d'acides gras habituels tels que l'oléique, le linoléique, le palmitique et le stéarique, ainsi que des acides gras à chaîne courte tels que le caprique, le laurique et le myristique. La quantification des stérols et des tocophérols a été réalisée à l'aide d'une méthode spectrophotométrique simple.

Mots clés: palmier dattier, noyaux, acides gras, tocophérols, stérols

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Study of structural, microstructural, and magnetic properties of High-Entropy FeCoNiMnAl Alloy synthesized by high-energy ball milling

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Abstract: A high-entropy $Fe_{30}Co_{20}Ni_{20}Mn_{20}Al_{10}$ (at%) alloy with a face-centered cubic (FCC) crystal structure was produced through mechanical alloying. The study examined the evolution of phases, microstructure, morphology, and magnetic properties. The morphology of the samples was examined using scanning electron microscopy (SEM) in regard to milling times. X-ray diffraction was used to examine the changes in the material that occurred during milling. The transformation of the phase depends upon the milling time. After 50 hours of milling, a single FCC solid solution with a crystallite size of 12 nm was identified. Additionally, magnetic characteristics were examined and shown to be associated with the microstructural changes. The powder mixture exhibited behavior consistent with soft magnetics with an Hc value of 8 Am^{-1} and an Ms value of 165 emu/g. The stability of the FCC phase obtained after 30 h of milling may be responsible for this excellent soft magnetic characteristic. In addition, the low value of Ms has been linked to i) the presence of Al atoms in solid solution and ii) the creation of high densities of defects and interfaces.

Keywords: HEA alloy; Mechanical Alloying; X-ray diffraction; Microstructure; Magnetic characteristic

Innovative entrapped Yarrowia lipolytica within polyvinylpyrrolidone (PVP) based hydrogel for improving olive mill wastewater bioremediation.

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Abstract:

To date, treated olive mill wastewater (OMW) remains expensive and challenging due to its acidity and high levels of hazardous compounds, which cause significant environmental concerns. Consequently, it is crucial to develop an eco-cleaner and effective method for treating OMW. Herein, the novel immobilization of Yarrowia lipolytica within a polyvinylpyrrolidone (PVP)/polyethylene glycol (PEG)/agar matrix was prepared as a bio-tool to enhance OMW treatment. The immobilized Y. lipolytica was characterized using Fourier transform infrared spectroscopy (FTIR) and scanning electron microscopy (SEM). Our results indicated that the immobilized Y. lipolytica significantly improved removal efficiencies, reducing 88.6% of COD, 98.05% of TKN, 92.64% of turbidity, 75% of lipids, and 32.08% of PO4 − 3 after 72 h. Interestingly, the removal efficiency increased upon reusing immobilized cells for three cycles, reaching 93.33%, 100%, and 98.73% for COD, TKN, PO4 − 3, and turbidity, respectively, after 72 h, along with valuable biomass production of 7.31 g L− 1. Furthermore, correlation analysis and predictive modelling confirmed the effectiveness and recyclability of this process.

Key words: Bioremediation, Immobilized cells, Olive mill wastewater, Polyvinylpyrrolidone Recyclability, Yarrowia lipolytica.

Isolation and characterization of Polysaccharides from Pods of Tunisian Broad Beans (Vicia faba L)

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The expansion of fruit and vegetable processing industries has generated substantial quantities of by-products, encompassing skins, peels, seeds, and pulp, rich in bioactive compounds like polyphenols, polysaccharides, and dietary fibers [1]. In this investigation, polysaccharides were extracted using an acidified solution (hydrochloric acid pH = 2) at 80 ºC with mechanical stirring for 2 hours. The structural elucidation of the polysaccharides (PSF) was accomplished through Fourier transform infrared spectroscopy (FTIR), nuclear magnetic resonance (NMR) spectrometry, Gas Chromatography-mass spectrometry (GC-MS), and size exclusion chromatography (SEC). Furthermore, elemental analysis and FTIR outcomes corroborated the presence of carboxylic acid in the polysaccharides. Additionally, GC-MS analysis identified arabinose, galactose, mannose, glucose, and xylose as the primary monosaccharide constituents of the sample. Notably, cytotoxicity tests conducted on Vero cells demonstrated the non-toxic nature of PSF extracts at a concentration of 2500 µg/mL.

Key words: Polysaccharide, Broad bean pods, Physico-chemical characterization, Cytotoxicity

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HPLC Analysis, Antioxidant, and α-Amylase Inhibitory Activity and of *Boswellia sacra* Oleogum Resin's Water Extract

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In the Arab nation, frankincense has traditionally been utilized to cure different diseases [1]. *Boswellia sacra* gum extracts have been used for centuries to stimulate and strengthen the digestive system [2]. In this study, *Boswellia sacra* has been extracted throw three conventional methods: maceration, decoction, and infusion. In this investigation, analysis was determined by high performance liquid chromatography coupled to photodiode array detector (HPLC-DAD). Results revealed that the perfect traditional method to extract the bioactive compounds is the decoction for about 15 minutes and then let it macerate for 12 hours (dec 15min/12h). This method showed the presence of gallic acid, chlorogenic acid, apigenin, isoquercetin, transferulic acid, hyperoside, isorhamnetin 3-*O*-rutinoside, isorhamnetine, with small amount of nargenine and quercetin. Samples are indicated to have antiradical properties, and the sample dec15min/12 exhibited the highest antioxidant activity (78.49 %), and it showed an interesting inhibitory power on the α-amylase enzyme with a competitive type. Thus, the present study provokes and validates the traditional use of the Omani traditional frankincense for reducing the rate of digestion of starch and for decreasing in the post-prandial blood glucose levels in diabetic patients.

Key words: *Boswellia sacra*, Conventional Methods, HPLC-DAD, Antioxidant, Diabetes.

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Synthesis and Molecular Docking of novel 1,2,4-Triazole Sulfamides as potential antibacterial agents

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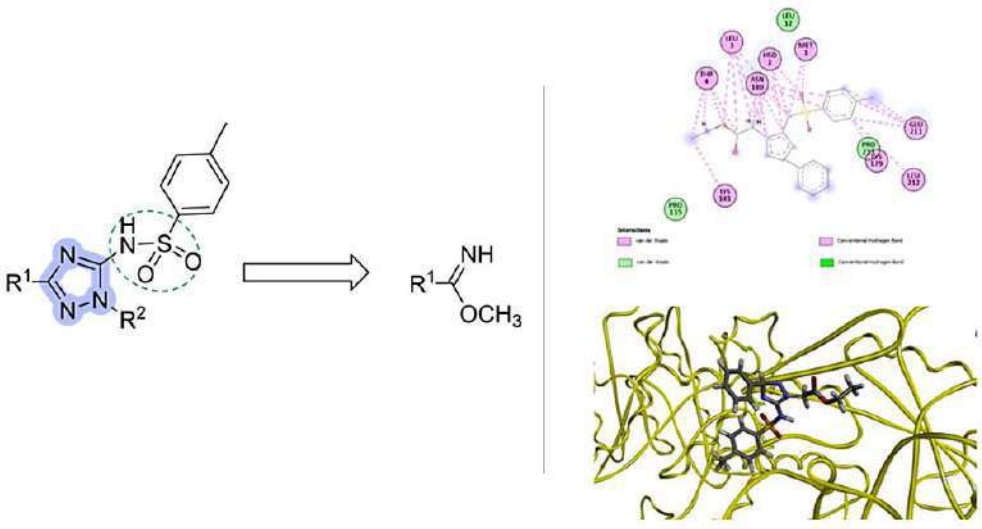
Abstract

Currently, triazole derivatives have attracted significant attention in both organic and medicinal chemistry due to their versatile applications[1]. Among these derivatives, those incorporating a sulfone moiety have been extensively reported for their diverse biological properties, ranging from antibacterial and antifungal properties to anti-inflammatory, and antihypertensive effects[2,3]. Our research aimed to expand our investigation into the synthesis of novel 1,2,4-triazole sulfamides starting from functionalized imidates. Molecular docking studies were employed to evaluate their potential as antibacterial agents.

Key words: Imidates, 1,2,4-triazole sulfamides, Molecular Docking



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Structure-based design and synthesis of a novel pyrrole derivatives

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Hepatitis C is a viral infection that affects the liver and has a significant impact on the quality of life of patients. Continued research and development of new anti-hepatitis C (HCV) drug candidates are still imperative [1]. There is still a need to conduct further research and development of new antiviral agents that exhibit higher efficacy and minimum adverse effects.

With this aim, a new series of unsaturated scaffolds contains the pyrrole skeleton were synthetized from several formyl-pyrroles and their anti-hepatitis C (HCV) activity was approved using *in silico* studies. Most of these compounds presented several interactions with the active site of the Hepatitis C virus polymerase (PDB:2JC1).

Key words: Pyrrole derivatives, Anti-Hepatitis C activity, Molecular docking.

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Biocarbon Derived from prickly pear seeds for lead Retention

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The objective of this study is the valorisation of biomass waste to producing an economic and low cost adsorbent. Activated carbon was prepared from prickly pear seeds (after the essential oil extraction) by chemical activation by phosphoric acid (85%). Activated carbon was characterised by Scanning Electron Microscopy (SEM), Fourier Transform Infrared (FTIR), and BET measurement, elemental analysis, zero point charge (pHPZC). The actived carbon was used for the removal of lead from aqueous solutions in batch mode. The adsorption studies were performed to evaluate the effect of: temperature, initial pH, initial concentration and adsorbent dose.

Key words: biomass, prickly pear seeds, activated carbon, chemical activation.

Chemical Composition, Toxicity and Repellency of Essential Oil from *Inula graveolens* Roots against *Tribolium castaneum*

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Several plant essential oils have been used against diverse insect pests since, unlike conventional pesticides, they pose almost no risk to humans and the environment.[1]
For this reason, the essential oil, extracted by hydrodistillation, from roots of *Inula graveolens*, and its fractions obtained by column chromatographic simplification, were investigated for their chemical composition and their toxicity and repellency against *Tribolium castaneum* adults, considered as one of the major pests of stored grains. Twenty-eight compounds were identified which represented 97.9% of the total oil with modhephen-8-β-ol (24.7%), *cis*-arteannuic alcohol (14.8%), neryl isovalerate (10.6%) and thymol isobutyrate (8.5 %) as major constituents. Regarding the repellency assay, results showed that the crude essential oil exhibited interesting repellent property (80%). After fractionation, fractions R_4 and R_5 displayed greater effects (83.3% and 93.3%, respectively) than the crude essential oil. The median lethal dose (LD_{50}) of the topical application of the oil was 7.44%. These results suggest that the essential oil of *I. graveolens* roots might be used as an alternative to synthetic insecticides in order to prevent insects from damaging the stored products.

Key words: *Inula graveolens*, Essential oil, Chemical composition, Insecticidal activity, *Tribolium castaneum*.

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Chemical Composition and Biological Activities of Phenolic Compounds from the Pulp of *Phoenix dactylifera* L.

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This study aimed to identify the chemical composition and biologically active compounds present in date palm pulp, commonly known as the heart of the palm. The percentage of moisture, ash, fat, protein, and carbohydrates was determined. Additionally, the Atomic Absorption Spectrometer (AAS) technique was utilized to estimate the percentage of certain mineral elements, including calcium, sodium, potassium, magnesium, phosphorus, iron, zinc, and copper. Moreover, a phytochemical survey was conducted to identify active biologically active compounds. Subsequently, the biological activity of these compounds will be evaluated and characterized using various techniques, including Gas Chromatography-Mass Spectrometry (GC/MS), to elucidate their antioxidant and anti-cancer properties.

Key words: date palm pulp, the chemical composition, the biological activity, AAS

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Development of polymeric ligand with N-diacylimidazole as a novel chelating polymer

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To enhance the adsorption capacity for toxic metals from wastewater, polymeric adsorbents are often modified by introducing various compounds into the polymeric matrix. In this study, the polymer was modified with adipoyl chloride and iminoether compounds to increase its capacity and chelating power. The synthesized product exhibits a strong affinity for ions, owing to its richness in nitrogen atoms, which facilitates the formation of complexes between the polymer and the metals which reduces their environmental impact and mitigates their negative effects.[1,2] The different polymeric structures were characterized using Fourier Transform Infrared spectroscopy (FT-IR). Their thermal stability and surface morphology were studied through differential thermal analysis (DTA) and X-ray diffractometry (XRD), respectively. Finally, the complexation power with metals was assessed using atomic absorption spectroscopy.

Key words: Chelating polymer, Adipoyl Chloride, Metals, Atomic Absorption

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Extraction, GC/MS Analysis, and Antioxidant Activity Study of Essential Oils from Two Medicinal Plants of Southern Algeria

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The utilization of medicinal plants for therapeutic purposes has been deeply rooted in traditional medicine practices. In this study, we focus on the extraction, Gas Chromatography-Mass Spectrometry (GC/MS) analysis, and evaluation of Antioxidant activity of essential oils derived from two indigenous medicinal plants native to the southern region of Algeria. The extraction process employs hydro-distillation technique to ensure optimal yield and preservation of bioactive compounds. Subsequently, GC/MS analysis is conducted to identify and quantify the chemical constituents present in the essential oils, providing insights into their phytochemical composition.

Furthermore, the Antioxidant potential of these essential oils is investigated through in vitro assays utilizing UV-Vis spectroscopy. The assay methodology is designed to assess the ability of the essential oils to modulate key parameters associated with free radicals. Complementing these experimental analyses, computational studies are performed using induced fit docking and Molecular Dynamics Simulation (MDS) [1] techniques, spanning a simulation period of 100 nanoseconds. Through in silico simulations, we aim to elucidate the molecular interactions between bioactive components of the essential [2] oils and target proteins implicated in stress oxidative.

The integration of experimental and computational approaches provides a comprehensive understanding of the therapeutic potential of these medicinal plants in managing stress oxidative. This multidisciplinary investigation contributes to the advancement of natural product-based drug discovery and underscores the significance of traditional knowledge in modern scientific research.

Key words: Medicinal Plants, Essential Oil Extraction, GC/MS Analysis, Antioxidant Activity

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o-cyanoaniline-derived Schiff bases: synthesis, crystal structure, Hirshfeld surface analysis, biological activities, ADMET and molecular docking studies

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Research on Schiff base (SB) compounds is a fast-growing interdisciplinary field in material sciences due to their potential applications resulting from a combination of unique chemical, physical and biological proprieties [1-3]. Specifically, cyanoaniline derivatives are found to possess various biological proprieties [4]. In this work, three crystal structures of new SBs, derived from *o*-cyanoaniline are reported. The (E)-2-(2,4-dichlorobenzylideneamino)cyano-benzene SB crystallize in two space groups $P2_1/c$ for **1** and *Pbca* for **2**. The (E)-2-(4-nitro-benzylideneamino)cyanobenzene, **3**, crystallize also in the $P2_1/c$ space group. Hirshfeld surface analysis indicates that the most important contributions to the crystals packing are from H···H and C···H/H···C contacts. Additionally, in vitro antibacterial assay revealed that compound **3** is the most active with the lowest MIC value (3.87 μg/mL). Besides, it exhibited feeble toxicity against Brine Shrimp larvae (LC_{50}=69.73µg/mL) compared to **1** which have moderate toxicity (LC_{50}=44.19 µg/mL). Moreover, molecular docking simulation of the SBs was performed to determine probable binding conformations and interactions and advocate a biological response. Finally, in silico ADMET properties were calculated for the studied compounds to predict their pharmacokinetic profiles.

Key words: *o*-cyanoaniline, Schiff base, biological activities, molecular docking, ADMET.

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Extracting chitosan from marine shrimp insects and determining its purity

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The biopolymer studied in our research is chitosan, extracted from shrimp crusts. Shrimp extraction was carried out in three stages: removing minerals, removing proteins and removing acetyls. The work began with the preparation of the experimental chitosan biopolymer and measured the purity of the material using the pH measuring device. We got 78% good results with pure materials

The research extracts provide detailed information on the process of extracting chitosan from shrimp crusts, highlighting the stages of mineral removal, protein removal and acetyl removal. They also emphasize the importance of material purity, measured using devices such as the pH scale

Key words: extraction, chitosan, shrimp, purity

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Coordination complex based on the antibiotic “Sulfanilamide”

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Sulfanilamide has been successfully used as effective chemotherapeutic agents for the prevention and cure of bacterial infections in human biological systems. Sulfanilamide drugs and their complexes have applications as diuretic, antiglaucoma or antiepileptic, antifungal, antiviral, antitumor and anti-inflammatories, among others. Sulfonamides have attracted increasing attention in supramolecular chemistry and supramolecular medicinal chemistry, because they combine functionalities required for various biological activities and metal coordination via phenylamino groups and sulfonylamino groups. Recently, modification of existing drugs through better coordination in a metal center has attracted considerable interest. Given the ability of sulfonamide derivatives to coordinate in various ways with metal atoms, considerable interest has arisen in the synthesis and structural characterization aspects of new complexes.

In this study, the coordination of the sulfanilamide ligand with transition metals was investigated and the synthesis and structure of new sulfanilamide complexes: ***Zinc***-based mononuclear complex and ***zirconium***-based polymer, characterized by X-ray diffraction, infrared spectroscopy and thermogravimetric analysis TG and two other polymer complexes of ***cobalt*** and ***copper***, characterized by X-ray diffraction, carried out by the study of hydrogen bonds.

Key words: Single-crystal, X-ray study, hydrothermal synthesis, sulfanilamide complex, drug

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Valorization and characterization of medicinal plant extracts of local origin developed in pharmaceutical formulation

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Natural extracts such as essential oils are considered the main source of raw materials sought after in pharmacy. Additionally, plants that have long formed the basis of traditional medicine around the world for various purposes, including the treatment of infectious diseases, have also been studied. They have become industrial products with new concepts such as herbal medicine, aromatherapy, nutraceuticals and cosmeceuticals, thus broadening the scope of their use. Algeria, due to its biogeographical position, offers very great ecological and floristic diversity, estimated at more than 3000 species belonging to several botanical families, of which 15% are endemic and which remain very little explored. Among these natural resources, "*Teucrium polium* (Lamiaceae)" which is a plant to which local populations attribute certain medicinal properties and used to treat different pathological conditions such as gastrointestinal disorders, inflammation, diabetes, and rheumatism. "*Teucrium polium* (Lamiaceae)" is a medicinal plant whose healing effect has been proven by several studies in Iran. The tannins and flavonoids present in the plant promote healing thanks to their astringent (tannin), anti-inflammatory, antioxidant and antibacterial properties. The essential oil of Teucrium polium (Lamiaceae) was the subject of a pharmaceutical preparation in order to better exploit and evaluate the therapeutic potential of the latter to highlight its effectiveness in healing, anti-inflammatory activity and treatment eczema.

Key words: Teucrium polium, hydro-distillation, essential oil, pharmaceutical form

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Study of the conversion of Coffee grounds biomass into activated carbon by chemical activation for water purification

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Abstract

The disposal of organic waste poses a major environmental challenge [1]. Activated carbon, which possesses highly developed pore structure, is widely used as adsorbents, catalysts and catalyst supports for the removal of pollutant [2].

The adsorption process on activated carbon is a topical area of research. The valorization of industrial by-products is undergoing a boom. The preparation of activated carbon with specific properties is attracting more and more attention from researchers. Our work has two basic environmental dimensions, on the one hand, is the exploitation and valuation of natural products such as coffee grounds and transform into activated carbon, and on the other hand, the study of the efficiency of activated carbon from coffee grounds on adsorption. The coffee grounds were transformed into activated carbon by chemical activation using phosphoric acid in order to improve their adsorption capacity. In addition, a comparative study with a branded commercial charcoal (Merck) should be carried.

Key words: Activated carbon, coffee grounds, chemical activation, adsorption.

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Analysis of Contaminants in Stormwater: Environmental Risk Assessment

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Abstract

Stormwater plays a crucial role in transporting various pollutants from land to surface waters. Runoff from stormwater leads to contamination by organic and inorganic micro-pollutants, often associated with the specific land use of drained surfaces. Water quality depends on the nature of runoff surfaces, their maintenance, the frequency of runoff events, as well as the presence of animals and industrial contaminants.

Analyzing contaminants in stormwater is an essential step for effective management and assessing the environmental risks associated with these contaminated waters, ensuring the protection of aquatic ecosystems. This study aims to identify and quantify the different types of contaminants present in stormwater collected from various roofs and roads in an experimental catchment area in Algeria. Stormwater samples were collected and analyzed for pH, electrical conductivity, total suspended solids, chemical oxygen demand, biochemical oxygen demand over 5 days and heavy metals. The concentrations of these parameters were measured at various urban sites in Algiers.

The results obtained in this study showed that runoff from roads had the highest concentrations, while runoff from roofs was less contaminated for most parameters.

Key words: Stormwater, contaminants, analysis, environmental risk

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bis[(azanediyl) ditetrazolato-bis[tetraaquabarium(II)]: In Situ synthesis, thermal stability, spectroscopy and intermolecular interactions study.

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Key words: Barium-tetrazole complex, *In-Situ* synthesis, Hirshfeld Surface analysis, Thermal stability, Framework Energy study.

This study explores a specific alkaline earth complex, $[Ba(C_4H_{18}N_{18})_2(H_2O)_8]$, featuring a tetrazole ligand. Synthesized hydrothermally [1], the compound's crystal formation occurred through gradual evaporation of an aqueous solution at ambient temperature.
Notably, crystallographic analysis reveals a dimeric structure stabilized by strong hydrogen bonding networks. FT-IR spectra analysis identifies characteristic absorption peaks, particularly around 3360–3400 cm^{-1} corresponding to coordinated water molecules. The presence of medium vibration bands between 2336 $cm^{-1}$and 2923cm^{-1} correspond to the O-H…O and N-H…O hydrogen bonds [2]. Thermal stability assessment highlights a triphasic decomposition mechanism, with sequential mass losses attributed to water molecule expulsion and ligand dissociation.
Concurrent investigations into Hirshfeld surface and network energies elucidate the compound's supramolecular architecture, showcasing interlinking dimers through hydrogen bonds and strong interactions between coordination water molecules and adjacent ligands. These analyses collectively offer a comprehensive understanding of the compound's structural features and dynamic properties, underlining the significance of hydrogen bonding within its framework.

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Hemisynthesis of new bioactive curcumin-sulfamide hybride molecule Molecular docking, ADMET, and DFT studies

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Curcumin is a natural chemical compound found in turmeric, an herbaceous plant in the ginger family (Zingiberaceae). It is responsible for the bright yellow color of turmeric and also possesses medicinal and therapeutic properties. It has been used for centuries in traditional medicine to treat various ailments and is garnering increasing interest in modern scientific research for its potential to aid in treating various diseases and medical conditions.On the other hand, sulfamides are a class of chemical compounds containing a functional group characterized by the bonding of a nitrogen atom to a sulfonyle group (SO_2). Sulfamides have been widely used as antibiotics in the treatment of bacterial infections. They act by inhibiting the synthesis of folic acid, a component necessary for bacterial growth. Introducing the sulfamide motif onto curcumin involves chemically modifying the structure of curcumin by incorporating a sulfamide functional group into its molecule. This modification results in the creation of a new molecular entity that combines the biological properties of curcumin with those of sulfamides.

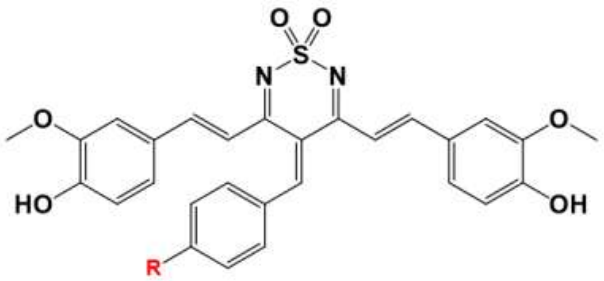

Figure 1. Structural modification of curcumin

Key word: Curcumin, sulfamide, structural modification, molecular docking, DFT/ADMET

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Physico-chemical analyses of sodium alginate biofilms incorporated with rosemary essential oil

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Biodegradable food films offer advantages for food packaging and preservation. This research explores these benefits by studying sodium alginate-based polymer films infused with essential oils known for their antimicrobial properties. The mechanical, barrier-like properties of the films were the focus of the study. The physicochemical properties of our sodium alginate films are influenced by factors such as Ca^{2+} cross-linking, the addition of glycerol (G) and essential oils, particularly rosemary.

The essential oil of Rosmarinus officinalis underwent chemical analysis via Gaz chromatography-mass spectrometry (GC-MS) with the objective of identifying the chemical components present.

The incorporation of glycerol, rosemary essential oil (EO) and calcium chloride ($CaCl_2$) significantly altered the mechanical properties of the samples. A general increase in strain (ε%) and a decrease in Young's modulus (E) and stress (σ) were observed with the addition of glycerol. Conversely, an increase in Young's modulus (E) and stress (σ) and strain (ε%) was seen with the addition of rosemary EO. Stress (σ) increased from 0.6 to 1.54 MPa, while strain (ε%) increased from 4.5% to 12%. However, upon immersion in $CaCl_2$, a clear increase in stress and a weakening of strain were observed.

SA films and ASG + Rosemary EO immersed in a higher concentration of CaCl2 (0.8 M) exhibited a reduced degree of swelling and constant gel fraction values compared to those immersed in a lower concentration (0.2 M) of CaCl2. The swelling degree of SA films and ASG + Rosemary EO decreased with long immersion times, reflecting the influence of crosslinking on water absorption behavior.

The impact of the incorporation of essential oils on mechanical properties is complex. We used FTIR spectroscopy and X-ray diffraction (XRD) to evaluate the chemical modifications of sodium alginate incorporated into essential oils and to identify the structural features and molecular interactions in these sodium alginate-based films.

The compositions were found to be quasi-optimal and were unanimously adopted by previous work carried out on AS films (at 2% w/v) incorporating Rosemary EO (at 0.3% w/w) and glycerol (at 1.5% w/w). It was observed that specific interactions between film components and essential oils, such as cross-linking and structural rearrangements, occurred. The absence of characteristic peaks for native (or emerging) species in the FTIR-ATR spectra of AS films and ASG + Rosemary EO suggests that no chemical reaction occurs between these products in such a composition

X-ray diffraction revealed the presence of semi-crystalline regions within the originally amorphous AS film. These regions became more prominent in the composite films containing essential oils. The XRD patterns of our biofilms demonstrated the growth of new, well-ordered zones. This likely occurred due to cross-linking, where the essential oils interact with the long, chain-like polymer molecules of the sodium alginate.

It's also noted that alginate-based dressings are biocompatible and biodegradable, and offer key benefits for wound healing they keep wounds clean and promote a healthy environment for healing. The addition of essential oil should consolidate these benefits.

Keywords: Alginate film, essential oil, mechanical properties, barrier properties, FTIR-ATR, DRX.

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Phytochemistry and bioactivity of essential oil from *Eucalyptus camaldulensis* trunk bark: *In vitro* and chemoinformatics analysis

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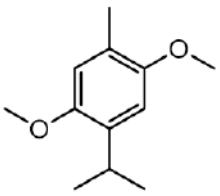
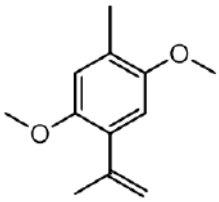
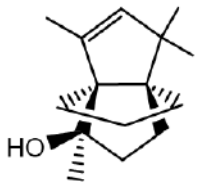
The aim of this study was to identify the chemical composition of the essential oil of *Eucalyptus camaldulensis* trunk bark (ECEO) and to investigate its *in vitro* antioxidant, anti-5-lipoxygenase, anti-acetylcholinesterase, and anti-*α*-amylase activities. The chemical composition of the extracted essential oil was analyzed by GC-FID and GC/MS. Twenty-one compounds were identified accounting for 96.3% of total oil. The phytochemical profile of this essential oil was distinguished by the dominance of oxygenated monoterpenes (58.4%) with Δ8,9-dehydro-4-hydroxythymoldimethyl ether (31.4%), thymohydroquinone methyl ether (21.9%), and modephen-8-β-ol (12.9%) as major compounds. Additionally, the ECEO was examined for its antioxidant activity using three *in vitro* tests (DPPH, $ABTS^{\bullet+}$ radicals and H_2O_2 assays). ECEO showed the highest effect in the hydrogen peroxide assay (IC_{50}= 33.55 ± 2.10 µg/mL). Additionally, ECEO exhibited significant anti-*α*-amylase and anti-acetylcholinesterase activities (IC_{50}= 10.02 ± 1.88 and 5.88 ± 0.81µg/mL, respectively). *In silico* analysis was in agreement with the *in vitro* studies in which most potent components of ECEO showed strong interactions into the binding sites of the enzymes (PDBs: 4EY6, and 7TAA) and good ADMET properties. Our results might be due to the synergistic effect of constituents present in this essential oil or acting separately.



2,5-dimethoxy-p-cymene (21.8%)



Δ8,9-dehydro-4-hydroxythymol dimethyl ether (31.4%)



Modhephen-8-b-ol (12.9%)

Phenolic constituents and biological activities of the trunk bark of *Acacia cyanophylla* Lindl.: *in vitro* and *in silico* assessments

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Abstract

Acacia cyanophylla Lindl. is identified as a reservoir of bioactive phenolic compounds. Interestingly, it has been found that the most obvious substances in *A. cyanophylla* are flavonoids and phenolic acids and the main of these compounds exhibited significant antioxidant and anti-acetylcholinesterase activities [1,2]. In the present work, we therefore studied the total phenolics and flavonoids of the methanolic extract of the trunk bark of this plant and quantified them using LC-HRMS technique. DPPH and ABTS assays were employed to assess the antioxidant potential. The inhibitory effects of tyrosinase and α-amylase were also studied. The results revealed that thirteen polyphenolic compounds were detected in the methanolic extract with *trans*-taxifolin (23.2 g/kg), as the major constituent. *A. cyanophylla* extract showed significant activities with DPPH (IC_{50} = 10.14 ± 1.00 µg/mL) and ABTS (IC_{50}= 15.27 ± 2.09 µg/mL) assays. The same extract also exhibited interesting α-amylase inhibitory action (IC_{50}= 4.00 ± 0.17 µg/mL). Moreover, the same extract exerted strong tyrosinase inhibition capacity with an IC_{50} value of 5.12 ± 0.41 µg/mL compared with kojic acid (IC50= 10.22 ± 0.85 µg/mL). This first report on the polyphenolic composition, antioxidant properties, anti-tyrosinase and anti-α-amylase activities of the methanolic extract of *A. cyanophylla* trunk bark was reinforced by *in silico* molecular docking analysis, which confirmed the results of the *in vitro* tests.

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Optical sensing performance of a new schiff base modified carbazole probe for selective detection of trivalent cation in drinking water

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Abstract

A new Al^{3+} ion carbazole modified Schiff base (CrAp) probe obtained by the condensation reaction of 9-hexyl-2,7-bisformylcarbazole with 2-aminophenol was conveniently synthetized and fully characterized by ^{1}H NMR and FT-IR spectroscopies. The optical sensing performances of the probe for Al3+ detection in aqueous medium were investigated by UV-Visible and fluorescence spectroscopies. The obtained results revealed a high selectivity and sensitivity of the CrAp toward Al^{3+} according to a turn OFF-ON mechanism. Interestingly, owing to the low obtained limit of detection (1.2 µM) lower than that recommended by the World Health organization (7µM), the synthetized probe could be conductive to the control of the toxicity of drinking water by the trivalent cation.

Key words: Schiff base sensor, carbazole, turn Off-On fluorescence sensor, drinking water taxicity.

Nerium oleander L. in southern Tunisia: prospecting, varietal identification and phenotypic diversity

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Nerium oleander is the only representative species of this genus (*Nerium*)that is both toxic and medicinal. It is an ornamental plant with a long flowering season and a wide range of colors then gives different varieties. However, it is also known for its high toxicity, which affects all the plant's organs. The toxicity is essentially caused by two substances, oleandrin and nerine. Although its toxicity, it is very widespread in the pharmaceutical field and used as a phytopharmacological plant. The aim of our study is to identify the varieties present in the south of Tunisia, whether spontaneous or cultivated, analyze their diversity and study their germination behavior. The morphological parameters measured for the leaf and seed are: biomass, surface, width, length, roundness, circularity. ImageJ is the software used to process and analyze images (scanned photos). The prospecting carried out in the Gabes and Medenine regions revealed the presence of six cultivars: Villa Romaine, Roseum Plenum, Little Red, Variegata, Alsace and Mont Blanc. All these varieties are cultivated, with the exception of Villa Romaine, which exists in both a spontaneous and cultivated state. Morphological analysis of the leaf and seed showed great genetic diversity; in fact, we recorded the highest leaf area for Var. Petite Red (19.30 cm²), however, the lowest value was obtained for Var. Roseum Plenum (15.68 cm²), with intermediate values for the other cultivars. The high diversity also concerns seed parameters, with the cultivar Villa romaine being the most productive, showing large seeds, with an average biomass of 4.71 mg for spontaneous plants and 5.42 mg for cultivated plants. The lowest average biomass of seed is 0.9 mg (var. Variegata). All other parameters revealed high phenotypic diversity into the different cultivars. Germination behavior is highly variable, with rates of 95, 78.87, 59.15, 48.3 and 0% for the varieties Petite Red, Villa Romaine, Roseum Plenum, Mont Blanc and Variegata respectively. This preliminary study reveals high genetic and varietal diversity within this species, and will be followed by phenological, molecular and phytochemical studies of the essential oils and extracts of these varieties.

Key words: *Nerium oleander*, cultivars, diversity, leaf, seed, germination.

Phytochemical screening, antioxidant, and biological properties of *S. undulata* part (Tuber, leaf, and flower).

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There are several medical uses for the genus *Scorzonera*. This genus's species was formerly employed as food or medicine. *S. undulata* is a plant belonging to the genus Scorzonera, it's mostly used as food. The tubers are appreciated for their sweetness and are eaten either raw or cooked in water in Tunisia. They are also used in the process of making a decoction because of its purgative qualities. Burned *S. undulata* tubers' ashes may be used to treat burns successfully [1]. The current study collected tuber, leaf, and flower extracts from *Scorzonera undulata* plants in the southwest of Tunisia to determine their phytochemical composition, antioxidant activity, and biological properties. Two extraction methods (ultrasonic and maceration) and two solvents (ethanol and water) were used to extract phenolic compounds from each of the three parts. The Folin-Ciocalteu test was used to determine the total phenolic content. The phytochemical composition *of S. undulata* extract was also investigated by the LC-ESI–MS method using phenolic acid and flavonoid standards. The potentialities of all three parts in terms of bioactive compounds varied because of the different extraction techniques. On the other hand, *S. undulata* aerial parts, which include its leaves and flowers, had the highest phenolic content. Twenty-five volatile compounds have been detected by GC-MS in *S. undulata* extracts; among them, fourteen were identified before derivatization. According to the DPPH test, the aerial part of the plant exhibits more antioxidant activity than the tuber (25.06% at 50 µg/mL for the ultrasonically extracted leaf ethanolic extract). The aerial part of the plant demonstrated the highest biological activities, such as anti-Xanthine, anti-inflammatory, and anti-diabetic (α-amylase and α-glucosidase), compared to tubers.

Key words: *Scorzonera undulata*, extraction, solvents, LC-ESI–MS, GC-MS, biological activities

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Chemical results: GC-MS profiling of *Bacillus megaterium* metabolites before and after derivatization

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Abstract

*Bacillus*are known for their abundance in soils and their beneficial effect on plant development [1-2]. These genera can also be used in the germination of aromatic and medicinal plants, providing additional support for their growth and health. In our research, we closely examined the metabolites of *Bacillus megaterium* (*B. megaterium*) using gas chromatography-mass spectrometry (GC-MS), before and after derivatization. This method enabled us to identify and characterize the chemical compounds present in the extracts of bacterial cultures. Before derivatization, a variety of metabolites were detected, including phenolic compounds, reducing sugars, primary amines and proteins. Derivatization improved chromatographic resolution, revealing new peaks and suggesting the presence of previously unknown metabolites. These results underline the effectiveness of derivatization in the analysis of *B. megaterium* metabolites by GC-MS, enabling a better understanding of their chemical composition. Furthermore, we show that *B. megaterium* produces a range of metabolites including butanediol, cyclic dipeptides, fatty acids and hydrocarbons, influencing its response to plant growth and its ability to adapt to diverse environments. These findings open up new perspectives on the bioactive properties of this species, suggesting potential therapeutic applications to improve plant health.

Key words:*Bacillus megaterium*, GC-MS, metabolites, derivatization, germination.

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Etat de l'art d'une exploitation résiliente de sous-produits agro-industriel : cas de l'olivier *Olea europaea* et du figuier *Ficus carica*

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Diverses activités ont été attribuées aux extraits dérivés de feuilles d'olivier (*Olea europaea*) et de figuier (*Ficus carica*) y compris des potentialités antimicrobiennes, anti-diabétiques, anti-cancéreuses etc. [1-2]. Toutefois, rares sont les travaux menés sur une combinaison d'extraits dérivés de ces deux espèces. Notre travail consistera à élaborer un état des lieux concernant les applications probables décrites précédemment tout en essayant d'explorer et d'élucider les mécanismes moléculaires qui pourront être impliquer. Dans cette perspective, une illustration par quelques résultats préliminaires obtenus au cours de nos travaux de recherche récents sera discutée. Finalement, nous mettrons l'accent aussi sur la comparaison des compositions phytochimiques présentent dans les feuilles de chacune des deux espèces.

Key words: Valorisation, Sous-produits, Olivier, Figuier.

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Synthesis, characterization, and properties of ZnO-GO/$Ni_{0.5}Mn_{0.5}Fe_2O_4$ for application in dye removal

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Environmental pollution has been a significant issue recently. For this reason, scientists concentrated their efforts on creating materials that can effectively remove contaminants. The objective of this research is to synthetize a new composite based on zinc oxide (ZnO) mixed with graphene oxide (GO) and ferrite $Ni_{0.5}Mn_{0.5}Fe_2O_4$. The first part was devoted to the synthesis of the ZnO-GO/ $Ni_{0.5}Mn_{0.5}Fe_2O_4$ composite, this synthesis was carried out in four principal's steps. The second part of this study focused on the characterization by the X-ray diffraction, infrared spectroscopy and Raman spectroscopy. Finaly, in order to evaluate the effectiveness of our composite in photocatalysis, a kinetic study was carried out on the degradation of Methylene blue BM. The findings of this work offer hope for the manufacture of magnetic composites that will be used in photocatalytic removal of organic contaminants.

Key words: ZnO, Graphene oxide, ferrites, X-ray diffraction, Raman spectroscopy, Photocatalysis.

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Taxonomy, diversity and valorization of some medicinal plants from the Lamiaceae family in Algeria.

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The present study aimed at species taxonomic identification and inventory of wild, rare and endangered plants in framework of phytodiversity conservation and valorization. The plant extracts promising source of new substances due to their molecular diversity comparatively to synthetic products. In fact, secondary metabolites are naturally synthetized as defensive strategies against pathogens. In this context, the family Lamiaceae encompasses many species extremely valued for their ethnobotanical and phytotherapeutic applications. In order to screen the diversity and potentially bioactive compounds, we evaluated key species from two genera, *Lavendula* and *Origanum.* Plant material was sampled in various bioclimatic regions from north Algeria and taxonomic determination was conducted based on morphoanatomical characters. Afterwards, leaves were cleaned than air dried and pulverized. The antagonistic activity of the extracts was carried out against various pathogenic bacterial strains. The extracts showed strong inhibitory activity reflected by inhibition zones varying between 2 to 10 mm which classed them as antibacterial agents. An effective antibacterial activity for some pathogenic bacteria and a broad spectrum of action for Gram+ (*Staphylococcus aureus*, *Bacillus subtilis*) and Gram- bacteria (*Escherichia coli*, *Pseudomonas aeroginosa*) were evidenced. The minimal inhibitory concentrations (MICs) using a microdilution method showed a rate of 20% to 40%. These results are reported her for a first time.

Key words: Diversity, Valorization, Antibacterial activity, Lamiaceae, Algeria.

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Diversity, vulnerability and conservation of medicinal plants: the case of Rosy Garlic (*Allium roseum* L.) polyploid complex in Algeria.

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The rosy garlic (*A. roseum* L. *sens lato*) represents a traditional medicinal herb. All parts of the plant were used in herbal medicine for sulfur compounds involved in antiproliferative and antimicrobial properties. This species complex native from the Mediterranean region includes several subspecies and varieties taxonomically difficult to circumscribe, especially in North Africa due to high polymorphism of local populations. At last, 12 infraspecific taxa were described following ancient floras including the rare endemic *A. roseum* subsp. *odoratissimum.* Unfortunately, unreasonable ethnobotanical collection, overgrazing, climate changes and strong anthropization of localities within its range have a strong impact on the occurrence and survival of its natural populations. This context led us to carry out an ecological and systematic survey in order to understand the extent of this impact and to identify conservation priorities. Plant material from 50 populations sampled in contrasted bioclimatic locations was subjected to multivariate analyses based on morphometric measurements. Chromosome counting was established for each population. Comparative molecular study covered both of Algerian and related Mediterranean populations. Phylogenetic analysis based on nuclear ribosomal ITS1-5.8S-ITS2 DNA sequences, was performed. Results explain substantial variability of flower segments correlated with diverse bulb structures suggesting occurrence of different breeding strategies. Morphological analyzes revealed two main groups structured in a north-south bioclimatic gradient, suggesting adaptation to arid environments. The phylogenetic tree topology provided a common evolutionary history of the north African populations, which form a single well-supported clade, despite the cytogenetic diversity highlighted with two chromosome numbers 2n=16 and 2n=32 as well as structurally variable karyotypes. This work showed the diversity of Algerian material but highlights the scarcity of natural populations. It is therefore essential to integrate our systematic evolutionary data into future conservation programs.

Key words: Diversity, Ecological survey, Phylogenetics, Rosy garlic, Algeria.

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Depth study of new materials used in energy storage : The case of activated carbons

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In solar thermal energy storage systems, activated carbon can be used as a heat storage medium to store excess thermal energy generated by solar collectors during sunny periods. Activated carbon has high thermal conductivity and heat capacity, allowing it to absorb and release heat efficiently. By storing thermal energy in activated carbon beds, solar thermal systems can provide reliable and dispatchable renewable energy to meet fluctuating energy demand., in this context, a detailed study on them was exposed and well detailed. activated carbon plays a vital role in various renewable energy applications, including biomass gasification, biogas purification, carbon capture and storage, and solar thermal energy storage. Its adsorption properties, high surface area, and thermal stability make it a versatile material for improving energy efficiency, reducing emissions, and enhancing the sustainability of renewable energy systems. in this article, a detailed study of these new materials dedicated to renewable energy has been studied and well exposed

Key words: Solar thermal, Storage system, active carbon, renewable energy.

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Green L-Trytophan electrochemical sensor based on GCE modified with chitosan and cellulose nanofibrils from *ammophiliaarenaria*

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Abstract

Nanofibrillated cellulose (NFC) from marram grass (*ammophiliaarenaria*) extracted from plants, harvested in the central western of Tunisia was used for the first time as a sensitive matrix to develop an electrochemical sensor of L-tryptophane (Trp) via Differential Pulse Voltammetry (DPV). The characterization of this modified electrode was performed by cyclic voltammetry (CV) and was subsequently verified by differential pulse voltammetry (DPV) in the presence of $Fe(CN)_6^{-3/-4}$ as a redox probe. The CS/NFC modified electrode exhibited a good analytical performance towards the detection of tryptophan with a wide linear range between $7.5.10^{-4}$ mM to 10^{-2} mM, a detection limit of 0.4 µM and a high sensitivity of 111.36 µM.mM^{-1}. Also, the CS/NFC/GCE showed good reproducibility, good selectivity towards the determination of L-tryptophan versus other amino-acids, uric acid and ascorbic acid and potential application in urine samples.

Keywords: Nanofibrillated cellulose, chitosan, chemically modified CGE, electrochemical detection, L-Tryptophan

Electrochemical Detection of the Neurotransmitters Dopamine and Seretonin on a Screen-Printed Carbon Electrode Modified by Nanofibrillated cellulose Derived from ammophilia arenaria Plant Extract

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A Nanofibrillated cellulose modified screen-printed carbon electrode (NFC-/SPCE) for monitoring important biomolecules, such as dopamine (DA) and serotonin (5-HT), having a high potential for personalized medicine and for continuous monitoring of human health is here proposed. Nanofibrillated cellulose (NFC) from marram grass (ammophilia arenaria) extracted from plants, harvested in the central western of Tunisia was used for the first time as a sensitive matrix to develop an electrochemical sensor of dopamine (DA) and serotonin (5-HT) via Differential Pulse Voltammetry (DPV). Cyclic voltammetry (CV) experiments demonstrated that the modified NFC-/SPCE sensor exhibits superior electrochemical performances to the bare SPCE. Low limits of detection (LODs) of 1 nM and 0.1 µM were registered for DA and 5-HT detection, respectively. The fabricated sensor has high selectivity, excellent storage stability, reproducibility, and repeatability.

Keywords: Modified electrode, Cellulose nanofibers, Electrochemical detection, Neurotransmitters.

Non-enzymatic electrochemical sensor based on Chitosan-anthraldehyde schiff base and multi-walled carbon nanotubes for the simultaneous determination of xanthine and uric acid

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A novel electrochemical sensor has been fabricated using Chitosan-anthraldehyde schiff base (AnCs) and multi-walled carbon nanotubes (MWCNTs) for selective and simultaneous determination of xanthine (XA) and uric acid (UA) in a phosphate buffer solution (PBS, pH 7.0).

In this study, Chitosan (Cs) is extracted from the Tunisian shrimp "*Parapenaeus longirostris*" by demineralization and deprotonation followed by deacetylation to produce Cs with 92% deacetylation degree. The Chitosan obtained reacts with 9-anthraldehyde to give Chitosan-anthraldehyde schiff base (AnCs). The structure of the prepared derivative was verified via FT-IR and NMR spectroscopy.

The electrochemical behaviors of XA and UA at the AnCs/MWCNTs modified glassy carbon electrode (GCE) were studied by cyclic voltammetry and differential pulse voltammetry (DPV) methods. The sensor is depicted to enable the individual and simultaneous voltammetric determination of two purine derivatives, uric acid (UA) and xanthine (XA). The modified GCE demonstrates several benefits, including high sensitivity and selectivity, low LOD and good electrocatalytic activity towards UA and XA.

Keywords: Modified electrode, Chitosan-anthraldehyde schiff base, Multi-walled carbon nanotubes Electrochemical detection, xanthine, uric acid.

Green Synthesis of Highly Photocatalytic Zinc Oxide Nanoparticles Using Eucalyptus Leaves Extract for Water Remediation

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The Green synthesis of zinc oxide nanoparticles (ZnO NPs) has gained significant attention as an eco-friendly and sustainable alternative to conventional physical and chemical methods. This study presents an intelligent and effective green sol-gel approach for synthesizing ZnO NPs with enhanced photocatalytic activity using Eucalyptus leaves extract as a natural capping agent and zinc acetate as a precursor. The influence of precursor concentration on the morphology, photocatalytic performance, and degradation kinetics of the synthesized ZnO NPs was systematically investigated. Remarkably, the ZnO NPs synthesized using a 2M precursor concentration exhibited superior photocatalytic activity, achieving 99% degradation of methylene blue (MB) within 60 minutes under UV irradiation. The enhanced photocatalytic performance at higher precursor concentrations can be attributed to the smaller particle size and higher surface area of the ZnO NPs. This study provides valuable insights into the green synthesis of ZnO NPs with tailored morphological and photocatalytic properties, demonstrating their potential for effective water remediation applications.

Key words: green synthesis, ZnO NPs, Photocatalysis, water treatment, UV irradiation.

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Sol-gel derived Nb/TiO_2 catalysts for dye degradation under visible light

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Methyl orange (MO) has mutagenic properties under oxidative stress as it gets radicalized, leading to the formation of carcinogenic anilines [1]. Among the strategies intended to decrease the concentration of MO in wastewaters, the photo-degradation under visible light is a well-established technique which has the potential to rapidly improve the quality of water. The photo-degradation of MO could be catalyzed by inexpensive TiO_2-based solids under the ultraviolet (UV) fraction of solar light [2]. However, due to the wide band gap of TiO_2, only a small UV fraction of solar light (3–5%) could be used [3].

One approach to synthesizing visible-light active photocatalysts is the exchange of TiO_2 with various metals, *e.g*. niobium [4]. In this context, several sol-gel derived Nb/TiO_2 catalysts were prepared and evaluated in the photo-degradation of MO under visible light. Starting from $TiCl_4$ like Ti precursor and ethylacetoacetate as templating agent, we were able to obtain, essentially, the anatase polymorph of TiO_2 without reaching high calcination temperatures. The catalytic results obtained with selected samples are compiled in Table 1.

Table 1: Methyl orange degradation: Catalytic results obtained with selected Nb/TiO_2 solids under visible light. [MO] = 0.06 mmol dm^{-3}, [H^+] = 6.66 mmol dm^{-3}, [H_2O_2] = 22 mmol dm^{-3}, [catalyst] = 0.4 g dm^{-3}, T = 25°C, 500 rmp, 25 Watt h^{-1}**,** λ_{max} = 500 nm.

Catalyst	TiO_2	3 *wt*. % Nb + TiO_2	5 *wt*. % Nb + TiO_2	7 *wt*. % Nb + TiO_2
Decolorization time (min)	240	210	90	30

According to Table 1, the total decolorization of MO solution was achieved after 30 min of irradiation over 7 *wt*. % Nb/TiO_2 solid. This catalyst is more active than a reference material loaded with 5 *wt*. % of commercial Nb_2O_5 (10 *wt*. % of Nb). Apparently, the active species in MO degradation are highly dispersed Nb_2O_5 particles, which generate $OH^{\bullet}$ radicals in the presence of H_3O^+ and H_2O_2.

Keywords: TiO_2, Niobium, Methyl orange, Visible light, Photocatalysis.

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SYNTHESIS OF NEW FLUORIZOLINE DERIVATIVES

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Abstract

Fluorizoline is a cytotoxic trifluorothiazoline that targets the scaffold proteins prohibitin 1 and -2 to disable the kinase C-RAF and boost the production of the cyclin dependent kinase inhibitor p21, resulting in cancer cell death. Fluorizoline promotes melanin production in melanocytes. Thus, we present the first structural requirement for fluorizoline analogues in these activities. We found many compounds that exhibit greater anti-C-RAF and anti-MEK actions, as well as stronger cytotoxicity in HeLa cells than fluorizoline. These findings provide groundwork for future optimization of PHB ligands for cancer therapy. We have developed an analogue of fluorizoline that has opposite pharmacological effects and can be utilized as a chemical tool to investigate PHB signaling in malignancies and other illnesses**.**

Key words: anticancer, Synthesis, selectfluor, ffluorizoline, p21 expression, C-RAF signaling

Etude. Phytochimique et Pharmacologique de *Calendula suffruticosa* Boiserie, plante du Nord-Est Algérien

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Le but de ce travail est de mettre en évidence l'effet des méthodes d'extraction sur le rendement et les activités biologiques d'extrait alcoolique d'une plante endémique du nord-est algérien *Calendula suffruticosa* Boiserie [1, 2].

Nous avons procédé à des extractions par sonication et macération en utilisant des solutions hydro-alcooliques, puis nous avons évalué quelques activités biologiques des extraits de différents organes (fleurs, feuilles, racines). Nous avons étudié également l'effet du solvant (éthanol 70% et méthanol 70%) sur ces activités. Les résultats ont montré une forte capacité inhibitrice contre la cholinestérase, l'anti-α-amylase, l'α-glucosidase, et un pouvoir antimicrobien.

On n'a évalué l'activité anti-oxydante (ABTS). Les résultats sont très encourageants. Sur la base de ces résultats, on peut dire que la plante étudiée à des activités biologiques importantes, elles peuvent être utilisées dans le secteur alimentaire, pharmaceutique ou en phytothérapie.

Key words: Plante endémique, ultrason, Activité antimicrobienne, Activité antioxydante.

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First-principles calculations on structural and electronic properties of compound CaTe with LDA approximation at different pressure

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Abstract

We performed first-principles calculations to explore the structural and electronic properties of the CaTe compound in various structures and at different pressure. Specifically, we investigated the NaCl (B1) structure with space group Fm-3m (No. 225) and the CsCl (B2) structure with Pm-3m (No. 221). Those calculations were employed out utilizing the full-potential linear muffin-tin orbital (FP-LMTO) method, and the energy of exchange was determined using the LDA approximation. We determined the lattice parameters, bulk modulus, and their pressure derivatives for both structures. Our results were found to be conforming with previously reported values. Furthermore, we analyzed the electronic and band structures of the compounds and identified their characteristics.

Key Words: DFT, FP-LMTO, LDA, CaTe

Saturated Phenyl Bioisostere Analogues for Atorvastatin: *In Silico* Study

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One of the risk factors for atherosclerosis, which can lead to a number of cardiac issues like angina, chronic renal disease, heart failure, or even stroke, is hyperlipidemia. The statins family is considered the first-line treatment of hyperlipidemia and cholesterol level reduction *via* inhibition of the HMG-CoA reductase enzyme, the key enzyme in cholesterol biosynthesis. Atorvastatin is a popular prescribed statin; although it has good action,it still has an issue with bioavailability, which is low due to the phenyl ring that leads to poor solubility. One of the effective approaches to enhance bioavailability is to use saturated benzene bioisosteres, such as bicyclo[1.1.1]pentane, bicyclo[2.2.2]octane, and cubane. Herein, 63 atorvastatin analogs were suggested and subjected to *in silico* evaluation to estimate their physicochemical properties, drug-likeness, and pharmacokinetics.

Further, the activity of these analogs to inhibit HMG-CoA reductase was evaluated using the docking approach. The *in silico* findings confirm that the cubane derivatives have favorable physicochemical properties, along with a higher docking score of -12.397 kcal/mol compared to -10.648 kcal/mol of the atorvastatin. In addition, molecular dynamics simulation followed by MM-GBSA is being conducted on the frontrunner compounds.

Keywords: Bioavailability, Molecular docking, ADME, MD, MM-GBSA

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A new *meso*-arylporphyrin: Synthesis, Characterization, X-ray Molecular Structure and Allelopathic activity

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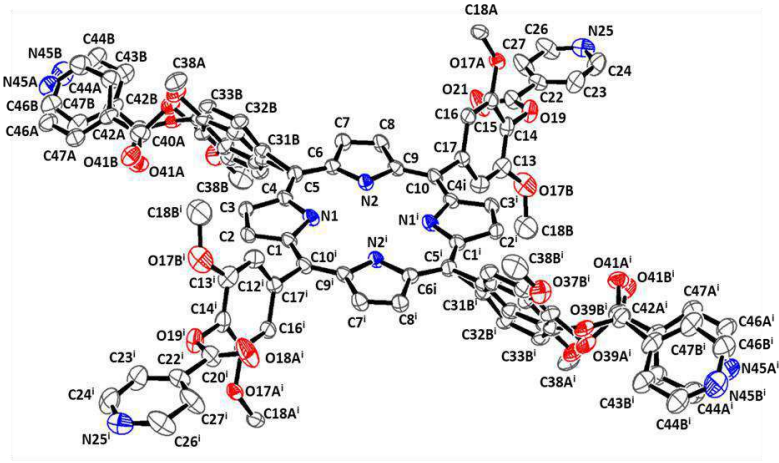

Porphyrin-based compounds are an attractive and versatile class of molecules that have attracted significant attention across different scientific disciplines [1]. These unique molecules, characterized by their distinctive macrocyclic structure featuring four pyrroletype rings linked by methine bridges, have drawn the attention of chemists, biologists, and material scientists [2]. The work describes in this communication describes the synthesis of the *meso*-tetrakis [4-formyl-(2-methoxy)phenyl-isonicotinate]porphyrin *n*-hexane monosolvate with the formula $H_2TMIPP{\cdot}C_6H_{14}$ (**1**). This new *meso*-arylporphyrin was characterized by UV-visible, infrared, ^1H Nuclear Magnetic Resonance spectroscopies as well as by elementary analysis and high-resolution ESI mass spectrometry. The single crystal X-ray diffraction study on compound **1** was performed at low temperature shows that our new free base porphyrin crystals in the monoclinic space group with the $P2_1/c$ space group. The asymmetric unit is made by one-half of a H_2TMIPP molecule and one-half of a disordered *n*-hexane molecule and the number of formulas by cell is Z = 2. Furthermore, the allelopathic properties of compound **1** on the germination, above-ground growth, root growth and hydration of lentil seeds were tested.

Key words: Free base porphyrin; UV-visible; X-ray molecular structure; Allelopathic activity

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Synthesis, Characterization, piégeage des radicaux et activités antifongiques in vitro of the A_3B-Porphyrin

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Notably, the use of the porphyrins and coordination compounds involving these aromatic derivatives as antioxidant and antifungal species. Thus, this last decade, several research groups, including our own, have reported a number of investigations on the use of porphyrins and metalloporphyrins as antioxidant and antifungal agents **[1]**. In this work we report the preparation of A_3B-type **meso** substituted porphyrins containing three phenyl groups and one subsituted 4-formyl-2-methoxyphenyl isonicotinate group namely the {4-[((4-formyl-2-methoxyphenyl isonicotinate }-10,15,20(triphenyl)porphyrin H_2MITPP. This new *meso*-arylporphyrin was characterized by UV-visible, infrared, ^{1}H Nuclear Magnetic Resonance spectroscopies as well as by elementary analysis and high-resolution ESI mass spectrometry. The radical scavenging activity of this compound against the 2,2-diphenyl-1-picrylhydrazyl (DDPH) and its antifungal activity against three yeast strains (C. albicans ATCC 90028, C. glabrata ATCC 64677 and C. tropicalis ATCC 64677) using the disk diffusion method and the microdilution method were tested.

Key words: Free base porphyrin; UV-visible; Antioxidant Activity, antifungal activity.

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Characterization of Prickly Pear seed oils from various regions in Tunisia: Clinical and dermatological evaluations

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Vegetable oils are vital for our daily diet, offering energy and a wealth of essential nutrients. They are widely utilized in food and cosmetic products, including margarines, chocolates, cooking oils, soaps, and lotions [1]. A comprehensive examination was carried out to compare the chemical composition, encompassing fatty acids and total phenol content, of Prickly Pear seed oil sourced from six distinct regions in Tunisia (Monastir, Sbitla, Kairouan, Kef, Sidi bouzid, Kasserine). This study involved the systematic collection of oil samples from these diverse regions using the cold press method to ensure a thorough representation of geographical variations. Subsequently, a detailed chemical analysis of the samples was conducted to assess their fatty acid profiles, vitamin content, and levels of antioxidants. Preliminary findings unveiled significant variations, underscoring the need for further comprehensive investigations. Furthermore, clinical trials were conducted to evaluate the effects of these oils on human skin. Volunteer participants were engaged in trials aimed at assessing dermatological aspects such as hydration, skin texture enhancement, and reduction of skin imperfections. Results revealed that Prickly Pear seed oil sourced from the Monastir governorate, displayed noteworthy physicochemical characteristics and substantial sensory and dermatological benefits. Additionally, collaborative efforts with experienced dermatologists were initiated to delve into the impact of these oils on various skin conditions. Initial observations are encouraging, suggesting potential therapeutic advantages for specific dermatological concerns.

Key words: Prickly Pear seed oil, Chemical composition, Geographic variation, Physicochemical characteristics, Dermatological aspects.

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Hydrothermal carbonization of prickly pear seeds: Characteristics of hydrochar and liquid fraction

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Hydrothermal carbonization is an environmentally friendly pretreatment process. It depends strongly on different parameters such as the stirring time, residence time and temperature. In order to investigate the effect of different parameters cited above, on both liquid and solid fractions, hydrothermal treatment of prickly pear seeds was performed at a temperature range of 160-220 °C, residence time range of 4-20h, and stirring time range of 6-15h.

Compositional analysis of the hydrolysate under different temperature conditions was performed by gas chromatography-mass spectrometry (GC-MS). The potential active compounds generated covered the main volatile such as volatile fatty acids, phenolic compounds and alcohols. The nature of these compounds depends strongly on the temperature value. In addition, an antibacterial activity of the liquid fraction has been proved; the high content of lactic acid seems to be the main reason for this activity.

However, the dynamic evolution of the chemical structure of char derived from hydrothermal carbonization (HTC) of prickly pear seeds was comprehensively studied by various characterization techniques, such as FT-IR, RX-D and SEM.

Key words: Hydrothermal carbonization, biomass, liquid fraction, hydrochar,

SYNTHESIS AND BIOLOGICAL ASSESSMENT OF KOJOTACRINES AS NEW AGENTS FOR ALZHEIMER'S DISEASE THERAPY

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The World Health Organization claims that 46 million people worldwide suffer from Alzheimer's disease (AD). It is likely that this number may significantly rise as the life expectancy increases [1]. AD is a multifactorial neurodegenerative disorder, inducing a progressive memory loss, decline in language skills, and other cognitive impairments. Although the a etiology of the disease is still not fully understood, low levels of acetylcholine (ACh), the aggregation of amyloid-beta peptide (Ab), hyperphosphorylation of tau protein, oxidative stress, and accumulation of biometals (Cu, Fe, Zn) are thought to play key roles in the pathophysiology, progress and development of AD. AD patients are currently treated either with the N-methyl- D-aspartate receptor antagonist, memantine, or donepezil, rivastigmine, and galantamine, three acetylcholinesterase inhibitors (AChEIs), but with limited therapeutic success. Consequently, there is an urgent need for new and more efficient drugs for AD therapy [2]. In this context we describe the synthesis, biological evaluation of new Kojotacrines. The biological evaluation of the target compounds started with the analysis of the hepatotoxicity, as the first and most critical biological test when dealing with new tacrine derivatives for potential AD therapy. In this sense, we submitted all new compounds to an in vitro cell viability test (MTT assay) using human hepatocellular carcinoma cell line (HepG2), as a well accepted probe to evaluate hepatotoxic effects, using tacrine as reference, and at seven different concentrations, from 1 to 1000 μM. We have identified compound **KT2d** as less-hepatotoxic than tacrine, at higher concentration.

Keywords: Alzheimer's disease; HepG2; hepatotoxic; Tacrine.

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Fabrication of a selective sensor based on a composite containing surfactant, silica and multiwall carbon nanotubes functionalized with 3-aminopropyltriethoxysilane (CTAB@SiO_2@MWCNT-APTES) for the detection of uric acid in the presence of interfering species

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Abstract

The CTAB@SiO_2@MWCNT-APTES composite was synthesised and applied as a modifier to a glassy carbon electrode and used for the determination of uric acid. APTES was successfully immobilised on multi-walled carbon nanotubes (MWCNTs) through non-covalent hydrophobic interactions, forming a nanoscale network extending from the electrode surface to facilitate direct electron transfer and access to the active site for uric acid determination. All experimental parameters were optimised to ensure the effective operation of the biosensor. The CTAB@SiO_2@MWCNT-APTES combination provided the sensor with a substantial surface area, excellent compatibility, electrical conductivity and stability, resulting in increased selectivity and sensitivity. Characterisation using FTIR, X-ray diffraction, scanning electron microscopy and transmission electron microscopy confirmed the integrity of the CTAB@SiO_2@MWCNT-APTES composite. This composite network efficiently separated the anodic oxidation potential of uric acid from other species with similar potentials, demonstrating its potential as a promising electrochemical sensor for selective determination. The viability of the CTAB@SiO_2@MWCNT-APTES array was evaluated for the selective detection of uric acid in real human plasma and urine samples. The results showed acceptable recoveries ranging from 78% to 104%, confirming its potential as a robust platform for future sensor development.

Keywords: CTAB@SiO_2@MWCNT-APTES; uric acid(UA) ; SiO_2@MWCNT-APTES; Electrochemical sensor.

Preparation, Spectroscopic and Structural characterization of the chlorido-bound five-coordinate high-spin iron(II) "picket fence" porphyrin complex

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Abstract

An Fe(II)-chloro five-coordinate picket fence porphyrin complex with the formula [K(2,2,2-crypt)][Fe^{II}(TpivPP)Cl]·C_6H_5Cl (TpivPP = α,α,α,α-tetrakis(*o*-pivalamidophenyl) porphinato, known as a picket fence porphyrin, and 2,2,2-crypt is the cryptand-222) has been synthesized and characterized. The synthesis utilizes cryptand-222 to solubilize potassium chloride in the preparation procedure. The UV–Vis and IR spectroscopic data studies have also been performed. The X-ray structural analysis and the Molecular Electrostatic Potential (MEP) theoretical calculation on [K(2,2,2-crypt)][Fe^{II}(TpivPP)Cl]·C_6H_5Cl are reported. This structure is a five-coordinate high-spin iron(II) picket-fence porphyrin complex. It crystallizes with a potassium cation chelated inside a cryptand-222 molecule. The axial chloride ligand is located inside the molecular cavity on the hindered porphyrin side and the Fe—Cl bond is tilted slightly off the normal to the porphyrin plane by 14.3°. The average equatorial iron-pyrrole N bond length (Fe—N_p = 2.092(3) Å) and the distance between the iron and the 24-atom mean plane of the porphyrin ring (Fe—P_C = 0.716(3) Å) are similar than complexes with five-coordinated Fe(II) high-spin porphyrinates (S =2).

Keywords: metalloporphyrins, chloro-complexes, Heme model.

Examining two Saharan BISKRA plants' potential insecticidal properties by analyzing their phenolic constituents

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The present work is about the dosage of the phenolic compounds of two Saharan plants, *Anvillea radiata* and *Astragalus armatus* and their insecticidal (*Aphis gossypii*) and antimicrobial (*Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Candida albicans*) effectiveness. The dosage of the total polyphenols and flavonoids is carried out by the method of Folin-Ciocalteu and $AlCl_3$, respectively, the phenol contents of *A. radiata* ethanol extract = 91.06 ± 13.8., *A. armatus* ethanol extract = 82.17 ± 10.8, *A. radiata* chloroform extract = 24.17 ± 4.12 and *A. armatus* chloroform extract = 35.28 ± 13.3µgEGA / mg DM. While the flavonoid contents remain low for all extracts (*A. radiata* ethanol extract = 5.40 ± 2.8, *A. armatus* ethanol extract = 0.3125 ± 0.2, *A. radiata* chloroform extract = 1.6 ± 0.6 and *A. armatus* chloroform extract = 0.312 ± 25.7 µg EGA / mg DM). Both chloroform and ethanolic extracts from *A. radiata* revealed antibacterial activity against *S. aureus* and *bacillus*, with zones of inhibition of 10.0 ± 2.6 mm and 16.5 ± 2.1 mm, respectively. On the other hand, the four extracts of the two plants showed an insecticidal effect for the three doses.

Key words: Characterization; antioxidants; phenolic compounds; flavonoids; Saharan plants

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Use low-cost bioadsorbents to remove heavy metals, drugs, and colorants.

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The objective of this study was focused on the synthesis and preparation of biomaterials of cationic and anionic type. These materials were used as adsorbents in waters polluted by different adsorbates likely to be present in the environment. The different materials will be characterized by different techniques (IRTF, DRX, MEB, BET and ATG/DTA). The studies of adsorption by these materials, will be carried out by controlling the various parameters such as: pH, mass, concentration and temperature.

Removal of effluents in aqueous media, especially the adsorption technique which seems to be well adapted to remove pollutants because of its proven efficiency and also for economic reasons, using low-cost adsorbents such as agricultural and industrial wastes.

Keywords: Characterization; Different materials; Water treatment; Bio adsorbents; adsorption

Valorization of *Laurus nobilis*, A Study on Mineral Composition, Essential Oil Extraction, and Antioxidant

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The potential of *Laurus nobilis*[1] as a useful fragrant herb from Algeria for folk medicine is investigated in this work. ICP-OES[2] analysis of the mineral element concentrations of *L. nobilis* revealed high amounts of vital minerals like calcium, iron, and potassium, all of which were within WHO and FAO-approved standards. Hydro-distillation (HD) and cold soaking were the procedures used to extract essential oils from *L. nobilis*[3], with crude extracts from the plant's leaves exhibiting the highest yield. In *L. nobilis* oil, GC/MS analysis revealed 75 chemicals, the majority of which were 1,8-cineole-related. Additionally, the DPPH assay[4] was used to assess the antioxidant potential of *L. nobilis* essential oils, revealing promising performance.

Key words: *Laurus nobilis*, ICP-OES, Essential oils temperatures, DPPH.

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Optimization of Cellulose Extraction from *Alfa (Stipa tenacissima* L.*)*

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The investigation aims to extract cellulose from the Alfa (*Stipa tenacissima* L.) plant[1]. By using the three levels and three variants, this work seeks to optimize the cellulose extraction[2,3] process from Alfa (*S. tenacissima*). Specifically, it investigates the effects of temperature, time, and NaOH concentration on the final mass of crude cellulose. The different variables used are extraction time (X_1: 15, 30, and 60 min), extraction temperatures (X_2: 45, 75, and 100°C), and NaOH concentration (X_3: 1, 2, and 5%) for maximum extraction.

In the experimental stage to determine the best yield for extracting cellulose from the Alfa (*S. tenacissima*) plant, the yield concerning the effect of the time factor on the final mass of extracted cellulose was the best yield of 64% at the time of 30 minutes.

The highest yield at 45 °C was 64% in terms of the impact of temperature factor on the extracted cellulose final mass. The highest yield was 64% at a concentration of 1% when it came to the impact of the NaOH concentration factor on the extracted cellulose final mass.

Using X-ray and infrared spectroscopy (FT-IR and XRD, respectively), we characterized the output produced.

Key words: *Alfa* (*Stipa tenacissima* L.), cellulose, extraction temperatures, NaOH.

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Self-assembly of carboxylate ligand functionalized ring-shape selenomolybdate: Synthesis, Characterization, and Hirshfeld surface

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Abstract:

An hybrid selenomolybdate compound $Na_2[SeMo_6O_{21}(O_2CCH_2NH_3)_3]\cdot 8H_2O$ has been structurally characterized scanning electron microscopy, FT-IR and ultraviolet spectroscopy, thermogravimetric analysis, and cyclic voltammetry measurement.

Single X-Ray diffraction technique was used to complete structure elucidation which confirm the title compound crystallizes in monoclinic space group $P2_1$ with two formula unit cell (Z = 2). The structure can be described by infinite of glycine functionalized polyoxoanions, organized with sodium ions and water molecules which are held together to generate a three-dimensional supramolecular network via hydrogen bonds.

Inter/intramolecular interactions which ensure the cohesion between these different entities were quantified and analysed by the Hirshfeld surface approach.

Antibacterial activityof three varieties of *Olea europaea* and the impact of their Polyphenol, flavonoid and oleuropein profile on this activity

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Olea *europaea is* a plant widely distributed in Mediterranean regions. It is rich in bioactive compounds such as polyphenols and irrinoides which has led to its extensive exploitation specially for its activities: antioxidant, anti-inflammatory and antimicrobial. This study aims to determine the secondary metabolite composition of three olive varieties and to evaluate their antibacterial activity in order to explore the relationship between this activity and the phytochemical composition of each extract.

This study was carried out on the leaves of 3 varieties of *O. europaea* which were macerated for 24 hours in 96% ethanol. Polyphenols and flavonoids were qualitatively analyzed by thin layer chromatography (TLC), followed by measurement of their concentration by colorimetric assay. A semi-quantitative TLC assessment of oleuropein was performed using software and subsequently confirmed by HPLC-UV assay. The antibacterial activity against *Staphylococcus aureus* was carried out by the agar diffusion method according to "the national committee for biological laboratory standards". Each extract was tested at 3 different concentrations (5 mg/mL, 10 mg/mL and 20 mg/mL).

The total polyphenol and flavonoid contents are different between the 3 varieties: variety 1 stands out for its richness in polyphenols, while varieties 2 and 3 are richer in flavonoids. For oleuropein, it is more abundant in varieties 2 and 3 (2.5211%, 2.614%) than in variety 1 (0.34991%) by both methods. The antibacterial activity at different concentrations varied among the three varieties reflected by the diameter of the inhibition zone.

Oleuropein -rich ethanolic extracts from *O. europaea* leaves demonstrated significant antibacterial activity against Staphylococcus aureus. In order to further exploit this molecule, an *in-silico* study will be carried out in the next step to elucidate its mechanism of action.

Comparative characterization of polyphenol extracts from plant waste using LC-MS/MS and assessment of their cytotoxic activities

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Residues produced during the processing of plant-based foods are valuable sources for extracting polyphenols, pectins, and proteins. These compounds can function as natural antioxidants and functional ingredients in food products [1]. In this study, phenolic compound extracts, designated as AP and BP, were obtained from the peels of two different plants: artichoke (*Cynara scolymus* L.) and bergamot (*Citrus limetta* L.), respectively, using ethanol extraction. The total phenolic and flavonoid contents were analyzed. Additionally, phenolic compounds present in the plant peels were identified using high-performance liquid chromatography coupled with mass spectrometry (HPLC-MS). Furthermore, the AP and BP extracts exhibited no toxicity against Vero cell proliferation.

Key words: polyphenols, HPLC-MS, cytotoxicity test, By-product

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Eucalyptus socialis F. Muell. ex Miq.: germinative behaviour and richness in essential oils

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Eucalyptus socialis F. Muell. Ex Miq., Ned. Kruidk. Arch. 4: 132 (1856) is a species recently identified in eucalyptplantations in southern Tunisia. No phytochemical studies on the extracts and essential oils of this species have been carried out. In this work, we studied the germinative behavior of this species and the effect of temperature on its germination. Temperatures of 18, 23 and 28°C were tested. In the second part, we analyzed the phenotypic variability of the leaf and the essential oil yield of ten trees planted in the Gabès region. The morphological parameters studied were leaf area (LA), limb length and width (LL and LW) and perimeter (PER), as well as specific leaf area. In addition, we analyzed the water content (WC) and essential oil yield (EOY) obtained by hydrodistillation. All these parameters were processed by XLSTAT 2024 statistical software. Results showed a high germination rate at 18°c (90,6%), decreasing at 23°c (80%) and becoming lower at 28°C (18%). In addition, high morphological variability was obtained for all leaf traits; leaf area varied from 11.32 to 19.97 cm^2, as did SLA (28.20 to 38.55 $cm^2.g^{-1}$) and water content (30.25 to 44.54%). Thus, a high variation was obtained for essential oil yield, its value varying from 1.9 to 4.53%; the mean value was 2.69 ± 0.84%. This variation could be explained by the presence of three subspecies within the species. A high positive correlation was obtained only between SF and EO yield (0.77), and between leaf width and EO yield (0.74). This study demonstrated high intraspecific diversity and richness of the leaves in essential oils. These preliminary results will be followed by studies on the EO yield of each organ (flower buds, flowers and twigs), the effect of subspecies and phenological stage/season on EO yield, and the chemical compositions and biological activities of these oils.

Key words: *Eucalyptus socialis*, diversity, germination, essential oil.

The chemical content of *Posidonia oceanica* from Libya

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This study explores the phytochemical content of the *Posidonia oceanica* plant, an endemic seagrass species in the Mediterranean Sea. The plant has been traditionally used for various purposes, including livestock bedding, food, agricultural fertilizer, and traditional medicine. The objective of this research is to investigate the chemical composition of the plant and identify its phytochemical constituents. Chemical screening was performed, revealing the presence of phenolic, triterpenoid, proteins, and other compounds. Hexane extracts obtained through Soxhlet extraction of different plant parts (leaves, rhizomes, and roots) were analysed using gas chromatography-mass spectrometry. The results yielded a total of sixteen compounds, which were categorized into four groups: the first category comprised ten long-chain hydrocarbons, the second category consisted of three long-chain fatty acids, the third category included one ketone, and the fourth category comprised one diterpene and one diterpene derivative. For the compound isolation process, flash column chromatography and preparative thin-layer chromatography techniques were employed. As a result, seven phenolic compounds were obtained from the methanolic extracts of different plant parts, namely decyl gallate, sinapinic acid, alpha-methyl cinnamic acid, acetosyringone, and chlorogenic acid from leaves, 4-ethoxycoumarin from rhizomes, and syringic acid from roots. The structures of these compounds were elucidated using spectroscopic methods such as 'H and 13C-NMR, and the spectra were analysed and visualized using *Mnova* software. This study contributes to the understanding of the phytochemical profile of *P. oceanica* and provides valuable insights into its potential applications in various fields, including medicine, agriculture, and industry.

Valorization of Pistacia vera L. waste: Extraction of Bioactive substances as natural antioxidants and antimicrobials

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Research on natural products in different industries is increasing mainly due to the drawbacks of synthetic chemistry. Plants present a renewable source of biomolecules which can be use in wide applications. The present work aims at a characterization of the leaves as well as the shell of the *Pistacia vera* L.. The analysis of the chemical composition of the leaves and the shell of pistachio tree was carried out. As a result, the leaves and the shell are rich in bioactive molecules. Two extraction methods have been applied to extract the natural substances from the leaves and shells of *Pistacia vera* L. The various extracts obtained were examined in order to determine their content of phenolic compounds. Antioxidant and antimicrobial activities are also considered. The extracts of the leaves of *Pistacia vera* L. are the richest in secondary metabolites and show a high antioxidant power as well as an important antimicrobial activity.

Key words: *Pistacia vera* L., chemical composition, antioxidant properties, antimicrobial capacities.

Characterization of bioactive Extracts of two fabaceae species using IR Spectroscopy and Evaluation of their Antimicrobial Activity

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As part of the valorization of medicinal aromatic plants from the North-East region of Morocco, renowned for their therapeutic properties, we focused on the study of two Fabaceae species used in traditional medicine: *Ebenus pinnata* and *Adenocarpus decorticans*.
Understanding their exact compositions, particularly in bioactive molecules, is crucial for enhancing the value of plant matrices and their derivatives. Infrared spectroscopy offers advantages such as speed, ease of use, and non-destructiveness, while being environmentally friendly due to minimal or zero solvent usage.
In this study, we specifically explored the application of infrared spectroscopy in characterizing extracts from various parts of these two medicinal plants.
This study evaluates also the antimicrobial effects of ethanolic extracts from flowers, leaves and stems of *A. decorticans* and *E. pinnata*; against several microbial population representing Gram-positive, Gram-negative bacteria including; *Staphylococcus aureus, S. epidermis, Bacillus subtilis, Micrococcus luteus, E. coli* and *Pseudomonas aeruginosa* using the standard agar disc diffusion technique.
None of the extracts exhibited antibacterial potency against Bacillus subtilis, E. coli, and Pseudomonas aeruginosa. However, for the other bacterial strains the screening for antibacterial activity was evaluated by measuring the zone of inhibition. Stems extracts was found to have strong antibacterial property, followed by leaves and flowers for both plants.

Keywords : *Adenocarpus decorticans, Ebenus pinnata*, infrared spectroscopy, Anti-microbial, Ethanolic extracts.

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Tin(IV) based organic–inorganic hybrid semiconductors with high thermal stability, photoluminescence and electric properties

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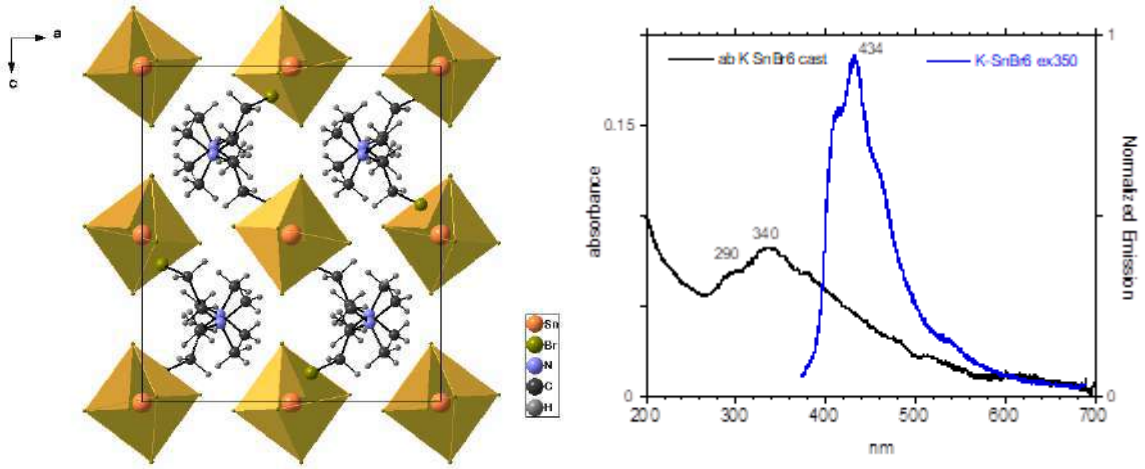
Abstract

0D hybrid halide perovskites (HP) have emerged as one of the most promising materials for the development of high-performance optoelectronic devices and have revolutionized the field of photovoltaic solar cells. In this report, a new organic-inorganic perovskite-like (2-bromoethyltrimethylammonium)$_2$SnBr$_6$ has been successfully synthesized. It is found that the compound exhibits a good semiconducting behavior, as well as remarkable electric properties. Single-crystal X-ray diffraction analysis revealed a perovskite-derivative structure having the inorganic $[SnBr_6]^{2-}$ periodically arranged in the three crystallographic axes and sandwiched by independent layers of organic cations. This study paves the pathway to explore a new lead-free hybrid perovskite for specific applications in electrolytes, batteries and photovoltaic.



Keywords: Hybrid halide perovskites, crystal structure, PL and electric properties.

Preparation, study and characterization of complex coacervates formed between chitosan and cactus mucilage extracted from *Opuntia ficus-indica* cladodes

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The study explores the complex coacervation between chitosan (Chi) and cactus mucilage (CM) extracted from *Opuntia ficus-indica* cladodes, examining the influence of pH and the Chi/CM ratio. Physicochemical characteristics of mucilage samples and resulting microcapsules were assessed. Mucilaginous polysaccharides were extracted at varying pH levels (pH=2, 4, 12) using hot water and purified with ethanol. The microstructure of mucilaginous extracts revealed amorphous, porous, features, enhancing moisture retention. These extracts displayed variability in monomer composition, including arabinose, galactose, glucose, xylose and uronic acid fraction. XRD analysis identified, primarily calcium salts. Encapsulation yielded microcapsules with diameters ranging from 4 to 12 µm and high encapsulation efficiency (83% to 95%). Integration of data suggested successful encapsulation of sunflower oil via complex coacervation, utilizing cactus extract as a carrier material. This approach suggesting potential applications in protecting bioactive compounds from oxidation and in drug delivery systems.

Keywords: Mucilaginous polysaccharides, microcapsule, complex coacervation

Optimization of Molecularly Imprinted Polymer-ZIF-7 Sensor for Urea Detection using Plackett-Burman and Central Composite Design

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Abstract

The optimized development of a selective urea biosensor using a molecularly imprinted polymer (MIP) associated with ZIF-7 was investigated employing the method of design of experiments (DOE). Electrode modification and quantitative measurements were conducted using cyclic voltammetry and DPV (differential pulse voltammetry). Several physicochemical parameters affecting the analytical performance of the modified electrode were examined, including the concentrations of Py and Ur in the pre-polymerization mixture, the number of cyclic voltammetric scans, the pH of the electrolyte solution, and the accumulation time. Parameter optimization was achieved using Plackett–Burman Design (PBD) and Central Composite Design (CCD) methodologies.

Keywords: Molecularly Imprinted Polymer; Urea sensor; CV and DPV measurements; CCD and PBD design.

Unveiling Discrepancies: Assessing Label Claims vs. Scientific Evidence in Plant-Based Dietary Supplements in Tunisia

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The use of herbal supplements has increased significantly in recent years due to a growing interest in natural health alternatives. However, since the dietary supplements field is not regulated in Tunisia, concerns have arisen regarding the accuracy of claims made on the labels of these products.
Several non-conformities can be identified based on the claims and dosage allowed in Tunisia for dietary supplements.
This study aims to evaluate the alignment of claims on labels of plant-based dietary supplements in the Tunisian market with scientific evidence. The results highlight potential areas of concern and regulatory deficiencies, revealing varying degrees of concordance between label claims and scientific evidence.
This is an analytic study where we evaluated a sample of food supplements selected by Raosoft randomized sampling software from a pool of dietary supplements provided by the two largest medical and para-medical distributors in Tunisia. From this pool, a smaller sample of herbal dietary supplements was specifically selected.
The selection criteria were defined rigorously, with a focus on plant-based products. Data collection involved extracting information from product labels, including claims, ingredients, and dosage recommendations. Claims and dosage accuracy were assessed based on the available scientific evidence.
A thorough search and selection of relevant scientific evidence was conducted from online Search engine databases.
Statistical analysis was employed to identify significant trends and discrepancies.
Using Raosoft software, we selected a representative sample of 80 products from a pool of 1500 available in the Tunisian market. Of these, 36 were identified as plant-based dietary supplements, with 94% being domestically manufactured and 6% imported. These supplements had a diverse composition, consisting of approximately 135 ingredients, categorized as follows: 34% plant extracts, 53% of unknown natural origin,7% essential oils, and 6% in alternative forms.
During our investigation into the dosage information of each herbal ingredient, we discovered that only 7 out of 135 ingredients could be substantiated with scientific evidence. Conversely, 72 out of 135 ingredients lacked applicable dosage information either due to the absence of labeling or insufficient data in the literature.
Additionally, we scrutinized the health claims featured on the labeling of these plant-based dietary supplements. It was observed that 17 out of 36 products made health claims that did not meet the criteria for qualification. The quality and strength of scientific evidence fell below the requisite standards.
The findings of this study contribute to the ongoing discourse surrounding herbal dietary supplements, emphasizing the need for enhanced regulatory oversight and consumer awareness. By bridging the gap between label claims and scientific evidence, this research aims to facilitate informed decision-making and ensure the safety and efficacy of plant-based dietary supplements.

Phytochemical analysis and pharmacological screening of *Schimpera arabica* Hochst. & Steud, wild plant with a focus on antidiabetic, haematological and antioxidant evaluations

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Objective: The prevalence of diabetes mellitus Type 1 diabetes (T1D) has reached alarming level globally. The natural product constituents are famous for their biochemical specificity among other molecular features that enabled them to be considered as an alternative cure for many chronic diseases in place of synthetic drugs. The current work focuses on studying certain hypoglycemic extracts searching for new natural antidiabetic source aiming to avoid deleterious adverse effects associated with synthetic drugs.

Material and Methods: Antidiabetic, haematological and histopathological study of methanol extract of *S. arabica* in streptozotocin-induced diabetic rats was carried out *in vivo*. Diabetes was induced by intraperitoneal injection of streptozotocin (58 mg/kg). The animals were treated with the extract (300 mg/Kg), metformin (100 mg/Kg), and insulin according to the experimental design.

Results: Daily oral co-administration of the plant extract and metformin for two weeks showed a beneficial effect on the blood glucose level. It also exhibited an increased number of white blood cells (WBCs), and red blood cells (RBCs). On the other hand, the plant extract showed a significant decrease in haemoglobin concentration by about 6.3%, and the platelet count showed a comparable decrease by about 7.2% when compared with their corresponding values in the diabetic-treated group. The treatment with extract for 15 days showed a favourable effect on the histopathological change of the pancreas in diabetic rat groups. Phenolic compounds of methanol extract were screened by the LC-MS method, which revealed the presence of 13 known phenolic compounds.

Conclusion: The current results suggest the usefulness of the plant extract as an effective adjuvant antidiabetic agent.

Multivariate analysis of microscopic elements of *Hyoscyamus muticus* L. *Subsp. falezlez* (Coss.) powder from Algeria

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Hyoscyamus Muticus L. Subsp. Falezlez (Coss.) Maire is a toxic species, very well represented in the Algerian Sahara. It is one of the richest Solanaceae in tropanic alkaloids with pharmaceutical and economic interests [1].
Microscopic test plays a leading role in species identification and was recently associated with statistical analyses [2]. The work aims to study the microscopic characteristics of this plant from three harvesting stations in Saharan Algeria.
Microscopic examination concerned all the organs' powder of the plant and was supplemented by a multivariate analysis study of elements. The distribution of microscopic elements was assessed using the analysis of main components (PCA). The associations between microscopic elements and the observations were made by dimension reduction analysis.
The results of the botany essay revealed a high degree of structural variability, in addition to the elements usually found during microscopic observation, some elements identified during our analysis have been cited rarely in the literature, like sclerosis fibers and prisms that were numerous in our samples. Certain elements were not mentioned, like cluster prism crystal of calcium oxalate, multicellular glandular trichome, and the bulky single-cell trichome element with a rounded tip. The multivariate study allowed us to classify elements powder depending on the degree of correlation. It also facilitated the identification by developing a key of two groups and two subgroups of elements powder (depending on the presence or absence of some elements).
At the end of our study, the results contributed to enriching the plant botany data.

Key words: Anatomy and histology, Algeria, *Hyoscyamus*, Multivariate analysis.

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Determination of tropanic alkaloids of *Hyoscyamus muticus* spps *falezlez* (Coss) in three harvesting areas of the Algerian Sahara by colorimetric method and HPLC

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Hyoscyamus muticus subsp *falezlez* (Coss) is a toxic species, very well responded in the Algerian Sahara, and has played an important role in the traditional medicine of the Tuareg [1]. It is one of the richest Solanaceae in tropanic alkaloids (especially atropine), which constitute a large group of secondary metabolites, of major pharmaceutical and economic interest. [2]. The objective of this work was to study *Hyoscyamus muticus* subsp *falezlez* (Coss) of Algeria from the regions of Abadla, Adrar and Tamanrasset, addressing its chemistry in order to exploit the data in the valorization of this species as a potential source of industrial production of atropine.

The determination of tropanic alkaloids (atropine and scopolamine) of the whole plant (harvested and cultivated) and of the various organs, was carried out by colorimetric method and by HPLC, the purity of some samples made use of the NMR.

The HPLC assay confirmed the alkaloid and atropine richness in all study stations for both the spontaneous plant and the cultivated species. The plant of the Tamanrasset station stood out with a content of 6.69± 0.5 mg/100gMS and 6.131± 0.496 mg/100gMS, the cultivated plant recorded a total alkaloid level of (5.948± 0.54mg/100gMS) and (3.91± 0.31mg/100MS) in atropine. The analysis also showed the purity of the sample, confirmed by NMR.

The colorimetric assay of the total alkaloids of the various plant organs showed the richness of the leaf and the flowers and fruits; 2.83% was recorded for the leaves of the Adrar Sbaa station and 2.45% for the flowers.

At the end of our study and content of the results obtained on *Hyoscyamus muticus* subsp *falezlez* (Coss) from Algeria, it is imperative to exploit this species as an industrial source of atropine production.

Key words: Atropine, *Hyoscyamus*, HPLC, Algeria

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Kombucha fermentation of black tea: biological potential and phytochemical properties

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ABSTRACT

The production of natural bioactive compounds troughthe fermentation of plants has increased in recent years. The present study aims to evaluate the biological potential and phytochemical propertiesof extracts obtained from the fermentation of black tea with kombucha consortium. After 14days of incubation, liquid-liquid extractions were performed with solvents of increasing polarity:ethyl acetate (EtOAc) and butanol. The total phenolic content (TPC), antioxidant and anti-inflammatory activities were measured.The results showed that kombucha teahad a significant relative TPC (227.7 mg GAE/g DW for EtOAc extract), which was 1.8 times higher than that of black tea (129.9 mg GAE/g DW for EtOAcextract). In addition,the antioxidant potentialwas enhanced bythe fermentation process, and the highest percentage inhibitory activity is attributed to the non-polar extracts, resulting in an IC_{50} value of 10.1 ± 0.3 (with EtOAc extract). As for the anti-inflammatory activity, the extracts obtained are not active. The quantification of total phenolic contents as well as the volatile compounds was performed using HPLC-DAD and GC-M analyses. The results showed the detection of eight compounds by HPLC-DAD and 37 compounds by GC-MS, including several polyphenols, organic acids, sugars, ketones, esters, and alcohols.

Keywords: kombucha fermentation; black tea, bioactivity, antioxidant activity, HPLC-DAD, GC-MS

Comparative study of the chemical composition of *Citrus Aurantium* wood to other wood sources

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Tunisia holds a significant position in the citrus industry with a yearly average production estimated at 416,000 tons. Bitter orange (*Citrus aurantium*) trees can be found in most of the Tunisian citrus-producing regions especially in the north where we find over 125 thousand trees covering an area of 480 hectares in the governorate of Nabeul. To maintain a good production quality, pruning is applied at least once a year causing a major environmental problem which consists in the incineration of wood waste leading to soil and air pollution. This work aims to study the chemical composition of *Citrus aurantium* tree wood waste including a comparative study to ensure its suitability for cellulose extraction as a new valorization method.

Key words: Citrus Aurantium, chemical composition, Cellulose, Agricultural waste.

A DFT Study on the chemical valorisation of CO_2 with epoxide catalysed by dimethyl-aminopyridine

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Abstract

Chemical valorisation of carbon dioxide into value-added products is a promising idea[1]. In this work, we report that the cycloaddition of carbon dioxide with epoxide, catalyzed by dimethyl-aminopyridine (DMAP) and the DMAP/H_2O system, has been thoroughly studied using the CPCM[3] solvation model and the DFT method at CAM-B3LYP[2]/6–31 G(d,p) in the gas phase. The aforementioned reaction was examined in the absence of a catalyst, in the presence of DMAP/H_2O-mediated pathways, and in DMAP alone.

Three paths are taken into consideration in order to evaluate the competitiveness of the addition of the H_2O molecule in the cyclization by CO_2: **Route I** is the implicit model, **Route II** is the explicit model, and **Route III** is the production of the ion bicarbonate. In conclusion, our study confirms that the catalytic activity of DMAP was higher for the investigated reaction when H_2O was present, and water was found to be an effective solvent for the DMAP-catalyzed cycloaddition of CO_2 with an epoxide.

Key words : CO_2, chemical fixation, DMAP, epoxide H_2O.

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Preparation and characterisation of ZnO-H_2TCPP thin films for photovoltaic applications

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ZnO and porphyrins have complementary properties that make their combination attractive for various applications such as photovoltaic and chemical detection[1]. By combining ZnO semiconductor nanostructures and porphyrins as self-assembled light harvesting components, porphyrins can have a significant impact in the field of solar energy conversion [2,3]. The Meso-tetra (4-carboxyphenyl) porphyrin (H_2TCPP) has four functional groups that are able to bind to a ZnO surface, so porphyrin molecules can act as both a linker and an energy source. Porphyrins can act as linkers and interconnect ZnO layers to form larger organic-inorganic hybrid assemblies. We will study the influence of the combination of the free porphyrin meso-tetra(4-carboxyphenyl)porphyrin) H_2TCPP and ZnO deposited in thin films on the structural properties by comparing them to films coated only with ZnO while respecting the growth conditions of the material.

Chemical Composition of the Essential Oils from *Calligonum comosum*, a wild Tunisian desert plant

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Abstract: The Polygonaceae family is considered a source of pharmaceutical products and biologically active substances, such as essential oils. The species *Calligonum comosum* of Polygonaceae is one of the most economically important resources of the Tunisian desert, playing an important role in the lives of the local populace. This plant has been reported to possess various chemical constituents and many medicinal effects. It is one of the least water-demanding species and constitutes, among other things, a source of bioactive compounds. Essential oils (volatile oils) are products with generally complex compositions containing volatile principles from plants, more or less modified during preparation. The volatile constituents of *C. comosum* were extracted by hydrodistillation from the aerial organs collected at the flowering stage and analyzed by GC-MS to discern the chemical composition of the essential oils of this species. A total of 12 compounds, which accounted for 91.3% of the total composition of the essential oils, have been identified. The isolated essential oils were a complex mixture of functional hydrocarbons (acids, esters, alkanes, etc.). The essential oil yield of the studied plant is acceptable and can be profitable on an industrial scale. Furthermore, the major compounds of this oil exhibit several interesting biological activities. However, it should be noted that the biological activities of an essential oil are not solely due to the major compounds but to all the compounds contained in the oil. Therefore, a detailed study on the biological activities of this oil should be conducted to demonstrate their importance and the possibility of their exploitation in various fields such as pharmaceuticals, cosmetics, insecticides, food, etc.

Key words: *Calligonum comosum*, Essential oil, Tunisian desert, Chemical composition.

Taguchi method and Artificial Neural Network for the General, Gentle, and Efficient Synthesis of β-ketoenamine in Deionized Water

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Abstract

The optimization of performance parameters, in particular the yield of the synthesis reaction of β-enaminones in demineralized water is crucial to improve their efficiency and accuracy. In this Report we investigate the optimization of the synthesis of β-ketoenamines in deionized water by controlling several parameters such as reaction time, temperature, amine equivalent, acid percentage and stirring rate. An orthogonal L_{16} (4^5) network was created using Taguchi's approach, allowing for the best possible parameters. To forecast the contribution of each parameter, analysis of variance (ANOVA) techniques are also used. Multiple linear and nonlinear regression (MLR, MNLR) and multilayer perception artificial neural network (MLP-ANN) predictive models were developed. Analysis of the results led to optimized design parameters, with Time = 6h, Temperature = 25°C, Amine Equivalent = 1.5, acid percentage at 20% and stirring rate = 1000 rpm, leading to a maximum yield of 63 %. Temperature had the greatest influence on the yield of the important variables (34 %), followed by stirring rate (20.53%) and Amine equivalent (0 %). In comparison with the multiple regression models (MLR and MNLR), the values calculated by the ANN model were in agreement with the experimental values with a coefficient of determination (R^2) of 1.

According to the molecular docking studies, some of these organic materials showed encouraging biological activity.

The results of this study give us insight into the gentle, cost-effective, and biologically active synthesis of β-enaminones in deionized water.

The Effect of Welding Currents on Microstructure of X60 steel

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Abstract:

Changes in microstructure affect weld formation and need to be controlled since weld failure is related to the microstructure of the heat affected zone. This research focuses on studying the variation of electric arc welding (SMAW) current on the microstructures of the heat affected metal weld zone of X60 steel. To achieve the research goal, X-ray diffraction (XRD) was used in the heat-affected zones and welding areas. As is evident from the analysis of the experimental results of welded joints, welding parameters have an effect on the grain types and structural phase characteristics of the welded structure.

Key words: *Microstructure, SMAW, Steel, XRD.*

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Valorization of agri-food waste by Fermentation Process

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Abstract:

There is a general interest in finding new ways of valorizing fruit and vegetable processing by-products. With this aim, application of fermentative process using beneficial microorganisms to produce biologically active compounds, have been developed. I this sense, the present study aimed to valorise agri-food waste by adding it to culture media during the fermentation process of beneficial bacteria for production of anti-infective molecules against multi-resistant pathogens. Obtained results showed that the supernatant of a culture of a *Bacillus* strain with an industrial waste has shown a wide spectrum of biological activities. Through the well diffusion test and MIC determination, combined culture of the agri-food waste and *Bacillus* strain shows antimicrobial activity against multi-resistant Gram-positive bacteria (*Staphylococcus aureus* 268 S), multi-resistant Gram-negative bacteria (*Escherichia coli* 18/22, *Escherichia coli* 19/21, *Klebsiella pneumoniae* 47740 and *Salmonella enteritidis* strains) with MIC value in the range of 250 µg/mL and 500 µg/mL and against *Candida albicans* strains responsible for candidiasis. Moreover, the cell free supernatant exhibited anti-biofilm activity of the most cited strains. It also showed antioxidant potential lower than the standard ascorbic acid. This study highlights the potent antioxidant, antimicrobial and antibiofilm properties of agri-food wastes fermented with beneficial bacteria, suggesting their potential as natural anti-infectious products to mitigate the adverse effects of antibiotic resistance in food animal farms.

Key words: Agri-food waste's valorisation, Antioxidant activity, Antimicrobial activity, Multi-resistant bacteria, *Bacillus* strain

Voltammetric determination of antioxidant character of some date palm seeds (*Phoenix dactylifera* L.) in Algeria

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The main objective of this study was to provide assistance and improve the chemical and practical aspects of five different types of date palm seeds found locally. These types include Tefezauine, Hamraia, Deglet Baidha, Gharas, and Deglet Nour from the Ouargla region in Algeria. The first step involved extracting phenolic compounds (PC) from each sample, followed by quantifying them and measuring their antioxidant activity using cyclic voltammetry. The PC of the extracts was quantified using the Folin Ciocalteu spectrophotometric method, revealing a range of 132.1 to 284.7 mg gallic acid equivalents (GAE/100 g). Subsequently, The IC50 value was calculated to determine the effectiveness of the antioxidants, the voltammetric response of the electrochemically generated superoxide anion radical in dimethylformamide (DMF) was monitored in the absence and presence of the DPF extracts. The observed decrease in current was interpreted as indicative of the antiradical activity of the added extract. The effective scavenging concentration (IC50) on superoxide anion radical ranged from 154.706 10^{-3}-236.071 10^{-3} g/l, with Deglet Baidha having the highest IC50 value and Gharas having the lowest. The use of DPF extracts for protection against oxidative stress is recommended.

Key words: Algeria Date palm Seeds, Phenolic content, Antioxidant capacity, Cyclic voltammetry, Superoxide anion radical.

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Chemical Composition and Antibacterial Activity of Essential Oil of *Artemisia Herba Alba* from Southern-Est Algeria

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In recent years, there has been a growing fascination with antimicrobial plant products due to the rise in resistance against them, antibiotics that certain microorganisms have obtained. Aromatic and medicinal plants play a crucial role as a source of these antibiotics. bioactive compounds, particularly in their volatile extracts, which are recognized as crucial antimicrobial agents inherent to these plants. The essential oil obtained by hydrodistillation from the aerial parts of *Artemisia herba-alba* growing in Djanet-Algeria, were analyzed by GC-MS. the antibacterial activity of the oil was tested using the agar disc diffusion method. the majority constituents found in the essential oil of *Artemisia herba alba* were camphor (47.26%), the results have shown a potential of the antibacterial activity against the tested strains, with The inhibition zones values of (8.33 ± 0.47, 10 ± 0.26, 12 ± 0.36 and 13.33 ± 0.62 mg/mL) for *Staphylococcus aureus*, *Salamonella Typhi*, *E. coli* and *Streptococcus pneumoniae* strains respectively. The essential oil extracted from *Artemisia herba-alba* plants cultivated in Southern-Est Algeria could serve as a promising reservoir of natural antibacterial compounds for the pharmaceutical industry, offering a potential alternative to antibiotics.

Key words: *Artemisia herba-alba*, essential oils, GC-MS, antimicrobial activity,

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Investigation of the effect of various additives on the band gap and pharmaceutical photocatalytic efficiency of TiO_2 as a fixed film

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Abstract: As one of the most effective and known wastewater treatment technologies, photocatalysis has been emerging to reap UV light and solar light to produce energy used in the degradation of pharmaceutical pollutants. TiO_2 has been widely used in photocatalytic applications under Ultraviolet radiation, and a lot of studies have been attached to its photocatalytic properties[1].

In this work, The TiO_2 was used as a fixed thin film modified by some additives: Y_2O_3, Ga_2O_3, WO_3, CuO, and CI to study their effects on the energy gap and photocatalytic properties of TiO_2 to degrade two different pharmaceutical molecules: Diclofenac and Ketoprofen under the UV LEDs light. All the additives showed the same results of photocatalytic degradation of 10mg/L of Ketoprofen around 30% during 150 minutes, however, the slide of TiO_2/Y_2O_3 showed the best result of Diclofenac photocatalytic degradation around 46% during 180 minutes 4 times better than TiO_2 alone under the UV-light radiation. The properties of the prepared slides were carried by SEM images, UV-Vis solid, and photocurrent measurements.

Keywords: Photocatalysis, TiO_2, Photocurrent, Oxides, Diclofenac, Ketoprofen, LEDs UV-light.

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IMPROVING THE EFFECTIVENESS OF HAZELNUT SHELLS ADSORBENT THROUGH SONICATION-ASSISTED ADSORPTION FOR DYE REMOVAL IN WASTEWATER TREATMENT

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Abstract : The textile dye industry, one of the largest industries worldwide, discharges large quantities of pollutants into the environment, including dyes, hazardous metals, and other chemical products; with the dyes having the greatest impact on the environment [1, 2]. Consequently, the removal of these dyes from wastewater before discharge is imperative. Lately, there has been significant interest in utilizing both ultrasound irradiation and the adsorption process in tandem. This approach offers potential benefits such as accelerating chemical reactions and enhancing mass transfer through acoustic cavitation, which involves the creation, expansion, and collapse of bubbles in the solution. Additionally, this method leads to the generation of new adsorption sites on the adsorbent material.

This study is dedicated to the investigation of the biosorption process of Methyl violet dye by integrating ultrasonication in the adsorption step with Hazelnut Shells as a novel and renewable biosorbent. The effect of different operating parameters such as particle size distribution, addition of salts and natural matrices. An increase in the particle size of adsorbent leads to an decrease in the adsorption capacity. The presence of NaCl in the solution can interfere with the introduction of ultrasound into the adsorption system and consequently lead to a reduction in the physical effects of ultrasound and cavitation.

Key words: Acoustic properties, Methyl violet, Adsorption, Ultrasound.

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ADSORPTION OF CATIONIC DYE FROM AQUEOUS SOLUTION ONTO PARACENTROTUS LIVIDUS SPINES

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Abstract : Although the textile industries have been a major contribution to the global economy, pollution from this sector poses a serious threat to the environment. The dyes discharged by these industries are inherently harmful, carcinogenic, and mutagenic. However, several methods and technologies can be employed for effective removal including adsorption, biological oxidation and membrane separation. Among these, adsorption receives significant attention due to its cost-effectiveness and simplicity. Therefore, there is a significant interest in optimizing the use of inexpensive adsorbents. Agricultural residues [1] and marine substances such as sea shells [2] have demonstrated their ability to effectively remove pollutant dyes from water. The objective of this study was to explore the viability of utilizing Paracentrotus lividus spines (marine waste) as an economical alternative adsorbent for eliminating Malachite Green from water. The study examined how different experimental variables such as initial dye concentration, stirring rate, and adsorbent quantity affect the removal kinetics. The obtained results indicated that an increase in initial dye concentration leads to an increase in the adsorption capacity of PLS. When initial dye concentration was increased from 5 to 15 mg L^{-1}, after 130 min of treatment, the adsorption capacity increased, respectively, from 2.78 to 6.41 mg g^{-1}. Additionally, it was observed that the amount of MG adsorbed decreased with the increase in adsorbent dose.

Key words: Adsorption, Malachite green, *Paracentrotus lividus spines*, Kinetics.

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k-carrageenan-modified electrochemical sensor for sensitive detection of copper ions in real samples

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Abstract

Polysaccharides, including alginate, carrageenan, fucoidan, are widely recognized marine-derived compounds esteemed for their biocompatibility and availability, serving diverse purposes including various industrial and environmental applications [1]. In this research, a modified electrode using k-carrageenan for electrochemical sensing of copper ions was developed. Through various preparatory steps involving mechanical, chemical, and electrochemical treatments, optimal adhesion of the polymer to the glassy carbon surface was ensured. The modified electrode was characterized using cyclic voltammetry and differential pulse voltammetry techniques, exploring potential applications in environmental monitoring. The study evaluated its ability to detect Cu^{2+} ions using square wave voltammetry. Optimization of parameters such as accumulation time, deposition time, and deposition potential improved the sensitivity of the method to 28.48 $\mu A.M^{-1}$ over a linear concentration range from 10^{-6} to 10^{-3} mol. L^{-1}. This research highlights the potential of polysaccharides for developing modified electrodes for electrochemical sensing applications, contributing to advancements in analytical and diagnostic tools for environmental purposes.

Key words: Polysaccharides, k-carrageenan, modified electrode, electrochemical sensor, Copper ions.

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Contribution to the hydrochemical evaluation of groundwater in the Bouira region.

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Abstract:

Water is vital for all forms of life. It is also an element of promoting individual's health and the socio-economic development of human communities. Among the exploited sources of water, groundwater is traditionally the best resource drinking since it is more protected from pollutants than the surface water resource. In rural areas, water is either a surface water source or a traditional well. The use of polluted water for food is dangerous for health.

The study of the characteristics of source water aims at clarifying the potential changes in their quality and origin or presenting their location. Their contamination by rain or pollution is considered to be the result of an important human activity.

This study emphasizes on the analysis of physico-chemical parameters of water resources in the area of Bouira (North of Algeria). The analysis comes from measurement campaigns.

The chemical analysis of waters samples shows a variability of physico-chemical characteristics in space.

Key words: Groundwater, hydrochemistry, Piper diagram, chemical facies, Bouira region.

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DFT study of bioactive molecule, spectroscopic characterization, FMO, ESP, BDE, NBO and QSAR analysis

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In this work, we have investigated theoretically, the properties and the spectroscopic features of jaceosidin (molecule extracted from *plantago albicans* L. *plant*) using DFT approach with B3LYP method. We have chosen three different basis 6-31G (d,p), 6-311G(d,p) and ccpvdz. The spectroscopic results (UV/VIS and ^{1}H, ^{13}C NMR) depict a good agreement with the experimental data. Complete bond analysis NBO, FMOs and molecular electrostatic potential (MEP) surface were executed to explain the electronic behavior of jaceosidin on the target to investigate different reactive sites such as hydroxyl groups and aromatic rings. Finally, we have calculated BDE (bond dissociation energy) of hydroxyl to evaluate the antioxidant reactivity of the molecule.

Key words: jaceosidin, DFT, spectroscopic analysis, NBO, BDE, QSAR.

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Palladium-catalysed synthesis of oxygen-containing heterocyclic compounds

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Abstract

Functionalized furans are structural features of naturally occurring and biologically active molecules, as well as in various pharmaceutical products and flavoring and fragrance compounds. Furans also used as building blocks in organic synthesis. For these reasons, the expansion of new and efficient methods for the preparation of functionalized furans continues to attract the interest of synthetic chemists. In this area, a new two-component alkylation-cyclization reaction catalyzed palladium was developed, producing functionalized furans in good yields from readily accessible and low cost starting materials, 1, 3-dicarbonyl compounds and allyl bromide. The reaction conditions and the scope of the process were examined, and a possible mechanism is proposed.

Key words: Furan, palladium-catalyzed, 1,3-dicarbonyl compounds, one-pot reaction.

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Green synthesis of photocatalytic, antimicrobial, and antioxidant zinc oxide nanoparticles using clove oil extract

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Abstract:

Zinc oxide nanoparticles (ZnO NPs) were prepared using clove oil. GC-MS analysis demonstrated that Eugenol is the main bioactive compound of the prepared extract. Experiments were designed, based on the central composite design. The effects of different amounts of zinc chloride and clove oil were evaluated for antioxidant and bactericidal properties of the formed ZnO NPs using the response surface methodology. The attained results demonstrated that more desirable NPs with maximum antioxidant activity and bactericidal effect, against Escherichia coli and Staphylococcus aureus. Furthermore, XRD and SEM analysis results revealed that the fabricated ZnO NPs had a hexagonal shape and could degrade methylene blue during UV radiation.

Keywords: antioxidant activity, clove oil, hydrodistillation, photocatalytic activity, zinc oxide nanoparticles.

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Composition of Algerian propolis from arid region, and evaluation of their antiradical scavenging activity

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Propolis, an organic compound obtained by bees from various plant and tree sources, possesses a wide range of beneficial properties, including antimicrobial, anti-inflammatory, antioxidant, and other therapeutic effects. In this study, the objective was to investigate the chemical composition, total phenolic and flavonoid content, and antioxidant activity of propolis sourced from the arid region of Algeria. The phytochemical assays performed have the ability to identify flavonoids, tannins, sterols, and triterpenes, as well as the detection of essential oils inside propolis. Propolis revealed a high concentration of phenolic and flavonoid components. The previous outcome was validated by the Folin Ciocalteu and aluminium chloride assays, respectively. The assessment of propolis' antioxidant ability was carried out using 2,2-diphenyl-1,1-picrirylhydrazil. The antioxidant activity of propolis was shown to be much higher in comparison to that of ascorbic acid. Propolis exhibits considerable potential as a natural alternative for use in food preservation and healthcare.

Valorisation des déchets des feuilles de *Myrtus communis* après hydrodistillation : Potentiel en tant que suppléments alimentaires pour animaux

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L'industrie de la production d'huiles essentielles génère une quantité significative de déchets après le processus d'hydrodistillation. Ces résidus, souvent négligés, présentent un potentiel inexploité en termes de valorisation.

L'objectif principal de cette étude est d'analyser la composition des divers métabolites (primaires et secondaires) présents dans les déchets issus de l'hydrodistillation des feuilles de *Myrtus communis*, une plante aromatique largement cultivée en Méditerranée pour explorer les différentes possibilités de leur valorisation.

Les déchets de l'hydrodistillation ont été séchés puis soumis à une extraction à gradient de solvants (chloroforme, acétate d'éthyle puis méthanol) par l'appareil de Soxhlet. Un criblage phytochimique a été effectuée par analyse chromatographique CCM suivi de la détermination des teneurs en polyphénols totaux et en flavonoïdes de ces extraits par dosage colorimétrique. L'activité antioxydante a été évaluée par deux méthodes : l'une *via* la CCM après pulvérisation avec une solution de DPPH (2 mg/mL), et l'autre par piégeage d'ABTS. La composition en acides gras des déchets a été déterminée par extraction par Soxhlet à l'hexane, suivie d'une analyse par GC/MS après une étape de dérivatisation par méthylation. Ces résultats ont été confrontés à ceux issus de l'extraction des feuilles de myrte intactes.

On a démontré que les déchets ont été très riches en acides phénoliques et en flavonoïdes ceci a été corrélé à un pouvoir antioxydant significatif. L'analyse par GC/MS a révélé des différences qualitatives et quantitatives dans la composition des acides gras entre les déchets de l'hydrodistillation et les feuilles intactes.

Cette étude vise à souligner l'importance de la valorisation des déchets provenant de l'hydrodistillation des feuilles de myrte grâce à leur richesse en polyphénols et flavonoïdes. Cette approche pourrait bénéficier à différents secteurs d'activité, notamment en explorant leur utilisation comme compléments alimentaires pour les animaux.

Antimicrobial and Antifungal Activities of Ravintsara Essential Oil Comparing to Antibiotics

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This study consists to evaluate the antimicrobial effectiveness of Ravintsara Essential Oil obtained by distillation of the leaves of *Cinnamomum camphora*, a tree native to Madagascar. This is to rationalize their use and apply them as an alternative remedy to antibiotics in the face of the emergence of multi-resistance and the failure of antibiotic therapy.

Ravintsara was tested on four bacterial strains Gram (–) (*E. coli* ATCC and *Salmonella anteritidis* ESBL+, *Pseudomonas aeruginosa*); one Gram (+) bacterial (*Staphylococcus aureus*), and *Candida albicans* as a yeast model.

Interesting antimicrobial properties of the HE studied were observed on the majority of the germs tested. This antimicrobial activity on yeast as well as Gram (+) and Gram (–) bacteria, in particular on ESBL producing that are multi-resistant to antibiotics, can contribute to the fight against infectious diseases and will eventually offer the possibility of using it in pharmaceutical industry.

Key words: Essential oil. Multi-resistant, antibiotics Antimicrobial activity, Ravinstara, *Cinnamomum camphora*

Chemical Composition and Antiproliferative Effects of Various organes of *Ruta graveolens's* essential oil against Human Cervical Cancer Cell Lines

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Ruta graveolen is a native herb commonly found in the Mediterranean region, and it is a widely used as medicinal herb both in traditional and in modern medicine. For this reason, this study aimed towas to examine the essential oils (EO) from Tunisian *R. graveolens* in three different organs (leave, stem and flower) *R. graveolens* essential oil's chemical makeup was examined using GC/MS analysis. The antiproliferative activity in vitro against human cervical (HeLa) cancer cells was evaluated using the MTT test.

Essential oil yields varied from 0.25% to 0.37% and showed a remarkable variation with plant organs. The GC/MS analysis revealed that ketones as the most abundant constituent in the three EOs. The essential oils of *R. graveolens* from leave and stem have almost identical components; the major compounds identified were 2-undecanone (33.61 and 35.42 %) and 2-nonadecanone (32.43 and 30.68 %), respectively. On the other hand, the major components of the flower essential oil were 2-undecanone (50.11 %) and 2-nonanone (20.35 %).

The stem essential oil had the most marked effect on cell proliferation, with IC_{50} values 318,983 ± 107,018 $\mu g.mL^{-1}$.

Keywords : *Ruta graveolens*, chemical composition, cervical cancer.

Study of the corrosion inhibition of carbon steel in 1M HCl by plant extract using electrochemical and theoretical studies

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Abstract:
Carbon steel is one of the commonly used materials in the industry. The cleaning process of these materials often involves the use of acidic solutions, which can result in significant financial losses. Currently, solutions based on synthetic chemical products are used, but they have major drawbacks such as high cost and toxic environmental impact. Therefore, researchers are turning to the development of more affordable, eco-friendly, and biodegradable inhibitors. In this study, we evaluated the potential of an extract from species belonging to the Apiaceae family grows in northeastern Algeria. We used advanced electrochemical techniques, including Electrochemical Impedance Spectroscopy (EIS) and Potentiodynamic Polarization Curves (PDP), as well as surface analysis using a scanning electron microscope equipped with an EDS analysis system. The extract characterization was done by LC-ESI-MS/MS as well as the identification of major compounds of the extract, subjected to a theoretical study using the DFT method, to obtain an idea of the major compound that adsorbs on the steel surface. The efficiency of inhibition was optimized using a genetic algorithm-based approach considering the parameters of the extract. Our results revealed an inhibition efficiency reaching 91% at such a low concentration of 600 mg/L. Scanning electron microscope examination coupled with EDS analysis confirmed the experimental results, thus validating the effectiveness of plant extract as a corrosion inhibitor. Furthermore, the genetic algorithm approach highlighted a significant correlation between the parameters used and inhibition efficiency, suggesting its usefulness and opening the door to other fine predictive tools in future research. These results encourage further research and testing on this promising plant species to better exploit its potential as a corrosion inhibitor in the industry.

Key words: Carbon steel, Corrosion, DFT, Extract, Genetic algorithm.

Anti-diabetic activity of a novel chitosan functionalized with a triazole/ carbazole System.

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Abstract :

Diabetes is a chronic metabolic disorder. Other than medication, adaptation of the diet is also considered one of the most effective methods of controlling blood sugar levels. Today's available therapies for diabetes, including insulin and a variety of oral hypoglycemic agents, are associated with serious side effects. Consequently, a large number of promising studies have been reported for the development of several natural substances, in particular polysaccharide derivatives, which are suitable for both the treatment and prevention of diabetes and any other associated health issues. Polysaccharides bearing heterocyclic groups are receiving considerable attention, especially triazole derivatives, owing to their wide range of biological activities. Chitosan is the second most abundant and renewable polysaccharide on earth after cellulose. Chitosan and its derivatives have been proved to show a variety of biological activities. The current work focuses on the synthesis and characterization of a new chitosan derivative created by click chemistry, for biological benefits involving anti-diabetic activity. This compound is soluble in common organic solvents. This structure was confirmed by XPS and IR-FT. The thermal characterization was carried out by differential scanning calorimetry (DSC). The biopolymer Cs-tri-carb proved to be an inhibitor of α-amylase activities. Both in vitro and in vivo studies revealed that Cs-tri-carb exhibited a significant inhibitory action toward the key enzyme. Moreover, the administration of Cs-tri-carb to surviving diabetic rats reduced intestinal α-amylase activity and blood glucose levels by 26 and 32% and 26 and 40% respectively, compared subsequently to untreated diabetic rats.

Key words : Chitosan, click chemistry, anti-diabetic activity

Properties and Applications of Schiff Base Compounds for Cadmium Detection in Solutions

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Abstract:

This study reports the pressing global concern over the control of dangerous water pollutants, in particular cadmium ions found in environmental samples. Cadmium poses serious threats to both aquatic and non-aquatic organisms due to its bioaccumulation and non-degradability. Even trace amounts of cadmium can have fatal effects on living organisms, and its introduction into the environment occurs through natural processes and various human activities. Cadmium ions present high solubility, mobility, and bioavailability, easily permeating polluted soils and entering the food chain, which leads to adverse health effects such as cancer, osteoporosis, and genetic mutations. Developing an effective and practical sensor for real-time cadmium ion detection is crucial for public safety. Electro-analytical techniques, particularly Square Wave Anodic Stripping Voltammetry (SWASV), provide cost-effective and highly sensitive solutions. The study aims to contribute to the field of chemistry by exploring the properties and applications of Schiff base compounds in catalysis and medicinal chemistry, potentially including the detection and analysis of cadmium ions.

Keywords: Schiff base, cadmium detection, Square Wave Anodic Stripping Voltammetry (SWASV)

Genetic diversity and structure models of natural populations of *Lavandula stoechas* L.: Performance of EST-SSR and ISSR markers

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The analysis of the genetic diversity of the natural populations of *Lavandula stoechas* constitutes an essential step for the rational exploitation of the species and the development of effective strategies for their improvement and conservation. The genetic variability of eight Tunisian populations of *L. stoechas* was estimated using EST-SSR and ISSR markers. The obtained results revealed a low level of genetic diversity with both ISSR and SSRs markers compared to that recorded for others listed threatened wild species. The dominant ISSR markers have been shown more informative than EST-SSRs with PIC values of 0.254 and 0.072, respectively. Additional clustering analyses, principal coordinate analysis (PCoA) and population structure (STRUCTURE), indicated that the grouping of populations was independent of their eco-geographic origins.

Considering these findings, it becomes imperative to develop a conservation strategy for the wild germplasm of this species. Increasing the *in-situ* population's sizes in the natural habitats and ensuring efficient *ex-situ* conservation measures is crucial for the sustainability of this endangered species in Tunisia.

Keywords: *Lavandula stoechas* L., Wild germplasms, ISSRs, SSRs, Genetic diversity, Tunisia

Repurposing of β-lactam Antibiotics as a Potential SARS-CoV-2 Mpro Inhibitors : *In silico* Study

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The COVID-19 pandemic has been confirmed in 774 million cases and has resulted in over seven million fatalities, according to the WHO 2024 situation report [1]. Up to date, finding a single, highly effective drug for COVID-19 is a challenge. A drug repurposing strategy is one of the best approaches to finding treatment for COVID-19 [2]. In this study, a database of 108 β-lactam antibiotics was screened in silico against the main protease M^{pro} enzyme using computational techniques. Initially, standard precision (SP) docking was used and further refined with extra precision (XP) protocol. Among others, Aspoxicillin, Ceforanide, Azlocillin, Cefpiramide, Mezlocillin, Doripenem, Piperacillin, Cefoperazone, Amdinocillin, and Cefbuperazone showed a good docking score. Molecular dynamics simulations were performed for 300 ns to evaluate the docking results, which were followed by molecular mechanics generalized born solvent accessibility (MM-GBSA) binding energy. The molecular dynamics simulation showed that Cefoperazone is more stable within the active site than the N3 peptide inhibitor and could be a possible treatment for COVID-19.

Keywords: COVID-19, Docking, MD, main protease

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Combination of Experimental and Theoretical Investigations on the New Supramolecular Organic Compound: Bis(4-Piperidinium ethyl ketal) Oxalate

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We report in this work, a novel supramolecular organic compound, Bis(4-Piperidinium ethyl ketal) Oxalate with general chemical formula $(C_7H_{14}NO_2)_2(C_2O_4)$, denoted by 4PEKOX. Single crystal X-ray diffraction was used to identify the asymmetrical 4PEKOX unit and its two-dimensional network. This compound have been elaborated and crystallized in a monoclinic system with space group $P2_1/c$ and cell parameters values: a = 12.1401 (8) Å, b = 6.9253 (5) Å, c = 11.2564 (7) Å, β = 106.433 (2)°, V = 907.71 (11) $Å^3$ and Z = 2. The attachment between cations and anions is provided by N-H...O and C-H...O hydrogen bonds forming supramolecular units of type $R_2^2(8)$, $R_1^2(5)$ and $R_2^1(6)$. Hirshfeld surfaces and two-dimensional fingerprints have been used to estimate the intermolecular interactions responsible for crystal stacking. Experimental investigation was combined with quantum chemical calculations to confirm and evaluate the properties of 4PEKOX from a theoretical point of view, allowing us to explain and examine in detail the role of non-covalent interactions in this new compound. The expected therapeutic effect of 4PEKOX as an organic supramolecular compound was studied using the molecular docking technique to show the evolution imposed by synthesis through the combination of organic molecules to produce supramolecules more reactive than the starting reagents.

Keywords: Single-crystal X-ray diffraction; Hirshfeld surfaces analysis; Quantum chemical calculations; Molecular docking.

A new hybrid halide 2D perovskite-like: Structural, thermal, optical and electrical properties

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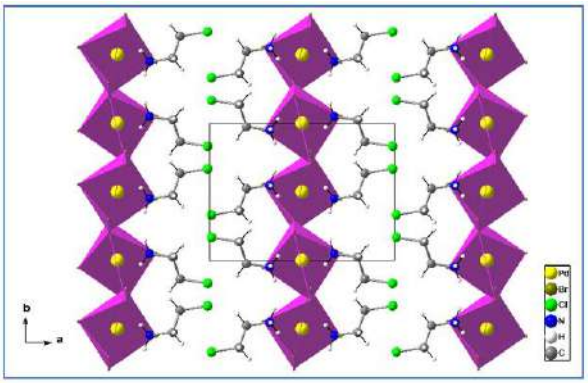
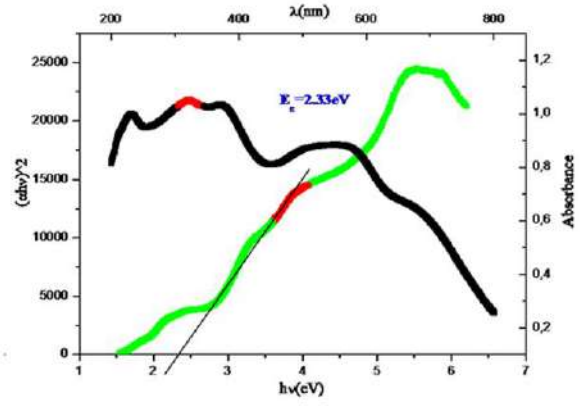
Abstract

A new palladium(II) bromide complex templated by 2-chloroethylammonium, $[Cl\text{-}(CH_2)_2\text{-}NH_3]_2PdBr_4$, was synthesized and crystallographically characterized by single-crystal X-ray diffraction. The title compound crystallizes in the monoclinic space group $P2_1/c$ with two formula units per cell and the following parameters: a = 11,758 (2) Å; b = 8,446 (14) Å; c = 7,592 (9) Å, β = 101,342 (7)° and V = 739,4 (2) $Å^3$. Its 2D perovskite-like structure consists of metallic layers parallel to the ab-plane, obtained by corner sharing between octahedra built of palladium(II) cations surrounded by six bromide anions, and protonated amine cations lying in the space between the anionic layers. The thermal decomposition of the compound proceeds through two stages giving rise to palladium oxide as the final product. The optical study reveals that the title compound exhibits four optical absorption bands at 230, 319, 372 and 556 nm. The gap energy value is 2.33 eV, which shows that the new hybrid compound is a semiconducting material.





HPLC-PDA/ESI-MS determination of the polyphenolic profile and assessment of the α-amylase inhibitory activity of *Pulicaria vulgaris* using *in vitro* and *in silico* methods

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Natural extracts of plants are a complex of bioactive compounds, such as polyphenols, terpenoids, carotenoids and alkaloids. Among them, polyphenols constitute one of the most important natural chemical families endowed with various biological activities [1]. Within this context, we were interested in establishing the polyphenolic profile and in appraising the anti-α-amylase activity of the EtOAc and BuOH extracts from the aerial parts of *Pulicaria vulgaris*. Total phenolics and total flavonoids of both extracts were quantified. The analysis of these extracts by HPLC-PDA/ESI-MS, allowed the identification of a total of 4 and 19 polyphenolic compounds in the EtOAc (major component: methylcatechin: 261.51±0.03 gkg^{-1}) and BuOH extracts (major component: 1,3-*O*-caffeoylquinic acid:12.95±0.12 gkg^{-1}), respectively. The biological study revealed that EtOAc and BuOH extracts exhibited a high α-amylase inhibitory action (IC_{50} = 10.0 and 7.5 $\mu g.mL^{-1}$, respectively). It has been shown that the EtOAc extract produced an uncompetitive inhibition against α-amylase, while the BuOH extract inhibited this enzyme in mixed manner. The molecular docking analysis of the major constituents of BuOH extract (1,3-*O*-caffeoylquinic acid) showed a low binding energy, a correct mode of interaction in the active pocket of the enzyme, and an ability to interact with the key residues of glycosidic cleavage (GLU-230 and ASP-206), which may explain, in part, the strong inhibitory effect of α-amylase established by this extract.

Key words: *Pulicaria vulgaris*, polyphenolic compounds, anti-α-amylase

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Synthesis and characterization of α-Al2O3 as a high added value product in the recycling strategy for the recovery of aluminum chips

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Abstract: This research aims to valorize aluminum chips collected from a metallurgical industry in the region of Sfax –Tunisia for the preparation of different types of alumina (Al2O3). The alkaline attack of aluminum chips with 2 M NaOH solution provides the sodium aluminate solution which was neutralize to pH=6 with 2M HNO3 acid solution at room temperature. At pH 6, the XRD pattern of the as-dried sample showed the characteristic peaks of well crystallized bayerite (Al(OH)3). The thermal treatment of bayerite at different temperatures (500, 800, 1000, 1100 and 1200 °C) was studied by X-ray diffraction, 27Al MAS-NMR and FTIR techniques. Bayerite (Al(OH)3) was converted into η-Al2O3 at 300-600 °C. From 800°C, a noticeable increase in structural order was detected in η-Al2O3, which is fully transformed to θ-Al2O3 at 1000°C. From 1000 to 1200 °C, θ- Al2O3 and α-Al2O3 coexist together. At temperatures above 1200°C we found the thermodynamically stable phase α-Al2O3 (figure 1). 27Al MAS-NMR spectrum of bayerite displays single peak at around δ ≈ 5.5 ppm, attributed to Al nuclei in octahedral coordination Al[6]. During the structural transformation of bayerite into η-Al2O3 at 500 °C, a portion of the aluminum atoms migrate from Al[6] sites to tetrahedral sites Al[4] in alumina lattice. It should be mentioned that for η-Al2O3, there are unique value of Al[6] to Al[4] ratio which is about 1:4. Indeed, 27Al MAS-NMR showed the presence of 79 % of Al[6] and 21 % of Al[4]. The further increase of temperature to 800 °C; we obtain roughly equal concentrations of Al[4] and Al[6] sites which is the case of θ-Al2O3. Finally, the sample treated at 1200°C contains mainly Al[6] sites and residual amount of Al[4] sites which confirms the formation of α- Al2O3, since α-phase is known to contain only Al[6]. The small quantity of Al[4] confirms the presence of residual θ-Al2O3 in the sample treated at 1200°C.

$$Bayerite \xrightarrow{300-600\,°C} \eta - Al_2O_3 \xrightarrow{850-1000\,°C} \theta - Al_2O_3 \xrightarrow{\geq 1200\,°C} \alpha - Al_2O_3$$

Figure 1: The phases resulting from the heat-treatment of bayerite at different temperatures.

Keywords: Aluminum chips, bayerite, θ-Al2O3, η-Al2O3, α-Al2O3.

A new luminescent material based on bismuth(III): Synthesis, Structural characterization, Hirshfeld surface, Thermal behavior, vibrational and optical properties

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Abstract

The halobismuthates organic-inorganic hybrids materials are interesting systems because of the opportunity to combine the organic and the inorganic material's proprieties. In the present work, the single crystal $(C_8H_{12}N)_2BiCl_5$ that has been synthesized by slow evaporation at room temperature, characterized by X-ray single crystal diffraction, Infrared, Raman spectroscopy, optical, and Hirshfeld surface analysies. The single X-ray diffraction results have revealt that this compound crystallized in the monoclinic system of space group P 21/c with four formula units cell(Z=4). The unit cell dimensions are: a= 13.71540(10)Å, b= 14.4354(8)Å, c= 11.4996(7)Å, β= 94.011(2)° and V= 2271.20(19)Å^3. The crystal structure is built up from two independent protonates α-Methylbenzylammonuim, and corner-sharing $[BiCl_6]$. The crystal cohesion is achieved by hydrogen bonds N–H· · · Cl joining the organic and inorganic layers. The Raman and infrared spectra of the title compound were recorded in the range of 50–400 and 400–4000 cm^{-1}, respectively. The crystal exhibits thermal stability up to 160 ºC using the Thermogravimetric analysis TGA. Finally, the photoluminescence measurement indicates that the synthesized material manifests luminescence property in its solid state.

Keywords: Hybrid material; X-ray diffraction; Hirshfeld surfaces; Vibrational spectroscopy; Optical study.

A 0D Sb-containing hybrid organic-inorganic material: Synthesis, Structural characterization, Hirshfeld surface, Vibrational and optical properties

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A novel interesting hybrid organic-inorganic material of quadris ((S)-1-phenylethylammonium) decaiododiantimoinates (III) with the formula ((S)-$C_8H_{12}N)_4Sb_2I_{10}$ was elaborated by slow evaporation at room temperature, characterized by X-ray single crystal diffraction, Infrared, Raman spectroscopy, optical, and Hirshfeld surface analysies. The title compound crystallizes in the non-centrosymmetric monoclinic space group $P2_1$ with lattice parameters a= 12.69129(15)Å, b= 14.96770(15)Å, c= 13.91397(16)Å, β= 92.2735 (11)°, Z= 2 and V= 2641.01(5)$Å^3$. Two octahedra are connected by edge-sharing to form a dimer, which is isolated from each other showing a 0D structure. The crystal cohesion is achieved by hydrogen bonds N–H· · · Cl joining the organic and inorganic layers. The Raman and infrared spectra of the title compound were recorded in the range of 50–400 and 400–4000 cm^{-1}, respectively. Finally, the photoluminescence measurement indicates that the synthesized material manifests luminescence property in its solid state.

Keywords: Hybrid material; X-ray diffraction; Hirshfeld surfaces; Vibrational spectroscopy; Optical study.

Innovative Green magnetic Fe_2O_3@BC adsorbent for water purification

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Abstract

Water pollution due to various industrial effluents represents a global environmental issue. Among various wastes generated from the industries, dyes and toxic metal ions are the most discharged pollutants. These pollutants are toxic to human and the ecosystem which linked to accumulation in human body and are non-biodegradability. Therefore, the purpose of this work is to remove Methylene blue and Cupper from water using an economical green magnetic Fe_2O_3@BC adsorbent. This adsorbent was prepared by following one step co-precipitation method. This new material characterization was achieved using FTIR spectroscopy, EDX, XRD and SEM techniques. The adsorbent dose, contact time, pH, temperature, and initial concentration were optimized in batch mode. The obtained results showed an excellent removal capability of this adsorbent for Cupper and Methylene blue witch reaches 90 % and 95 % respectively.

ANALYSIS OF CHEMICAL AND ANTIOXIDANT ACTIVITY OF MORINGA OLEIFERA FROM MALI (LOCATION: BAMAKO) AND ALGERIA (LOCATION: BENIABASS)

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Moringa species are multipurpose plants with nutritional, medicinal and industrial benefits. The aim of this paper was to investigate the total phenolic content (TPC) and total flavonoid content (TFC) of different extracts prepared from various parts of *Moringa oleifera*, and evaluation of antioxidant and antibacterial activity. *Morina Olifeira* (MO) samples collected from Mali and Algeria, the former the Central region, i.e. Bamako (Malian MO) and the latter, the South West region, i. e. Bechar from location of Beniabass (Algerian MO).
MO was extracted with ethanol providing a series of ethanol extracts (EE-MO). The latter were analyzed to assess their total polyphenols and flavonoids contents using UV spectroscopy. Then they also assessed for their antioxidant activity by means of established methods such as ferric-reducing power (FRAP) and 1,1-diphenylpicrylhydrazyl (DPPH) free radical-scavenging methods. Finally, they were examined for their antibacterial activities.
Interesting results were obtained both for antioxidant and antibacterial activities of MO. The best value of TPC was found in leaves of MO Algeria (LA-MO). The linear correlation between phenolic content and antioxidant activity of MO from Algeria was also confirmed. For the best value of TFC was found in powders MO Mali (PM-MO). All EE-MO samples showed antibacterial activity against *B. subtilis, K. pneumoniae and P. aeruginosa* and the antimicrobial activity varied according to the origin of the MO.
M. oleifera is an important medicinal plant. It is one of the most widely cultivated species of the family moringaceae. The level of secondary metabolites polyphenols and flavonoids is different between the three EE-MO samples investigated in this work, and this may be due to several factors such as: geographic origin, drying, storage and age of the plant. According to the tests carried out on the antioxidant activity (DPPH and FRAP methods), one notices that the extract of the powder from Mali revealed a strong activity than the two others (leaves from Mali and Algeria).

Keywords: *Moringa Olifeira*, Polyphenols, Flavonoids, antioxidant activity, antibacterial activity

Study of the inclusion complexes of bioactive extracts of the *Ephedra alata* plant (Taghit region) with cyclodextrin, and biological evaluation.

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Abstract:

Ephedra is one of the most used plants in traditional medicine for the treatment of various diseases. Cancer is only treated with Ephedra alata for the Tuareg community in the Illizi Region [1]. The objective of our work is to investigate the impact of different cyclodextrins on the antioxidant activity of extracts from the Ephedra alata plant.

The result obtained during this study is that the complexation was very successful between the cyclodextrin and the methanolic extract of the plant, proven by the decrease in absorbance in the UV-Visible curves between the free extract and the complexed extract. While for the antioxidant activity was significantly improved in the presence of different types of cyclodextrin. Because cyclodextrin improves the solubility of extracts, this improves antioxidant activity.

The results obtained are promising, in terms of antioxidant activity, but the CD concentration factor remains decisive for improving activity. This result is currently being extended to the antimicrobial and anti-inflammatory activity of the plant.

Key words: *Ephedra*; Cyclodextrin; antioxidant activity; inclusion complex; extraction.

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PHENOLIC PROFILES (HPLC-UV) OF TUNISIAN OLIVE OIL BY ETHANOLIC EXTRACTION PROCEDURE

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Abstract

Polyphenols have become a subject of intense research because of their perceived beneficial effects on health due to their anticarcinogenic, antiatherogenic, anti-inflammatory, and antimicrobial activities. It is well known that olives and their derivatives are rich in phenolic substances with pharmaceutical properties, some of which exert important antioxidant effects. The characterization and quantification of their polyphenol composition is taken in any evaluation of the putative contribution of the olive to human health.

This review is concerned with polyphenols in Tunisian olive *(Olea europaea* L.) products (fruit and oil) by the method of Folin-Ciocalteu and the HPLC analysis.

Key words: polyphenols, olive, antioxydant, olive oil, Tunisian olive.

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Structural characterization and biological activities of polysaccharides from Tunisian genus of *Allium roseum* leaves

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Allium roseum is medicinal plant of Alliaceae family grown in Tunisia, widely used as an important ingredient in food and medicine because of its excellent nutritive and functional properties [1]. The present study explored the extraction of polysaccharides from *A. roseum* leaves was carried out by ultrasound –assisted. The carbohydrate content was determined via the phenol-sulfuric acid method and galacturonic acid content was measured by a carbazole assay. They were characterized by size exclusion chromatography, GC/MS, UV–vis and FTIR-ATR, and the evaluation of their antioxidant potential and anti-inflammatory effects in vivo and invitro.

As results, structural characterization, and physico-chemical composition performed by FT-IR, UV-visible, GC/MS and SEC analysis tools showed that *A.* extracts present higher amounts of neutral sugars, with a significant content of 71.76 % of the total composition. Besides, GC-MS analysis of *Allium* fraction indicated the presence of seven monosaccharides with the predominance of glucose (40.20%) and mannose (25.30%). The extracted polysaccharides from *Allium* leaves were evaluated for the antioxidant and anti inflammatory activities. Results showed higher antioxidant activities up to 69.61% and 71.72% against DPPH and ABTS assays, respectively. Similarly, the polysaccharides were demonstrated to keep an important anti-inflammatory inhibiting effect in human monocyte derived macrophages (THP-1). In addition, they showed a potential in reducing inflammatory mediators including the pro-inflammatory TNF-α, IL-6 and IL-8 cytokines, while promoting the anti-inflammatory IL-10 mediator**.**

Key words: *Allium roseum*, Polysaccharide, physicochemical characterization, Antioxidant activity, Anti-inflammatory activity.

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Evaluation de la connaissance de la population de l'ouest d'Algérie sur la toxicité de la phytothérapie utilisée contre la COVID-19

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Introduction : l'utilisation des plantes médicinales a connu une progression marquée dans la plupart des pays du monde pour prévenir ou pour lutter contre la Covid-19. Cette croissance est fondée sur l'idée que naturel est synonyme d'inoffensif. Or une plante peut à la fois être utile et toxique.

L'objectif du présent travail est d'évaluer les connaissances de la population générale sur les aspects toxicologiques des plantes médicinales utilisées pendant la pandémie.

Méthodes : Il s'agit d'une enquête en ligne, menée dans différentes régions de l'Algérie. Les questions portaient sur des données socio-économiques des participants et l'utilisation des plantes médicinales pour lutter contre la Covid-19.

Résultats et discussion : Au total, 69 personnes ont participé à cette étude, dont 31% ont été atteint de la Covid-19 et 67% étaient considérés suspects. Les résultats de cette enquête montrent que 24,64% de la population utilise seulement des plantes médicinales pour se protéger de la Covid-19. Cependant, la majorité (62%) utilise ces plantes sans avoir connaissance de la dose exacte. Le non respect de la dose, des éventuelles interactions entre plantes ou avec les médicaments, ainsi que les confusions dans l'identification représentent majoritairement les causes de toxicité. Les signes cliniques rapportés après la consommation de préparations à base de plantes sont essentiellement les troubles digestifs (21,7%), suivis par les vertiges (10, 14%), l'anémie (8,7%) et céphalées (5,8%).

Conclusion : Au cours de la pandémie, de nombreuses plantes ont été utilisé pour leurs vertus préventives ou curatives contre la Covid-19. Toutefois aucune thérapie naturelle n'a encore prouvé scientifiquement son efficacité. La population générale doit être sensibilisée quant aux dangers de l'utilisation anarchique et inadéquate de ces produits vu que les incidences des intoxications liées à leur emploie ne sont pas négligeables.

Mots clés : Phytothérapie, Plantes, Covid-19, Toxicité.

Interaction plantes médicinales-chimiothérapie et risque de toxicité

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Introduction : Le cancer représente un véritable problème de santé publique en Algérie. En effet, le nombre de patients qui en sont atteints a été estimé de 65000 cas depuis le début de l'année 2021. Lors de la prise en charge des tumeurs, les patients ont souvent recours à la phytothérapie pour optimiser les résultats de la chimiothérapie et atténuer leurs effets secondaires. Par ailleurs, l'utilisation inadaptée de la phytothérapie peut engendrer des effets délétère et toxique.

L'objectif du présent travail est de mettre l'accent sur le risque de toxicité lié à l'association des plantes médicinales et les médicaments de la chimiothérapie.

Méthode : Il s'agit d'une revue de la littérature basée sur des articles scientifiques, sélectionnés à partir de différentes bases de données : Pubmed, science direct, springer.

Résultats et discussion : Selon la revue de la littérature, l'utilisation de la phytothérapie est en nette augmentation particulièrement dans le cadre de prévenir et d'atténuer les effets indésirables de la chimiothérapie. Cette médecine alternative a un impact favorable sur la qualité de vie des personnes atteintes d'un cancer. Cependant, les plantes médicinales peuvent être toxiques ou créer des interactions nocives avec les médicaments anticancéreux. Ces interactions sont soit d'ordre pharmacocinétique tel que l'association du millepertuis avec la chimiothérapie (Etoposide) et on aura l'augmentation de l'élimination du médicament soit d'ordre pharmacodynamique tel que l'utilisation concomitante du soja avec le tamoxiféne et on aura comme conséquence un antagonisme fonctionnel.

De plus, le non respect de la dose, l'utilisation des mélanges des plantes ainsi que les confusions dans l'identification participent aussi dans la majoration de risque de toxicité et l'échec thérapeutique par ces plantes médicinales.

Conclusion : La phytothérapie est devenue une arme contre le cancer, mais elle ne peut apporter la guérison à elle seule. De ce fait, La population générale doit être sensibilisée quant aux dangers de leur utilisation inadéquate afin de réduire le risque de toxicité liée aux interactions.

Mots clés : phytothérapie, chimiothérapie, interaction, cancer

Synthesize of biologically active molecules

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Our interest is to synthesize biologically active molecules, such as pyrazoles pyrazolines derivatives, which present a wide variety of compounds with biological, pharmaceutical and physical (fluorescence) applications. On the other hand, we wanted to integrate cyclenones known to be excellent precursors of biologically active compounds. We synthesised pyrazoles and pyrazolines derivatives via the NITEC (nitrile imine-mediated tetrazole-ene cycloaddition) reaction between tetrazoles and functionalised cyclenones. The latter were used for absorbance and fluorescence measurements, as well as biological activity assessment.

NITEC Reaction

Key words: NITEC, Cycloaddition, Pyrazole, Cyclénones.

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Évaluation des propriétés bio-insecticides des extraits d'une plante aromatique saharienne contre le *Tribolium* rouge de la farine, coléoptère ravageur des denrées stockées.

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Notre étude vise à évaluer l'activité insecticide des extraits d'une plante aromatique saharienne collectée dans le sud algérien contre le Tribolium rouge de la farine, l'un des principaux coléoptères ravageurs des denrées stockées. Les extraits ont été testés dans des conditions de laboratoire à différentes doses pour observer leur effet insecticide, fumigène et répulsif sur les adultes de *Tribolium castaneum* et *Tribolium confusum*. Les résultats de notre étude démontrent la toxicité variable des différents extraits vis-à-vis des deux insectes étudiés, à travers l'ensemble des tests effectués."

Mots clés: Denrées stockées, Tribolium, Extraits végétaux, Huile essentielle, Activité insecticide, Activité répulsive.

Physicochemical propertie and Fatty Acids Analysis of Fixed Oils

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Abstract

Oil seeds are an important economic factor in global trade in agricultural products. Recently, more emphasis has been placed on utilizing seed oil that contains high levels of unsaturated fatty acids and even a small amount of free fatty acids.

Food vegetable oils extracted from oil crops and used in human food with high nutritional value, as these seeds contain fatty, protein, carbohydrate and vitamin nutrients and a high percentage of oil ranging between 25-60%.

Given the importance of these oils and their many benefits in several fields, it was necessary to take advantage of this data, and we chose a group of these seeds to study their physicochemical properties, index of refraction and viscosity, as well as the iodine number, acid number, and fatty acid analysis, in addition to their oil content mainly.

Keywords: Oil seeds, oils, fatty acids, index of refraction, iodine number

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Exploration de la capacité de *Hermetia illucens* (linnaeus, 1758) (diptera : stratiomyidae) à recycler les déchets organiques en Algérie

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Résumé

Cette étude vise à découvrir comment traiter les déchets alimentaires par Hermetia illucens (L.). L'impact de plusieurs régimes alimentaires sur le cycle de vie et la taille des différents stades de développement de cette espèce a été étudié. H. illucens pond ses oeufs en tas dans des nichoirs, avec une période d'incubation des œufs de 03 ± 0,9 jours et une phase larvaire de 24,21 ± 4,10 jours. Le stade pré-pupe dure environ 03 jours et la transformation des larves en pupes commence le 16ème jour et dure jusqu'au 41ème jour après l'incubation des œufs. Le sex-ratio est de 49,34 ± 7,62 % pour les femelles et de 50,41 ± 7,74 % pour les mâles. Les larves de H. illucens ont un poids moyen de 0,13 ± 0,03 g, une longueur de 1,66 ± 0,14 cm et une largeur de 0,46 ± 0,05 cm. La pré-pupe pèse 0,17 ± 0,06 g, la pupe mesure 02,05 ± 0,13 cm de longueur et 0,52 ± 0,04 cm de largeur, et l'adulte pèse 0,03 ± 0,01 g. Une centaine d'œufs pèsent 0,0085 g, et la coquille de l'oeuf représente 63,42 % de l'œuf. La larve de la mouche soldat noire consomme 0,36 à 0,47 g de nourriture au cours de son développement, avec une valeur moyenne d'utilisation alimentaire de 75,57 ± 8,53 %. A la fin de la phase larvaire, les larves atteignent une taille maximale de 1,8 cm. Les lipides et protéines contenus dans le fromage et les œufs de caille ont amélioré le poids des larves, entraînant un gain de 0,04 g/larve de H. illucens a été élevé sur de la boue provenant d'une unité de traitement des eaux usées avec un poids moyen de 0,25 g, une longueur de 2,12 cm et une largeur de 0,58 cm. Les résultats de cette étude indiquent que les déchets alimentaires en Algérie peuvent être utilisés par les larves de mouches soldats noires, ce qui entraîne une période de développement plus courte et une augmentation de la biomasse larvaire.

Mots clés : Déchets alimentaires, La mouche du soldat noir *Hermetia illucens*, gestion des déchets, Méthode d'élevage.

Criblage phytochimique et étude du pouvoir antioxydant d'une plante aromatique du genre *Globularia*

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Dans le cadre de la valorisation de la flore algérienne, nous nous sommes intéressés à une espèce de la famille des Globulariaceaes. La plante que nous avons choisie est une «*Globularia alypum* L.» de la région d'Ouled-Driss de la wilaya de Souk-Ahras. Afin d'identifier les classes phytochimiques présentes dans la partie aérienne de notre plante, nous avons eu recours à des tests phytochimiques par plusieurs méthodes qualitatives basées sur des phénomènes de précipitation ou de coloration à l'aide des réactifs spécifiques [1].

Les résultats de ce screening phytochimique confirment la richesse de cette plante en composés phénoliques, en composés terpéniques, ainsi qu'en iridoides, mucilages, glucosides et en composés réducteurs.

L'évaluation des activités antioxydantes des extraits : hexanique, dichlorométhanique, acétonique et méthanolique de *G. alypum* a été envisagée par la méthode du piégeage du radical libre DPPH, et la réduction du fer FRAP. Les résultats ont révélé que les extraits méthanolique et acétonique ont montré le plus large spectre d'activité antioxydante comparés aux deux autres extraits testés.

Key words: Plantes médicinales, *Globularia alypum* L., Huiles essentielles, Activité antioxydante

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Crystal structure and Hirshfeld surface analysis of an isoxazolone derivative

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Isoxazolones show some interesting biological properties. They are inhibitors of the factorization of tumor necrosis alpha (TNF-α) [1] and antimicrobial [2]. They are used for the treatment of cerebrovascular disorders and as muscle relaxants. They are also herbicides and fungicides [3]. On the other hand, isoxazolone derivatives constitute excellent intermediates for the synthesis of various heterocycles such as pyridopyrimidines, quinolines and undergo various chemical transformations [4]. For these reasons, these compounds have been the subject of several investigations.

The present method for their synthesis is a three-component polycondensation between an aromatic aldehyde, ethyl acetoacetate and hydroxylamine hydrochloride under different conditions and for our part we propose here the use of a food additive, tolerated in organic agriculture, very inexpensive, highly available and a safe catalyst, in an aqueous medium. In the present study, we report on the synthesis, molecular and crystal structure together with a Hirshfeld surface analysis of (Z)-3-methyl-4-(thiophen-2-ylmethylidene)isoxazol-5(4H)-one.

Key words: crystal structure, π–π interactions, isoxazolone, hirshfeld surface.

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Preparation and physical chemistry characterization of a new gold(III) porphyrin complexes

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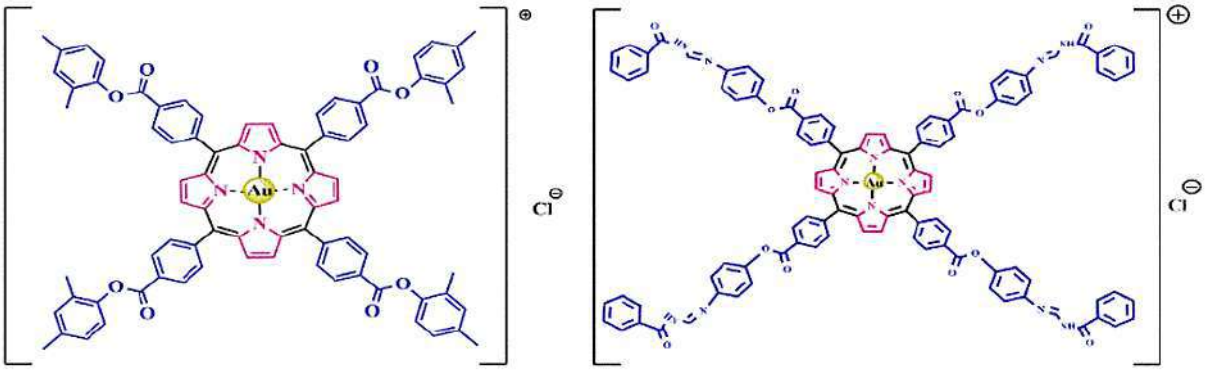
Due to the significant development of the different cancer diseases, a number of compounds have been proposed to treat various types of cancers **[1] [2]**. Among these species gold metalloporphyrin complexes are increasingly used due to their high antiproliferative potential and lower toxicity compared to platinum-based compounds. This communication reports the synthesis and the UV-visible, IR and ^{1}H NMR spectroscopic characterizations of a novel gold metalloporphyrin complexes which are the {*meso*-tetra(*p*-[4((benzamidomethylene)amino) Phenyl benzoate])porphyrin} gold(III) [Au^{III}(TBAPP)]Cl and the {*meso*-tetra(*p*-(2,4-dimethyl phenylbenzoate))porphyrin} gold(III) [Au^{III}(TDPP)]Cl coordination complexes.

Keywords: Gold(III) porphyrin complexes; UV-visible; NMR; IR.



Structures of the [Au^{III}(TDPP)]Cl and [Au^{III}(TBAPP)]Cl complexes.

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Preparation of poly (acrylic acid) graft on luffa fiber and enhanced adsorption properties of chromium (IV)

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Luffa Cylindrica (LC), a member of the gourd family, possesses a unique self-consolidated fibrous structure composed primarily of cellulose (60%), hemicellulose (30%), and lignin (10%). The naturally occurring hydroxyl groups in these fibers render them suitable for surface modification, enhancing their properties and enabling diverse technical applications. Exploiting the three-dimensional sponge-like structure of luffa fibers and the high adsorption capacity of poly (acrylic acid), this study reports the facile grafting of poly (acrylic acid) onto luffa fibers. The prepared poly (acrylic acid)-grafted luffa sponge fibers were employed as an adsorbent for the removal of Cr (VI) ions from aqueous solutions. Crucial parameters, including contact time, adsorbent dosage, pH, and temperature, were systematically investigated to optimize the adsorption process. Based on the adsorption isotherm data, a plausible retention mechanism is proposed.

Key words: Environmental remediation, Water treatment, Poly (acrylic acid), Luffa cylindrica, Chromate adsorption.

Biodegradable composite films based on mucilage from *Opuntia* (Cactaceae)

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This study examined the ability of using cactus mucilage (CM) to form ecological packaging films enhanced with synthetic polymers. The CM was isolated and precipitated using different solvents. Mucilage-based films were produced, and the thickness, moisture content, density, microstructure, water vapor permeability, water contact angle, film solubility, thermal stability, and toughness were controlled. Results show that the addition of synthetic polymers to CM films produces compatible, hydrophobic, flexible, and stiffer films with low moisture contents and good barrier properties. Film filled with 6 wt% of CM reached the highest Young's modulus (1512 ± 21–1988 ± 55 MPa). At high temperatures, the formulated films are thermally stable. The biodegradability test shows that the films are totally biodegradable after 40 days. Thus, CM blended with synthetic polymers can benefit specific applications, especially food packaging.

Key words: cactus mucilage, film, thermal stability, biodegradable.

Phytochemical Composition, Allelopathic Potential and Insecticidal Activity of Essential Oil of *Laurus nobilis* L.

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Abstract:
The exploration of new green, ecofriendly bioactive compounds has attracted the attention of researchers and scientists worldwide to avoid the harmful effects of chemically synthesized compounds. Secondary metabolites are valuable natural compounds of natural origin with important biological activities. Natural pesticides, such as plants with an insecticidal and allelopathic effect, deserve to be promoted in order to reduce the use of chemical products to protect the environment. The current work is a first description of the chemical composition of the EO from the leaves of *L. nobilis*, along with studying allelopathic effect on *Hordeum vulgare, Raphanus sativus, Lactuca sativa*, as well as its potential insecticidal and repellent activities against the stored grain insect *Tribolium castaneum.*

The chemical composition of the essential oil from *Laurus nobilis* L. leaves was analyzed by gas chromatography–mass spectrometry and resulted in the identification of 30 compounds, representing 94.03% of the total oil. 1,8-cineole (19.41%), β-Elemene (9.75%), α-Terpinyl acetate (8.99%), β-cis-Ocimene (8.15%) and (R)-α-Pinene (6.45%) were determined to be the main components.

The EO exhibited significant allelopathic potential regarding the germination and growth the three target species, in a concentration-dependent manner. Applications of volumes of around 20, 30 and 60 µL completely suppressed the germination of three target species.

The insecticidal potential and the repellent activities against the stored grain insect *Tribolium castaneum* (Herbst) was investigated. Fumigant and repellent activity bioassays were investigated in vitro. In a fumigant test, a dosage of 93.524 µL/L air of essential oils of *Laurus nobilis* was sufficient to kill 50% of insects after 24 h of treatment. our work clearly vindicates interest in the efficacy of essential oil of *Laurus nobilis*, both as insecticides and repplents against stored product pests. and his important allelopathic potential.

Key words: *Laurus nobilis* L., essential oil, allelopathic potential, insecticidal activity, repellency

Electrochemical biodetermination of glucose molecule using $La_{1.7}Sr_{0.3}CuO_4$ nanoparticles modified sensor with black carbon deposited on glassy carbon electrode

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Abstract

Non-enzymatic developed biosensors, especially with noble nanoparticles received a tremendous attention in the field of glucose molecule sensing [1]. Herein low-cost, highly sensitive and more effective nano-sized materials such as $La_{1.7}Sr_{0.3}CuO_4$ synthesized by a simple citrate method, and modified with black carbon and deposited on a glassy carbon electrode in purpose to use as modified electrode for the simultaneous detection of glucose analyte [2]. The crystallite size, purity, shape, and morphology of the nanomaterials were characterized using X-ray diffraction and scanning electron microscopy techniques. Cyclic voltammetry, differential pulse voltammetry, square wave voltammetry, and electrochemical impedance spectroscopy techniques were used as investigative techniques. The modified electrodes showed excellent response and sensitivity for glucose molecule detection compared with previous literature, with a wide linear range from 0.1 M to 0.001 nM, high sensitivity of 876.3 $\mu A.mM^{-1}.cm^{-2}$ and low detection limit of 0.0194 nM. The performance of the prepared electrode was checked by using real samples like synthetic urine and human blood and its demonstrated satisfactory and reproducible results.

Key words: Non-enzymatic Biosensors, Nano-Materials, Square wave Voltammetry Synthetic Urine, Differential pulse voltammetry.

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PRODUCTION OF BIOETHANOL FROM BIOMASS LIGNOCELLULOSIC OF LOCAL MISCANTHUS X GIGANTEUS BY ORGANOSOLV PRETREATMENT AND ENZYMATIC HYDROLYSIS

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Abstract

In a context of energy transition and the fight against climate change, the production of 2nd generation bioethanol is recognized as a promising way to reduce our dependence on fossil fuels.

This work concerns the study of the feasibility of the production of 2nd generation bioethanol from a plant substrate of the "Miscanthus x giganteus" type. The chemical analysis of this dry matter showed that it contains approximately 70% (g/g) of potential source of sugars in the form of cellulose and hemicelluloses usable for the production of 2nd generation ethanol by biochemical route which involve three key stages: a pretreatment stage, an enzymatic or chemical hydrolysis stage, and finally, a fermentation stage.

The pretreatment step chosen in this work is based on an Organosolv method with microwave heating. This process uses a pure or diluted organic solvent, supplemented with a catalyst to eliminate lignin while promoting the recovery of cellulose and hemicelluloses and limiting the formation of inhibitors. Lignin, a co-product of fractionation, can be valorized elsewhere. Parameters such as the concentration of sulfuric acid (H2SO4) as a catalyst, the ethanol/water ratio in the extraction solvent, the temperature and the processing pressure applied were studied to optimize the fractionation of Miscanthus x giganteus, the yield and purity of cellulose, recovery of lignin and absence of inhibitor formation. For pretreatment, the optimal conditions which were obtained experimentally on the sawdust are as follows: an ethanol/water ratio of 60/40 with 0.25% H2SO4 for an extraction of one hour at 175 ◦C. These conditions made it possible to eliminate 50% of the lignin while preserving 82 ± 3% of the initial cellulose with a purity of 71 ± 3%. Then, the enzymatic hydrolysis of the pretreated substrate was carried out under optimal conditions by a CellicR Ctec2 enzyme cocktail, (Novozymes, Denmark) at 50 ◦C and with stirring (180 rpm. /Min), which made it possible to achieve a conversion rate of cellulose into glucose of 80% after 12 days. Finally, after enrichment of the hydrolyzate obtained, fermentation thereof by a strain of Saccharomyces cerevisiae led to obtaining an alcoholic fermentation yield close to 80% of the theoretical yield, which seems consistent with the absence of inhibitors observed during the different stages.

Keywords: bioethanol, plant, analysis, biochemical, extraction

Hydrogen bonding, in organic–inorganic hybrid materials

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Studies of organic–inorganic hybrid materials have received great attention in recent years, because of their ionic, electrical, magnetic and optical properties[1-3].

We will rapport in this presentation a study of Hydrogen bonding in two organic–inorganic hybrid materials: Creatinium perchlorate and cytosinium dihydrogen phosphate.

The structure analysis of creatininium perchlorate, (I) and cytosinium hydrogenphosphite (II), where undertaken as part of a more general investigation into the nature of hydrogen bonding between organic bases or amino acids and inorganic acids in their crystalline forms.

The asymmetric unit of creatininium perchlorate contains a monoprotonated creatininium cation and two perchlorate anions. The bond distances in the imidazolyl ring of creatininium perchlorate are, in general, not significantly different from those found in similar hybrid compounds containing protonated imidazolyl moieties.The creatininium ring is planar, as expected, with a mean deviation from planarity of 0.0017 Å. The average Cl—O bond distances and O—Cl—O bond angles are 1.40625 (4) Å and 109.50 (3)°, respectively, confirming a tetrahedral configuration, similar to other perchlorates studied at low temperature. Perchlorate anions (ClO4 -), surrounded by two creatininium residues *via* hydrogen bonds play an important role in stabilizing the crystal structure. The cation-anion N—H—O interactions form sheet parallel to the (0 1 0) plane. Weak C-H···O interactions further link the sheets to form a three dimensionnal network.

The asymmetric unit of cytosinium hydrogenphosphite contains one protonated cytosine rings and one ydrogenphosphite anion. The main feature of the alkyl or aryl ammonium hydrogenphosphite is that the anionic subnetwork is built up through short strong hydrogen bonds and the organic cations are bonded to the phosphite layers by weaker hydrogen bonds forming a two-dimensional network of hydrogen bonds.

Key words: organic–inorganic hybrid materials, Crystal structure, Hydrogen bonding framework.

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THE SYNTHESIS OF GLUCIDIC ANALOGS OF SANSALVAMIDE

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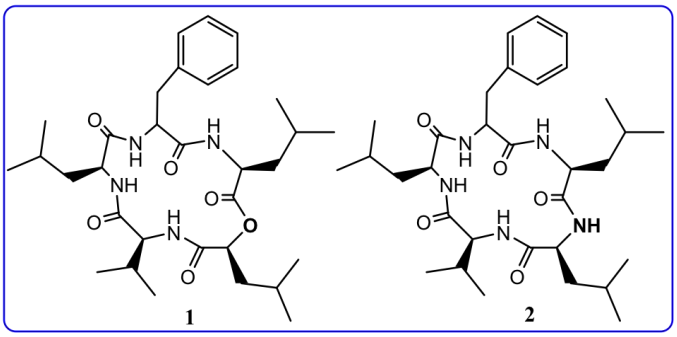
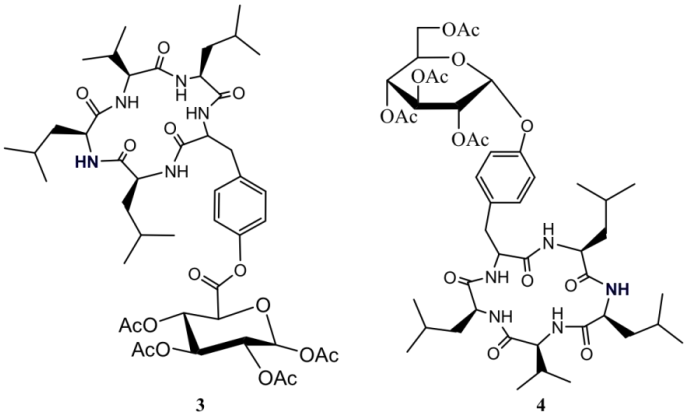
Sansalvamide A (**1**) is a cyclic depsipeptide produced by a marine fungus of the genus *Fusarium* found on Little San Salvador Island, Bahamas. This natural product is a highly lipophilic compound that was found to have significant cancer cell cytotoxicity with a mean IC_{50} value of 27.4 μg/mL against the National Cancer Institute's 60-cell-line panel. The corresponding cyclic peptide of Sansalvamide A (**2**) also has antitumor activity.



1 **2**

A novel glucoconjugate of Sansalvamide (**3, 4**) was prepared through the replacement of the *L*-phenylalanine residue with *L*-Tyrosine and the functionalization of tyrosine residue with glucose. Those modifications lead to a novel protected Sansalvamide.



3 **4**

We believe that the presence of a glucose residue in the target compound could result in adding supplementary molecular recognition properties to this compound. As a matter of fact, sugars play an important role in the causative agents of infectious and bacterial diseases, since polysaccharides mediate host-pathogen interactions.

Keywords: Anticancer / carbohydrate/ sansalvamide / Cytotoxicity /bioconjugates/ cyclopeptides

Posidonia Oceanica balls: Chemical Composition And lignin extraction

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ABSTRACT

Posidonia oceanica balls are the dominant sea grass in the Mediterranean Sea. This biomass has great potential for use as a novel lignocellulosic material on an industrial scale. The rational valorisation of these available renewable resources fits very well with the recent sustainable approach, commonly established everywhere. During this paper, the chemical composition of *Posidonia oceanica* balls was established according the TAPPI standard methods. The obtained results show clearly that the marine biomass present a high polysaccharide i.e. 68% and it can be justified to investigate in many applications and specially to produce fibre.

The delignification step was done by using soda-anthraquinone process. The obtained fibre was characterized by several methods by determination their mechanical, chemical, thermal and morphological behaviours.

Key words: *Posidonia oceanica balls*, fibre, surface morphology, characterizations.

Synthesis of MnO-paracetamol and their Antibacterial application

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Nanotechnology stands at the forefront of innovation, offering a vast array of applications across numerous fields, including drug delivery, electronics, cosmetics, and biosensors. At the heart of this technological revolution lie nanomaterials, distinguished by their unique properties across physical, chemical, biological, electrochemical, transport, and mechanical domains. These materials drive advancements and breakthroughs in various industries[1-2]. This study focuses on the synthesis of manganese oxide nanoparticles utilizing paracetamol and evaluates their effectiveness in combating pathogenic bacterial strains, specifically Escherichia coli and Staphylococcus epidermidis. Employing the diffusion method, the research determines inhibitory diameters for different concentrations of the synthesized compounds. The findings reveal notable antibacterial efficacy, with manganese oxide nanoparticles displaying the most significant inhibitory diameter (30mm) against both bacterial strains. Comparative analysis with conventional drugs highlights the superior effectiveness of these nanoparticles.

Key words: Synthesis, Nanomaterials, paracetamol, MnO- paracetamol, Chemical precipitation method, antibacterial efficacy

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Synthesis, crystal structure and optical properties of Dy^{3+} doped novel Whitlockite-type phosphate based-phosphor for white LEDs and plant growth

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Abstract

A novel dysprosium-doped strontium-yttrium-pentaphosphate, $Sr_6Y(PO_4)_5:Dy^{3+}$ denoted as SYP:xDy (x = 0-12% mol), was synthesized through a solid-state reaction method as part of research on a versatile single-doped phosphor. X-ray Diffraction (XRD) analysis and Rietveld refinement of the obtained pattern revealed a single phase with monoclinic whitlockite type structure (space group *I 2/a*). FTIR and Raman analysis confirmed the presence of PO_4^{3-} groups. The UV-Vis diffuse reflectance spectrum demonstrates a broad and beneficial direct energy band gap suitable for potential host materials. Under 445 nm excitation, the phosphors exhibited distinct (PL) emission spectra characterized by four bands at 481 nm (Blue band), 575 nm (Green-Yellow band), 668 nm (red band), and 761 nm (Brownish Red band) ascribed to the ($^4F_{9/2} \rightarrow {}^6H_{15/2}$), ($^4F_{9/2} \rightarrow {}^6H_{13/2}$), ($^4F_{9/2} \rightarrow {}^6H_{11/2}$) and ($^4F_{9/2} \rightarrow {}^6H_{7/2}$-$^6F_{9/2}$), respectively, specific to intra-configurational 4f-4f transitions of Dy^{3+} ions. The simulated CIE chromaticity coordinates for $Sr_6Y(PO_4)_5:xDy^{3+}$ phosphors fall within the yellowish-white region, near the standard white light coordinates (0.333, 0.333). The variation in emission intensity observed at different temperatures suggest that $Sr_6Y(PO_4)_5:Dy^{3+}$ possesses good thermal stability. All the findings suggest that the investigated $Sr_6Y(PO_4)_5$: xDy^{3+} phosphors hold significant potential for use in both white LEDs for lighting applications and in promoting plant growth.

Agrochar prepared from castor bean shell by chemical activation

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Abstract :

High surface area micro porous activated carbon has been prepared from castor bean shell by chemical activation with *ortho*-Phosphoric acid (H_3PO_4) as agent activation. The process has been conducted at different impregnation (H_3PO_4/precursor) ratios (0.5–2) and carbonization temperatures (300–700°C). The thermal decomposition of activated carbon was examined by thermo gravimetric analyser. Micropore surface area, micropore volume, and pore size distribution of activated carbons were characterized by nitrogen adsorption isotherms. The scanning electronic morphology show that a porous structure formed during activation. The prepared activated carbons were characterized using Fourier Transform Infrared Spectroscopy, elemental analyses, pH zero-point charge measurement (pH_{PZC}), Boehm titration, and elemental analysis.

Key words: Activated carbon, castor bean shell, chemical activation, adsorption.

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Optimizing and assessing gluten-free pasta made from Spinach leaves

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Taking into account the nutritional advantages of spinach leaves, this study aimed to create gluten-free pasta utilizing various proportions of spinach flour. The pasta formulations involved the substitution of spinach flour at levels of 5%, 10%, 15%, 20%, 25%, and 30%. The primary objective was to evaluate the impact of these substitutions on the pasta's quality attributes and pinpoint the optimal replacement ratio. Furthermore, a comprehensive analysis compared the nutritional composition, color, and texture of the optimized pasta with that of commercially available durum wheat pasta. The findings of this investigation revealed that the pasta incorporating 20% spinach flour exhibited superior cooking properties and sensory attributes. Notably, the optimized gluten-free pasta demonstrated significant improvements ($p < 0.05$) in protein content, dietary fiber, mineral content, phenolic compounds, and polyunsaturated fatty acids when contrasted with the control, which was durum wheat pasta.

Key words: Pasta, Spinach leaves, Formulation, Gluten-free, Polyunsaturated fatty acids.

Assessment of allelopathic potential of a spontaneous plant on various oasis weeds

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Abstract

Allelopathic effects of *Aretmisia campestris* leaves were studied on *C. annuum* (Chili) and associated weeds: *Setaria verticillata*, *Phragmites communis* and *Cynanchum acutum*, through the pulverization of its aqueous extracts (at 5, 10, and 20%), in pot experiments. Results indicated that the water extracts inhibited the germination potential, germination rate, seedling height, root length, Water level, fresh weight and dry weight of the three plants, with increasing extract concentration further enhancing the inhibitory effect. The pulverization treatment was futile for chilli growth, with organ length remaining steady at all concentrations. However, it has been very harmful to weeds, which were totally scorched at 20%. The allelopathic effects of the water extracts from *A. campestris* leaves on the three receptor plants varied in strength from strong to weak as follows: *S. verticillata*>*C. acutum*>*P. communis*. Thereby, *P. communis* exhibited strong resistance to the allelopathic effects of *A. campestris* and could be cultivated in areas where *A. campestris* occurs. The significant impact of the water extract from *A. Campestris* leaves on the seed germination and seedling growth of *S. verticillata* was evident. Thus, *A. campestris* emerges as a species rich in allelochemical compounds, given its allelopathic potential. The possibility of using its aqueous extract by spraying shows that it could be an ecofriendly approach to exploit its valuable allelochemicals.

Keywords: *A. campestris,* allelopathic effect, pulverization

Characterization of Major Compounds in Methanolic Extract of *Cymbopogon citratus* from Algeria by LC-MS and Assessment of Antifungal Activity

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Abstract:

Cymbopogon citratus, commonly known as lemongrass, is valued for its medicinal properties, including antifungal activity. This study aimed to analyze the methanolic extract of C. *citratus* collected from Algeria using liquid chromatography-mass spectrometry (LC-MS) and evaluate its antifungal activity.LC-MS analysis identified catechin (35.42%), chlorogenic acid (17.89%), and salicin (9.75%) as major components of the extract. The antifungal activity of the extract was assessed against *Thielaviopsis paradox*, *Alternaria* sp., and *Fusarium solani* using the agar diffusion method. The extract exhibited significant antifungal activity, with inhibition rates ranging from 50.59% to 70.20% at the highest concentration (100%). These findings suggest that the methanolic extract of *C. citratus* from Algeria contains potent antifungal compounds and could be explored further for its potential in developing antifungal agents.

Keywords: *Cymbopogon citratus*, methanolic extract, LC-MS analysis, antifungal activity

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CHEMICAL COMPOSITION AND BIOLOGICAL ACTIVITIES OF ESSENTIAL OILS OF *CITRUS LIMETTA* AND *ORIGANUM MAJORANA*

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The inhibitory effects of essential oil (EO) on bacteria development give them an important role in the fields of the food industry as an additive in food packaging. This study aimed to determine the chemical composition of essential oils of *Citrus Limetta* and *Origanum majorana* and their antioxidant and antibacterial activities in order to applicate it as biopreservatives in poultry meat products. Obtained results showed that *Citrus limetta* had the highest essential oil yield (0,7%) comparing to essential oil yield of *O. majorana* (0,4%). Chemical composition of each essential oil was identified using GC-MS method. For *C. Limetta* dl-limonene (82,42%) was the major component while 4-Terpineol (45,49%) was the major component for *O. majorana*. This two EOs were characterized with strong antioxidant and antimicrobial potentials with possible synergy between different components that may improve their biological activities. Also, Synergy between the two EOs was proved with the lowest EC_{50} and IC_{50} recorded, lower not only than the tested EOs but also than the references, ascorbic acid and butylated hydroxytoluene (BHT), means higher antioxidant power. Moreover, our EOs and the combination were not only active against all the tested microorganisms through the well diffusion method but also with MIC determination where the Gram + bacteria (*Staphylococcus aureus* ATCC 6538, Metecillin Resistant *Staphylococcus aureus, Listeria monocytogenes* ATCC 19115 and *Enterococcus faecalis* ATCC 29212) showed the largest inhibition zones (20mm ≤ IZ ≤ 26 mm) and the lowest MICs (0,25 mg/ml ≤ MIC ≤ 0,5 mg/ml). Also, Gram – bacteria (*Escherichia coli* ATCC 25922, *Klebsiella pneumoniae* CIP 104727, *Salmonella enteritidis* DMB 560 and *Pseudomonas aeruginosa* ATCC 2134) showed a sensitivity behind the two tested EOs and higher sensitivity versus the combination (19 mm ≤ IZ ≤ 25 mm; 0,5 mg/mL ≤ MIC ≤ 1mg/mL). High anti-candida albicans activity was recorded (30 mm ≤ IZ ≤ 36 mm ; 0,125 mg/ml ≤ MIC ≤ 0,5 mg/mL). The study highlights the potent antioxidant and antimicrobial properties of *C. Limetta* and *O. majorana* essential oils, suggesting their potential as natural preservatives in poultry meat products, offering enhanced food safety and shelf-life extension.

Key words: Essential oils, Antioxidant activity, Antimicrobial activity, Chemical composition.

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Catalytic effects on pyrolysis of biofuels blended from olive mill solid wastes and pine sawdust

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The effect of potassium impregnation at different concentrations during pyrolysis and gasification of pellets produced from olive mill residues blended or not with pine sawdust was investigated. Three concentrations (0.1M; 0.5M and 1.5M) of potassium carbonate solution (K_2CO_3) were selected to impregnate pellets. Four pellet's samples were prepared from exhausted olive mill solid waste (100%G (100G)) and blended with pine sawdust with different percentages (50%S 50%G (50S50G); 60%S 40%G (60S40G); 80%S 20%G (80S20G)). The catalytic effect of potassium was obvious observed up to a concentration of 0.1M of potassium for 80S20G and 60S40G and slightly observed with 50S50G and 100G up to a concentration of 0.5M. In addition, it can be noticed that when isothermal temperature increases during gasification for two concentrations 10% and 30%, the reactivity increases with potassium concentration up to 0.5M, and especially for 100G. On the other hand, the effect of the steam concentration on the gasification reactivity was significant with the non-impregnated sample 100G. Finally, a kinetic study was carried in order to determine the different kinetic parameters of Arrhenius law

Key words: olive solid waste, pine sawdust, pyrolysis, biochar, catalysis effect

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A field Exploration and Inventory of the Most Toxic Plants of Southern Flora Tunisian

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In Tunisia, plants occupy an important place in traditional medicine, which itself is widely used in diverse fields of health. Herbal remedies are considered cheaper with no side effects. In addition, these therapies tend to be more used in chronic diseases such as diabetes, rheumatism (chronic pain) and cancer. The accurate identification of plants is necessary, as it is ensures the safe use of medicinal plants. Many people believe that these are natural and traditional products, therefore they are deemed safe, so there is no risk of harm. It is easier to pick the plants or buy them from herbalists and traditional healers, either in their raw forms or in the form of preparations. The present work cover the analysis of survey results, particularly a monograph of the plants used in our survey and describe a prospective study conducted over a few months to establish a preliminary directory comprising a few indicative toxic plants from the flora of southern Tunisia to enable rapid identification in case of intoxication and facilitate more effective and prompt management in hospital emergency departments.

Key words: Tunisian flora, plants, Toxic, phytotherapy, Alkaloids, Antidote.[1]

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Chemical composition, fatty acids, total phenolics and antioxidant activity of desert truffle *Terfizia boudieri* Chatin in Northern Region of Saudi Arabia

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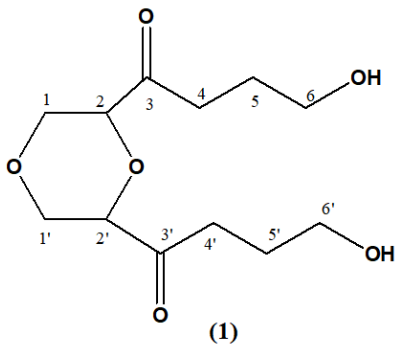
Abstract

*Terfizia boudieri*Chatin (*T. boudieri*), belonging to the Terfeziaceae family, is a desert truffle that grows naturally from mycorrhizal relationships with plants that inhabit the slightly moist sandy soils of some desert or semi-desert regions. The chemical examination of methanolic extract of*T. boudieri*led to the isolation of a new ketone (1) and known compound, namely mannitol (2) The structures of the 2 isolated compounds were resolved using spectroscopic analysis including:(ES)-HRMS,1D and 2D NMR, IR spectroscopic analyses and supported by literature data. The GC-MS analysis of the fatty acids (FAs) of *Terfizia boudieri* oils showed high unsaturated fatty acid (SFA) profile (78.72%) the major FAs were linoleic acid (62.36%)and Oleic acid (14.7 %).Comparing the extracts obtained, the methanolic extracts revealed the highest levels of total phenolic compounds (TPC) (185.56 mg GAE/100 g of truffle), thus the same extract showed the best results for antioxidant activity.



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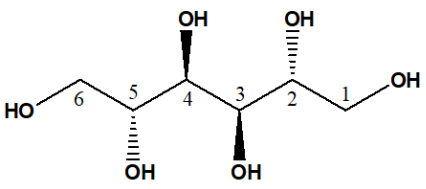

(2)

Chemical characterization and assessment of surface waters' suitability for irrigation in the Ouizert dam (Western of Algeria)

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Water is used for several purposes by humans, but the level of purity of the water being consumed is very crucial since it has a direct effect on health. More than half of all illnesses and deaths among children are caused by germs, which get into the mouth via water and food. Reservoirs or dams are built to store surface water to guarantee the availability of water for drinking water production, especially in regions with water scarcity. Surface water is often threatened by pathogen contamination from manure application, grazing livestock in adjacent agricultural fields and avian presence in waterways. This has led to increased water-treatment costs especially for municipalities dependent on surface water. *Escherichia coli* (*E. coli*) contamination is common in reservoirs in both agricultural and urban aquatic ecosystems, resulting in food safety and public health implications. E. coli is a bacterium found in the intestines of humans and warm-blooded animals. Therefore, it is used as an indicator for fecal contamination and, thereby, the likelihood of pathogens to be present in water bodies.

Key words : Ouizertdam, western of Algeria, contamination

Optimization of process variables by response surface methodology for methyl orange removal using Fe-doped FAU zeolite prepared from Tunisian raw clay.

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Novel heterogeneous photo-Fenton catalyst, iron coated Faujasite zeolite (Fe-FAU) was synthesized by exchange-calcination method. Iron was exchanged in zeolite support based on Faujasite type zeolites prepared in laboratory from instratifed illitic kaolinite raw Tunisian clay. The studied materials were characterized by XRD, BET, SEM–EDX and FTIR methods. X-ray diffraction (XRD) analysis showed that the zeolite structure was not affected by the catalyst preparation method. BET results revealed that Fe-FAU possess a trimodal structure (micro, meso and macropores) with a porosity of 0.28 cm^3 /g. The catalytic performance of the Fe-FAU was studied for the oxidation of methyl orange (MO) in aqueous solution in the presence of hydrogen peroxide. The effects of different operating parameters on the degradation efficiency were studied at atmospheric pressure. The results indicated that the Fe doped zeolite exhibited good degradation efficiency. Measurements of the mineralization of MO by TOC analysis showed that the maximum degradation of MO (94%) was detected with 50 mg of adsorbent dosage after 20 min of contact time and under UVC irradiation. Moreover, in order to predict the empirical variables significance, the variances analysis "ANOVA" was used. Response Surface Methodology (RSM) incorporating Central Composite Design (CCD) of experiments was applied to optimize oxidation parameters. High regression (R^2=0.95) and the low probability (p value<0.0001) values signify the validity of the quadratic model to predict the removal (%) of MO.

Key words: Fe-FAU, Methyl orange, Oxidation, Response Surface Methodology

Structural, vibrational, optical properties and theoretical studies of new noncentrosymmetric pentachloroantimonate : $(C_3H_6N_3S_2)_2[SbCl_5]$.

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A new non-centrosymmetric Sb(III) halide complex with formula $(C_3H_6N_3S_2)_2SbCl_5$ has been synthesized by reaction between antimony trioxide (Sb_2O_3) and 2-Amino-5-(methylthio)-1,3,4-thiadiazole (AMT) in an aqueous solution of hydrochloric acid. Single crystal X-ray diffraction analysis shows that this compound crystallizes in orthorhombic system with the non-centrosymmetric space group $Pna2_1$. Its crystal structure consists of isolated $(C_3H_6N_3S_2)^+$ cations and square pyramidal shape $[SbCl_5]^{2-}$ anions. The anions are disposed to form a polymeric chain in which each subunit is connected to the others through a Cl bridge. The organic cations are connected to these chains via H-bonding N-H…Cl and C-H…Cl. The intermolecular interactions which ensure the cohesion between different entities were analyzed by DFT calculations and Hirshfeld surface analysis. Ab-initio DFT calculations were also used to investigate geometric and electronic properties of complex 1 and AMT. Absorption, photoluminescence and infrared spectroscopy have been carried out. DFT calculations with different functionals have been used to gain a better insight into its vibrational and optical properties and a good agreement was found between experiments and calculations. The thermal stability of compound was studied by thermal analysis.

Key words: Noncentrosymmetric compound, X-ray diffraction, Infrared spectroscopy, Optical properties, DFT calculations.

Phytochemical characterization and bioactivities of different fruit parts of *Cupressus sempervirens* combined with multivariate analysis

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The Cypress "*Cupressus sempervirens*. L" is a species of evergreen trees of the Cupressaceous family. The goal of this study was to investigate how three commonly used extraction process (ethanol (EtOH), ethanol 50%, and water) affected the yields, chemical composition, antioxidant capacity, as well as, their biological activities of cones and seeds extracts. The results showed that the hydro-alcoholic extract (EtOH 50%) of seeds has the highest yield rate (21.4%), compared to the other solvents. However, for the cones, the aqueous and hydro-alcoholic extracts showed the highest rate with comparable values (12.7 and 12.0%, respectively). The HPLC-DAD has enabled the identification of eight molecules among them chlorogenic acid (5.5 mg/g dr), and catechin (9.9 mg/g dr) in the cones EtOH and EtOH 50% extracts, respectively. Principal component analysis (PCA) was used to correlate the bioactive response with total phenolic content. It was found that the EtOH 50%, showed the highest antioxidant activity (IC_{50}=3.1 and 3.6 µg/g dr for seeds and cones, respectively) associated with the highest total phenolic content (TPC) (35.5 and 14.8 mg GAE/g dr for seeds and cones, respectively). Moreover, the same extracts were nontoxic against non-cancer cells (HEK-239), and toxic against cancer cell line (LS274T). They showed a low toxicity which does not exceed 30%, against HEK-239, and a moderate cytotoxicity (around 50%) against LS274T. Taken together, fruit of *C. sempervirens* have a broad range of potential applications in several fields, such pharmaceutical, medical, and food industries as nutraceutical supplements.

Key words: Antioxidant, Bioactivity, *Cupressus sempervirens*, HPLC, Phytochemical analysis, PCA.

Chemical Composition and Insecticidal Activities of Essential Oils of *Eucalyptus* against *Tribolium castaneum*

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Insect resistance, poisoning and pollution linked to the use of pesticides constitute serious environmental and public health problems. Thus, in recent years, much work has been carried out to propose alternative methods of protection that are inexpensive and environmentally friendly. Natural insecticides, such as plants with an insecticidal effect, deserve to be promoted in order to reduce the use of chemical insecticides and protect the environment. It is in this context that we carried out this study which aimed, on the one hand, the extraction and quantitative characterization of the chemical composition and on the other hand the study of the potential insecticidal and repellent activities against the stored grain insect *Tribolium castaneum* of the essential oils of the leaves of the species, *E. torquata*, *E. woodwardii* and their natural hybrid, *E. torwood*, planted in the region of Gabes (Republic of Tunisia).

The GC/MS analysis also showed the large variability in chemical composition that exists among Eucalyptus hydro distillated essential oils from different species. The majority of oils produced are rich in torquatone, 1,8-cineole, β-Eudesmol, aromandendrene α-pinene and globulol. Chemical characterisation of essential oils showed also, that sesquiterpenes were predominant in all *eucalyptus* essential oils. *E. Torwood* essential oil having the highest content of oxygenated sesquiterpenes with a rate of around 61.5%. Indeed, it is the richest in torquatone (35.32%) and β-eudesmol (16,87%). However, torquatone rates are 16.24% and 28.95% for *E. woodwardii* and *E. torquata*, respectively.

Fumigant bioassay demonstrated that the three types of oil caused significant insect mortality. The lowest median lethal dose, CL_{50} =70.674 µL/L air, was observed with *E. torquata*. In repellency test, the essential oils of the three eucalyptus species studied were found to be powerfully attractive and not repellent, in particular the essential oil of *E.torquata* had the more rapid action than all other species. This study highlighted the significant potential of *Eucalyptus*, particularly *E.torquata*, in the fight against stored product pests. The high insecticidal effect of *E. torquata* may be explained by its high eudesmol content, which is known for its high insecticidal activity; it may act individually or synergistically

Key words: *Eucalyptus*, Essential oils, insecticidal activity, repellency, *Tribolium castaneum*

Synthesis, biological activity, chiral separation and absolute configuration assignment of iminoflavans

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Some iminoflavan derivatives were synthesized by simple condensation in position C4 of the flavanone. All new compounds were characterized by using UV-Vis, IR and NMR as spectroscopic techniques. A chiral chromatographic analysis of racemic mixtures was performed by direct chiral high-performance liquid chromatography using Chiralcel® OD-H (Daicel) as chiral stationary phase, and online coupled with electronic circular dichroism (ECD) detector. The correlations of experimental ECD traces with quantum chemical ECD calculations with time-dependent density functional theory made it possible to elucidate the absolute configuration for each enantiomer, and establish the elution order. Furthermore, molecular docking was performed to analyse the binding modes of R- and S-isomers.

All isolated isomers of compounds under investigation reproducing even ECD curves. We demonstrated, however, that the use of ECD spectroscopy, both in online approach HPLC-CD and ECD spectroscopy instrument can easily, unambiguously, and without any complication simulate all curves.

All iminoflavan derivatives have been evaluated for their antibacterial activities. Most of the synthesized derivatives were found to be active against Escherichia coli, Bacillus subtilis, Listeria monocytogenes and Staphylococcus aureus. Activity of iminoflavans was found to be higher than the initial materials flavanone. Investigated compounds having substituents like Cl, OMe and OH at the starting amine exhibited enhanced activity and the presence of electronegative groups in the studied compounds showed a direct relationship to the antibacterial activity.

Key words: iminoflavan, chiral separation, biological activity, absolute configuration

Tailoring structural and dielectric properties of $Pr_{0.01}Zn_{0.97}O$ through (Bi) substitution: Insights and applications

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This work presents the preparation of $Pr_{0.01}Zn_{0.97}O$ (PZ) and $Pr_{0.01}Bi_{0.01}Zn_{0.97}O$ by sol gel method. The correlation among their structural and dielectric properties was investigated in details. We used the X-ray diffraction (XRD) along with Rietveld refinement to confirm the hexagonal wurtzite structure with $P6_3mc$ space group and the existence of a secondary phase attributed to the praseodymium oxide (Pr_6O_{11}) in all samples. To find the impacts of temperature and frequency on dielectric properties of our samples, we have also employed impedance spectroscopy. The dielectric properties revealed that the $Pr_{0.01}Zn_{0.97}O$ sample shows a low tangent loss and a high conductivity compared with Bi doped $Pr_{0.01}Zn_{0.97}O$ sample, which demonstrates the potential application of the $Pr_{0.01}Zn_{0.97}O$ in microwave semiconductor devices.

Key words: $Pr_{0.01}Zn_{0.97}O$, $Pr_{0.01}Bi_{0.01}Zn_{0.97}O$, structural properties, dielectric properties, electrical devices.

Phytochemical screening and *in vitro* antioxidant activity of extracts from pinecones

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The Pinaceae family is widely distributed in the western Mediterranean. The various parts of pines (wood, needles, cones) have attracted much attention due to their richness in biologically active compounds, especially phenolic compounds (PC). PC is characterized by various properties such as antioxidant, antibacterial, anti-inflammatory, and anti-cancer properties. The most important bioactive property of PC is its antioxidant activity. Moreover, the use of pine residues is desirable from the viewpoint of the circular economy (ex. *P. sylvestris* $1.5x10^6$ hec, *P. Pinea* $1.43x10^6$ hec in France in 2020 [1]). The current study aims to determine biochemical properties of both petals (P) and cores (C) fractions from pinecones of *P. brutia* (PB), and *P. pinea* (PP). Pinecones were manually separated into P and C, which were then milled to investigate maceration with solvent of increasing polarity: cyclohexane (1SV), ethyl acetate (2SV), and methanol (3SV) at 20 °C. Spectrophotometry was used to quantify the total phenolic content (TPC) as well as to assess antioxidant activity. High-performance liquid chromatography (HPLC) was employed to identify the chemical composition. The results showed that 3SV extracts demonstrate a higher TPC and antioxidant potential against 1,1-diphenyl-2-picrylhydrazyl (DPPH) compared to 1SV and 2SV extracts. PP and P demonstrated a higher antioxidant activity and TPC than PB and C. The highest TPC was observed in PP-P-3SV (233.79 mg GAE/g DW) and the lower TPC was reported in PB-C-1SV (11.24 mg GAE/g DW). Furthermore, the best IC_{50} against DPPH was displayed in PP-P-3SV (10.54 µg/mL). HPLC analysis identified twenty-eight polyphenol compounds in PP and twenty-two in PB. The dominance of these compounds was detected in the P fractions compared to the C fractions of both species. These compounds included Catechin, chlorogenic acid, caffeic acid, trans-cinnamic acid, 5-hydroxy-4'-methoxyflavone, and 4-hydroxy-3-(3-oxo-1-phenylbutyl) coumarin, known for their antioxidant potential [2].
This study highlights the significant potential of pinecones as a rich source of bioactive compounds with promising applications in the pharmaceutical and cosmetic industries.

Key words: Pinecone, antioxidant, polyphenols, HPLC-DAD.

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A wireless QCM humisensor based on LiCl-ZnO QDs blend for real-time monitoring of ppm moisture level

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Real-time monitoring of humidity at ppm level is vital in the control of the moisture content during the manufacturing of anhydrous gas. Nevertheless, in spite of a large panel of commercialized highly sensitive ppm-humisensors, the latter remains prohibitive. To overcome this drawback, many efforts are devoted to develop lucrative and highly sensitive humidity sensors based on different transducers functionalized with highly hygroscopic materials.

Herein, we report the development of a wireless differential QCM ppm-humidity sensor (WDQCM-ppm Hum). As critical component of surface-based humisensor, LiCl-ZnO Quantum dots (8 nm) blends synthesized by sol-gel route were used as sensing layer.

Initially, humidity sensing experiments indicate that the LiCl salt content in the blend improved meaningfully all the humidity sensing performances in the whole humidity range (~0%-98% RH). Really, the optimized content of 1.2 wt% of LiCl exhibits the best sensing performances. These included the highest sensitivity (48Hz/%RH), good linearity (99.8%), negligible hysteresis (2%), rapid response and recovery times (12 and 7 seconds) and particularly an insensitivity against fluctuation of luminosity, temperature, vibrations and gas flow.

Besides, to clarify the probable sensing mechanisms involved during humidity detection, several considerations were taken into account. These included surface morphology and reactivity concurrently with thermodynamic at macroscopic level modelling.

The applicability of the optimized humisensor as a node for internet of things (IoT) applications to detect traces of moisture was demonstrated. The developed prototype exhibits a linear response (99.83 %) over a ppm moisture ranging from 170 to 1500 ppm, a sensitivity of 0.138 Hz/ppm and a limit of detection of 25 ppm.

Preparation of phenylalanine-based polyesteramides nano-drug delivery system with high cell-viability and chemical stability

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Abstract

At the end of the nineties, nanomedicine as it involves the use of nano-sized materials, arose as a panacea for the diagnosis and treatment of diseases [1]. Among the diverse range of drug delivery systems using nano-sized materials, biodegradable polymeric nanoparticles PNPs have captured increasing attention due to their numerous benefits [2]. Herein, we report the synthesis of a series of phenylalanine-based polyesteramides derived from ε-caprolactone (CL) and L-phenylalanine (L-Phe) via melt polycondensation with a wide range of molar compositions. Their performance as drug delivery systems was studied. The emulsion-solvent evaporation method has been successfully used to produce nanoparticles based on this copolymer, with sizes below 230 nm. They were found to be non-cytotoxic with high cell-viability and chemical stability demonstrating with that its suitability for biomedical applications, notably as long-term drug delivery systems.

Key words: Polyesteramide, drug delivery system, non-cytotoxic, cell-viability, chemical stability

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Amino acid-based biosourced poly(ester-amide)s: Synthesis, characterisation and drug-loaded nanoparticles production.

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Abstract

A series of polyesteramides (PEAs) with a range of molar composition from 90/10 to 20/80 were synthesized by direct melt polycondensation of ε-caprolactone and β-alanine (PCBA). PEAs are systematically characterized with FTIR, ^{1}H-NMR, ^{13}C-NMR, DSC and TGA measurements. Due to their biocompatibility, these copolymers are used in the development of nanoparticles loaded with drugs. The term “nanoparticle” stands for both nanocapsules and nanospheres, which are distinguished by the morphological structure. Polymeric NPs have shown great potential for targeted delivery of drugs for the treatment of several diseases, minimized toxic side effects, enhanced drug delivery, feasibility of incorporating other functions such as controlled release and loading more than one drug for combination therapies[1,2]. In this work, we discuss the most commonly used methods for the production of PCBA (ε-caprolactone/β-alanine) and PCP(ε-caprolactone/phenylalanine)-based NPs using the emulsion-solvent evaporation and the dialysis methods and their characterization by DLS analyzis and cytotoxicity tests.

Key words: polyesteramides, β-alanine, phenylalanine, melt polycondensation, nanoparticles, drugs loaded.

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Polysaccharides in CO_2 enriched *Arthrospira platensis*: Structure, physico-chemical properties, antioxidant and cytotoxicity activities and laser burn wound healing in rats

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Arthrospira platensis also called *Spirulina plantensis* is one of the edible microalgae that has been used as health food and feed for a long time. A study was conducted in order to determine the structural characteristics of polysaccharides extracted from CO_2-enriched *Arthrospira platensis* (Spirulina Water Soluble Polysaccharide: SWSP), as well as its antioxidant activities, cytotoxic effects and laser burn wound healing in rats. This SWSP was structurally characterized by Scanning Electron Microscopy (SEM), Fourier-transformed infrared (FT-IR), X-ray diffraction (XRD), high-performance liquid chromatography (HPLC), and thin layer chromatography (TLC). A novel polysaccharide was found to have an average molecular weight of 6.21 kDa. It is a hetero-polysaccharide composed of rhamnose, xylose, glucose and mannose. According to XRD and FT-IR spectra, the SWSP showed a semi-crystalline structure. It is composed of 100 to 500 µm geometric shaped units with flat surfaces and it was found to inhibit the proliferation of human colon (HCT-116) and breast (MCF-7) cancers. This polysaccharide display potential antioxidant activities determined through three different assays: scavenging activity against 2,2'-azino-bis-3-ethylbenzothiazoline-6-sulphonic acid (ABTS), 2,2-Diphenyl-1-Picrylhydrazyl (DPPH) scavenging assay and ferric reducing antioxidant power assay (FRAP).Results strongly support the beneficial effects of the SWSP to accelerate wound healing in rats. Indeed, its application significantly increased tissue re-epithelization and remodeling phases, after 8 days of the experiment. Findings herein demonstrated that SWSP could be a novel auspicious source of natural wound healing closure and/or cytotoxicremedy.

Key words: Polysaccharide, *Spirulina platensis*, antioxidant activity, cytotoxic activity, wound healing.

New B@Xenes structure in Toxic Metal Removal using ADOX process

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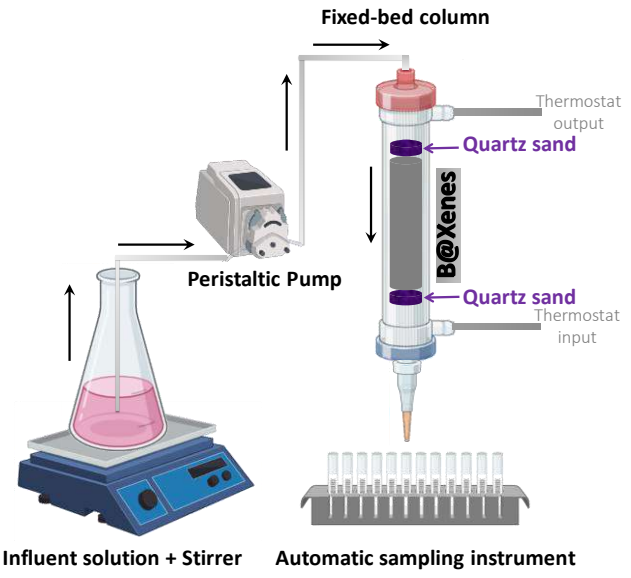
This work addresses a significant research gap by presenting the latest advancements in Bio-nano-composites materials, including adsorbents and photo-catalysts, for selective separations in water treatment, (3D B@Xenes) specifically targeting the removal of heavy metals. Some hypotheses have been made using the Cr and Cu as the toxic metal. These pollutants pose a grave environmental concern as they adversely impact the quality of water bodies, thereby affecting various living organisms. The work demonstrates the superior separation capabilities of B@Xenes materials in eliminating such toxic compounds. Additionally, B@Xene-based composites have garnered considerable interest as photo-catalysts for contaminant degradation due to their exceptional thermal and optical properties, hydrophilicity, substantial surface area, customizable chemical characteristics, high chemical stability, regular planar configurations, high metallic conductivity, and numerous derivative products. Literature highlights numerous B@Xene-based materials exhibiting fascinating separation performance when compared to other available two-dimensional (2D) materials. The potential of B@Xene-based composites in toxic metals removal is noteworthy; however, several challenges need to be addressed to enable their practical applications in real water environments.

Key words: Biomass, Xenes, Adsorption, Oxidation, Oprimization

Graphical abstract:



Microwave-assisted extraction of polysaccharides from apricot seeds: antioxidant, antiglycation and α-amylase inhibitory activities

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Biowaste produced from food processing industries lead an environmental issue due to macronutrients, phosphorous, nitrogen and water contents. These nutriments make the waste more liable to the putrefaction, thus giving rise to pollution [1]. Nevertheless, the biowaste contains a great level of marketable bio-products such as polysaccharides. Current study deals with polysaccharides extraction from apricot seeds waste (APS) using microwave-assisted extraction (MAE) technique. Further, response surface methodology (RSM) was employed to define optimum conditions [2]. The extracted polysaccharides were characterized using Fourier Transform Infrared Spectroscopy (FTIR) analysis, Size Exclusion Chromatography (SEC/MALS/VD/DRI), GC/MS and 1D NMR (^{1}H & ^{13}C). The optimal conditions for MAE polysaccharides were obtained to generate an optimal yield of 28.43%, a microwave power of 686.57 W, a liquid–solid ratio of 43.33 mL/g and extraction time 1.27 min. Moreover, APS was composed of galactose, glucose arabinose, rhamnose, xylose, mannose and fructose in molar percentage of 68.9 %, 12.9 %, 4.6 %, 3.4 %, 6.9 %, 5.6 % and 7.7 %, respectively with a molecular average weight of 492 000 g/mol. Finally, results showed that apricot seeds polysaccharides present strong antioxidant activities as well as an interesting antiglycation and α-amylase inhibitory properties.

Key words: Apricot seeds, Polysaccharides, Microwave-assisted extraction, Diabetes mellitus

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Chemical composition and antioxidant activity of the essential oil of *Thymus lanceolatus* Desf.

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Abstract: The essential oil of Thymus plants is of great importance according to previous studies, so in this study we chose the *Thymus lanceolatus* plant. *T. lanceolatus* (Lamiaceae), perennial sub-woody plant, with erect stem. The leaves are lanceolate, more than 1 cm long. The calyx is finely pubescent. The flowers are pink in elongated spiky inflorescences. In this study, we tried to know the chemical composition of the essential oil of the *T. lanceolatus* plant, which was harvested in the summer of 2023. The essential oil was obtained from the aerial parts by water distillation using a Clevenger-type device. The oil was analyzed by gas chromatography (GC) and gas chromatography coupled to mass spectrometry (GC-MS). Taking into account the biological properties of essential oils, we attempted to determine the antioxidant capacity values of the oil extracts of the plant *T. lanceolatus* using two different and complementary assays: free radical (2,2-diphenyl-1-picrylhydrazyl [DPPH]) assays and reduction of antioxidant power [FRAP] assays).

Key words: *Thymus lanceolatus*, essential oils, chemical composition, DPPH, FRAP.

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Optimization of sonic extraction using maceration method for phenolic content and antioxidant activity of *Thymus lanceolatus* Desf.

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Abstract: *Thymus lanceolatus* (Lamiaceae), perennial sub-woody plant, with erect stem. The leaves are lanceolate, more than 1 cm long. The calyx is finely pubescent. The flowers are pink in elongated spiky inflorescences. The optimal extraction of total phenolic compounds (TPC) depends on the values of independent variables such as temperature, time, and solvent volume. Therefore, in this study, we tried to find out the best values for each of the total phenolic compounds (TPC) and flavonoids (TF) present in the plant which was harvested in the summer of 2023, as well as the antioxidant activity, through changes in the independent constants (T, t, V). Ultrasonic extractions (UAE) were performed using response surface methodology (RSM) and Box-Behnken design (BBD). We used two methods to express antioxidant activity: 2,2-diphenyl-1-picrylhydrazyl (DPPH) and ferric acid antioxidant activity (FRAP).

Key words: *Thymus lanceolatus*, Polyphenols, Flavonoids, DPPH, FRAP, UAE.

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Craft new polymers through structural alterations of PVC

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Abstract

Polymers are renowned for their versatile applications, making them essential compounds that wield significant influence in the commercial market. A new set of chemical formulations has been synthesized, with a specific focus on modifying PVC using an aromatic amine to enhance its functionality, notably for applications such as water purification. Various chemical and physical analyses, including infrared spectroscopy, have revealed the presence of functional groups affirming the comprehensive alteration in the new structure. Furthermore, the experimental findings regarding the extraction of Cu++, Zn++, Pb++, and Ni++ from solutions underscore the significant effectiveness of the novel structures on a large scale.

Key words: Polymers, Aromatic amine, PVC, Extraction.

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Optimization and cytoprotective potential of *Opuntia ficus indica* cladode extract against cadmium toxicity using surface methodology as an optimizing tool

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Several studies reported the ability of *Opuntia ficus indica* extracts to treat various diseases. This study identified the optimum extraction conditions to get the highest phenolic compounds yield from *O. ficus indica* aqueous extract. Using the response surface methodology, optimum conditions were 10 min for extraction time, 80°C for the extraction temperature, and 30 for the ratio water: raw material. Our results *in vitro* tests showed that *O. ficus indica* phenolic extract exhibited a strong ability to scavenge free radicals and to protect HepG2 and HEK273 cells against oxidative stress caused by cadmium exposure. We conclude that *O. ficus indica* extract showed significant antioxidant and cytoprotective potential. Further researches should be carried to explore the capacities of this plant.

Keywords: *Opuntia ficus indica* cladode, extraction, optimization, antioxidant, cytoprotective.

A Phytochemical and biological study of *Thymus capitatus* plants growing in Algerian high plains

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The Lamiaceae family contains bioactive medicinal compounds mostly used as ornamental plants and traditional medicine, as well as in the food, cosmetics, and pharmaceutical sectors. Common uses for this type include treating high cholesterol, diabetes, respiratory diseases, heart disease, and food poisoning, these medicinal uses were linked to its components and numerous biological properties, including antimicrobial and antioxidants. The goal of this study was to investigate the phytochemicals and biological activities of the petroleum ether extract of *Thymus capitatus* plant from two different regions of eastern Algeria (Souk ahras and Guelma), as well as to extract volatile oils using a Clevenger device and then analyze by using GC/MS. The results revealed that the total amount of phenolic compounds was better in the case of phenolic extract of Souk Ahras (3.41 mg GAE·g^{-1}), while the amount of Flavonoid compounds was higher in the region of Guelma (26.31 mg QE·g^{-1}). Following the quantification of phenolic compounds by HPLC, we observed that the phenolic extracts contained most of the standard compounds in variable proportions. Furthermore, we tested the antioxidant activity of the phenolic compounds electrochemically with cyclic voltammetry method. We concluded that the highest antioxidant content was recorded in the case of Guelma region extract (3.17 mg GAE·g^{-1}). We have also evaluated the antioxidant activity by a chemical method using DPPH, and referring to the IC_{50} values the results showed that the Guelma extract exhibited a high effectiveness. When extracting the volatile oils, it was found that the highest yield was in the Guelma region.

Key words: *Thymus capitatus*, Phenols, Flavonoid, Volatile oil, Biological activity.

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Chemical Composition and *in vivo* Efficacy of the Essential Oil of *Mentha piperita* L. in the Suppression of Crown Gall Disease on Tomato Plants

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Peppermint (*Mentha piperita*) is one of the most widely consumed single ingredient herbal teas, or tisanes [1], has been traditionally used for their antiseptic properties for the treatment of infectious diseases [2]. The leaves of *M. piperita* are used in food preparation to enhance taste and appearance. However, there is no report available in the literature on the *in vitro* and *in vivo* antibacterial activity of essential Oil (EO) of *M. piperita*, against phytopathogenic bacteria. This study was undertaken to determine the antibacterial efficacy of the essential oil (EO) of peppermint (*Mentha piperita* L.), *in vitro* and *in vivo*, against the phytopathogenic bacteria *Agrobacterium tumefaciens* (*A. tumefaciens*).

Key words: *Mentha piperita*, *Agrobacterium tumefaciens*, essential oil, biological control, antibacterial activity.

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Cross-metathesis transformations of terpenoids in dialkyl carbonate solvents

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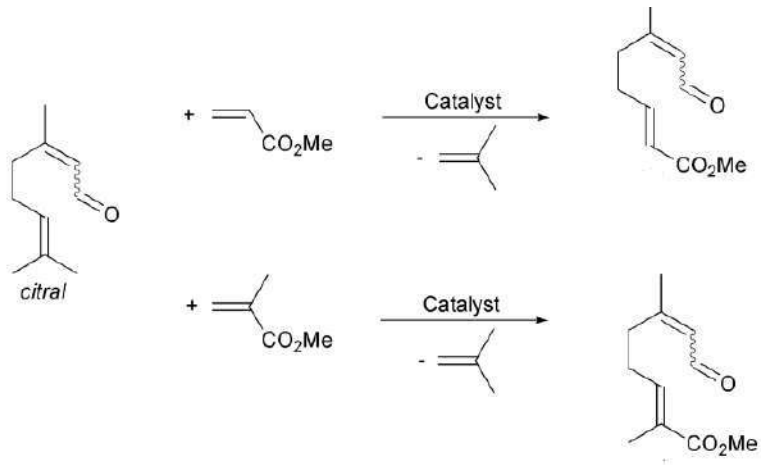
Terpenes are a class of natural compounds that have been used for a long time as flavorings and fragrance and in medicinal formulations.[1] Recently, terpenes have been shown to be valuable compounds in the fields of oil shortage and renewable materials as sources of raw materials for the chemical industry.[2] In this context, the ruthenium catalyzed cross-metathesis of terpenoids with methyl acrylate and methyl methacrylate (scheme 1) was used to prepare new terpenoids and to improve the synthesis of known terpenoids under environmentally friendly conditions either in dimethyl carbonate or under solvent-free conditions.

Key words: Terpenes, cross-metathesis, ruthenium, environmentally conditions.



Scheme 1. Cross-metathesis of citral with MA and MMA.

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A New Luminescent Chiral Hybrid Compound: [((R)-$C_8H_{12}N)_4$](Sb_2Cl_{10}) with Antimony Dimers

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Abstract

A novel crystal of $(C_8H_{12}N)_4Sb_2Cl_{10}$ was synthesized by slow evaporation at room temperature from an aqueous solution, which was characterized by single-crystal X-ray diffraction, infrared absorption, Raman spectroscopy scattering, optical absorption and photoluminescence measurements.

The non-centrosymetric compound crystallizes in the monoclinic system of space group $P2_1$ with four formula units (Z = 4). The unit cell dimensions are: a= 12.0672(1)Å, b=12.8059(1)Å, c=29.6270(15)Å, β = 101.499(1) ° and V = 4486.4(2)$Å^3$.

The chiral molecular compound consists of discrete binuclear $[Sb_2Cl_{10}]^{4-}$ anions sharing two edge and four $[C_8H_{12}N]^+$ cations. The Organic and inorganic parts are linked by means of hydrogen bonding contacts N-H…Cl to from a zero-dimensional network. The Intermolecular hydrogen bonding was investigated by means of the Hirshfeld surfaces. The percentages of hydrogen bonding interactions are analyzed by 2D-Fingerprint plots of Hirshfeld surface. The existence of vibrational modes correspond to the organic cation and inorganic groups are identified by the Raman and infrared spectroscopy in the frequency ranges 4000-25 and 4000-500 cm^{-1}, respectively. The optical properties of this compound were studied by UV-Vis and luminescence spectroscopy.

Keywords: Halide complex; X-ray diffraction; Vibrational spectroscopy; Hirshfeld surface; Luminescence.

Crystal structure, vibrational spectra, optical and DFT studies of One-Dimensional Organic–Inorganic Material ($C_5H_8N_6$) $BiCl_5.H_2O$

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Abstract

A new Bi(III) halide complex, ($C_5H_8N_6$) $BiCl_5.H_2O$ has been successfully created through slow evaporation at room temperature and carefully analyzed using physicochemical methods.

This compound which was examined by single-crystal X-ray diffraction, was found to crystallize in the monoclinic system, space group P21/ c with crystallographic parameters a=8.3149 (2) Å, b =21.1165 (4) Å, c = 8.7441 (2) Å and Z = 4. The cristal lattice was composed of $BiCl_6$ octahedra sharing two cis-Chlorine atoms and forming infinite $[BiCl_5]_n$ zig-zag chains surrounded by organic cations and water molecules. The crystal cohesion is achieved by hydrogen bonds N–H...Cl joining the organic and inorganic layers. Raman and infrared spectra of the title compound were recorded in the range of 50-4000cm^{-1} and 500-4000cm^{-1}, respectively. The Intermolecular hydrogen bonding was investigated by means of the Hirshfeld surfaces. The optical properties of this compound were studied by UV-Vis and luminescence spectroscopy.

Keywords: crystal structure; chlorobismuthate; vibrational properties; Hirshfeld surface analysis; optical properties.

Synthesis, crystal structure and characterization of a new phosphate $Na_2Ni_2Cr_{0.75}Fe_{0.25}(PO_4)_3$

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This work is part of a general study on alkali transition metal phosphates belonging to the A_3PO_4-$B_3(PO_4)_2$-$M^{III}PO_4$ systems (A: Alkali metal, B: divalent cation; M^{III} = trivalent transition metal) using the modified Pechini[1] synthesis method, in search of new materials with attractive physical and chemical properties.

It reports the synthesis of the $Na_2Ni_2Cr_{0.75}Fe_{0.25}(PO_4)_3$ have been prepared by modified Pechini and have been characterized by X-ray diffraction technique. This compound crystallizes in the orthorhombic system with Imma space group, with unit cell parameters: a=10.402(2) Å; b =13.083(1) Å; c=6.410(1) Å; V= 886.358 $Å^3$ and Z= 4. The main structural feature displays strong similarities with the high temperature polymorph of the parent chromium phosphate, the α-$CrPO_4$[2]. The crystal structure of the compound exhibit an open three-dimensional anionic framework $[Ni_2Cr_{0.75}Fe_{0.25}(PO_4)_3]^-_\infty$ forming two sets of interesting tunnels where two Na^+ ions are located. Although its complexity, a close look at this framework shows the whole building to be consisted by two blocks: (1) sheets parallel to the (b,c) plane and constructed by M_2O_{10} (M = Ni^{2+}/Cr^{3+}) binuclear units, corner-linked by PO_4 tetrahedra, and (2) chains running parallel to the b axis, consisting of $M(1)O_6$ (M = Ni^{2+}/Cr^{3+}/Fe^{3+}) octahedra, alternating with PO_4 tetrahedra. The structural model was validated by the bond valence sum (BVS) and charge distribution (CHARDI) methods.

The IR spectrum is typical of a monophosphate and gives clear evidence of the occurrence of two crystallographic distinct phosphorus sites.

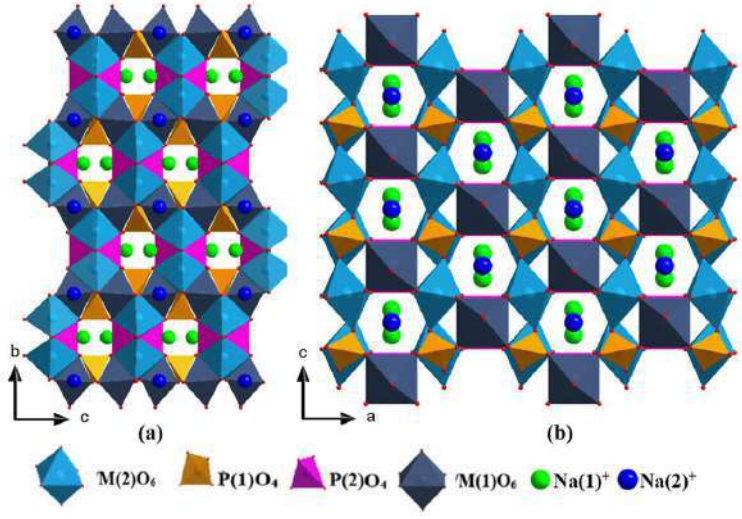

Figure 1. Projections along the a-axis (a) and b-axis (b) of the structure of $Na_2Ni_2Cr_{0.75}Fe_{0.25}(PO_4)_3$, showing the intersecting tunnels in which two Na^+ are located.

Key words: Phosphate, modified Pechini synthesis, α-$CrPO_4$, X-ray powder diffraction (XRD), Infrared spectroscopy (IR), bond valence sum (BVS), (CHARDI).

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The impact of varying exposure durations in microwave heating on the physical and chemical characteristics of virgin olive oil blended with plant extracts

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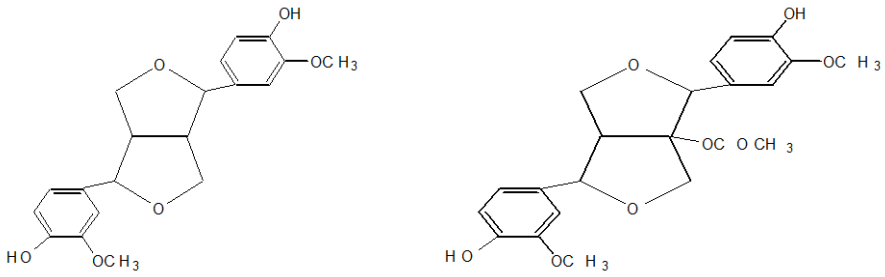
Abstract:

The physical and chemical parameters of virgin olive oil enriched with plant extracts were assessed under varying microwave heating times (0–15 min; 1000 W). The parameters evaluated were free acidity, peroxide value, ultraviolet absorbance values at 232 and 270 nm, phenolic content, chlorophylls and carotenoids content. All oil samples studied containing natural extracts showed high stability against oxidation when microwave treatments did not exceed five minutes. We've demonstrated that phenolic compounds from aromatic plants and olive leaves reduce quality loss in the analyzed olive oils during heating for up to 5 minutes compared to the control. The duration of microwave heating time significantly impacts the total chlorophyll and carotenoid contents, demonstrating a clear decrease with longer exposure times. Incorporating natural antioxidants could offer an effective strategy to safeguard olive oil, a vital commodity globally, against oxidation when subjected to microwave treatment.



Pinoresinol Acetoxypinoresinol

Fig. Structure of some phenolic compounds present in olive oil.

Key words : Olive oil; Microwave treatment; Phenolic content; Carotenoids content; Chlorophylls content.

Convenient synthesis of disubstituted pyrazolines from an α-functionalized vinylketone

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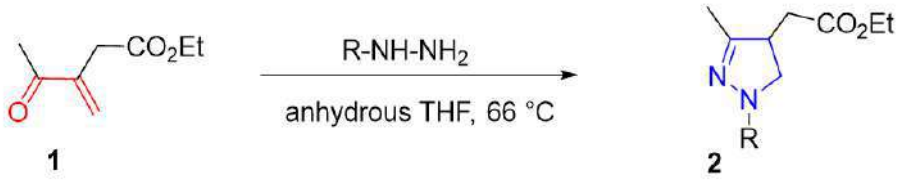
Organic compounds featuring the central structure of 2-pyrazoline exhibit a broad spectrum of potential pharmacological activities [1], and these compounds are present in diverse medications [2]. In this context, we outline the various synthetic steps employed to produce a crucial intermediate, specifically ethyl 3-methylene-4-oxopentanoate **1** [3], starting from commercially available acetylacetone. We examined the reactivity of a Michael **1** acceptor with a variety of hydrazines in anhydrous THF at reflux aiming to isolate a novel series of polysubstituted 2-pyrazolines **2** with yields ranging from 58 to 74%.



1 **2**

Key words: Ethyl 3-methylene-4-oxopentanoate, Hydrazines, 2,3,4-trisubstituted 2-pyrazolines.

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Etude des activités biologiques des métabolites secondaires de deux espèces du genre *Pistacia*

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Pistacia atlantica et *Pistacia terebinthus* sont deux espèces de la famille des Anacardiacées reconnues par leurs vertus thérapeutiques. Une analyse quantitative des composés phénoliques et des activités biologiques des extraits méthanoliques et des huiles essentielles de ces espèces a été réalisée. Les résultats obtenus varient significativement selon l'organe et l'espèce. Ces travaux ont montré que les extraits de feuilles de *P. atlantica* sont les plus riches en polyphénols et en flavonoïdes et les moins riches en tanins. La meilleure activité antioxydante a été observée chez les extraits et les huiles essentielles de *P. atlantica* alors que la meilleure activité antidiabétique est observée chez les huiles essentielles et les extraits de *P. terebinthus*.

Mots-clés : *Pistacia atlantica, Pistacia terebinthus,* composés phénoliques, huiles essentielles, activité antioxydante, activité inhibitrice de α -amylase.

Synthesis of hybrid materials with $NH_3[Cd(C_2O_4)2].2H_2O$ for water depolution

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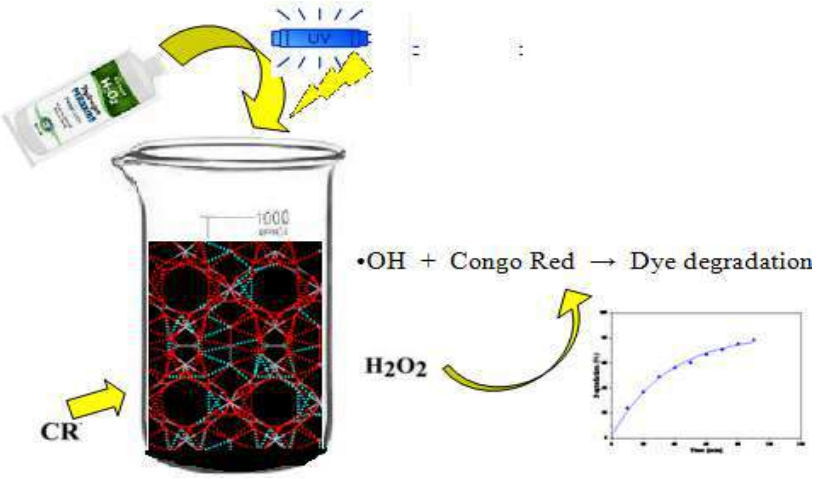
Abstract

To remove pollutants from water, an hybrid $NH_3[Cr(C_2O_4)2].2H_2O$ complex was produced utilizing the co-precipitation approach. The reaction employed amonium oxalate, and chrome cation precursors. The analyzers XRD, FTIR, MEB/EDX, High Score Plus, and Mercury software were used to characterize and identify the final product type. As part of the utilization of affordable sources, Congo red has been decomposed using a phenton detector and natural radiation (the sun).

Keywords: hybrid complexes, methyl orange, photo fenton process, detector, water pollution



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Synthesis, antioxidant, and molecular docking of new fluorescent (4-alkoxyphenyl)-nitrothiophene compounds

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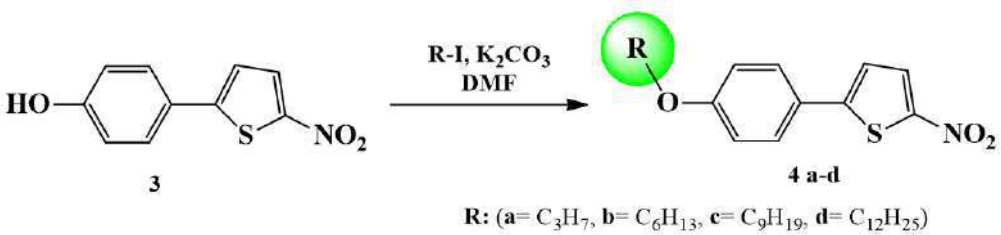
New 4-alkoxyphenyl-nitrothiophene compounds **4 a-d** were prepared by alkali-catalyzed alkylation of 4-(5-nitrothiophen-2-yl) phenol **3** with propyl, hexyl, nonyl, and/or dodecyl iodide. [1] The molecular structures were determined by IR, ^{1}H NMR, and mass spectroscopy. Ultraviolet–visible absorption and emission spectra of the produced 4-alkoxyphenyl-nitrothiophenes revealed considerable extinction coefficients, which were shown to be controlled by the thiophene bridge in conjugation with the alkoxy donor moiety. It was found that the maximum absorbance wavelength was affected by the alkoxyl group-bonded substituents. The antioxidant efficiency obtained from the 4-alkoxyphenyl-nitrothiophene hybrids was excellent compared with that widely used drugs (BHT) and vitamin C. Unlike 2-(4-[dodecyloxy]phenyl)-5-nitrothiophene hybrid **4d**, which has made solid claims about the good effect of its reference drugs and vitamins, Docking investigations of the prepared 4-alkoxyphenyl-nitrothiophene hybrids towards the selected 5IKQ protein revealed impressive coordination and antioxidant effectiveness.

Key words: (4-alkoxyphenyl)-nitrothiophene, antioxidant, hexyl iodide, pull–push



Scheme1

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Synthesis and spectroscopic characterization of a new cobalt(II) *meso*-aryl porphyrin complex. Crystal structure of $[Co^{II}(TTMPP)(3\text{-}A\text{-}2Clpy)]\cdot 2H_2O$

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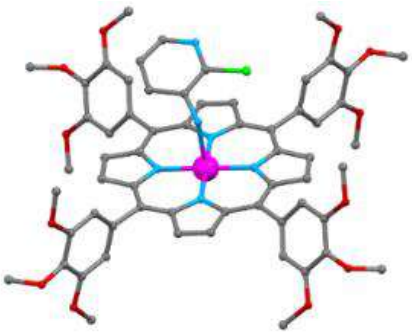
Cobalt metalloporphyrin complexes attract considerable attention due to their biological resemblance to cobalamins **[1]**, which have a porphyrin-like structure. They are recognized as excellent compounds to explore in the development of new catalysts **[2]**, sensor **[3]**… In this work, we have focused on the synthesis, the crystal structure and the spectroscopic characterization (UV-visible, IR, NMR) of the 3-amino-2-chloropyridine{*meso*-tetrakis(3,4,5-trimethoxyphenyl)porphyrin}cobalt(II) complex with their formula $[Co^{II}(TTMPP)(3\text{-}A\text{-}2Clpy)]^{\bullet}2H_2O$. This new metalloporphyrin crystallizes in the triclinic crystal system (*P-1* space group) with the cell parameters: a = 7,8240(8) Å, b = 12,7807(12) Å, c = 14,3179(6) Å, α = 85,664(6) °, β = 76,444(5) °, γ = 89,517(8)°. The final R values are: R_1 = 0,0554 and Rw_2 = 0,1303 and the Goodnee of fit is S = 1,204.

Keywords: Cobalt (II) porphyrin complex; X-ray molecular structure; UV-visible; NMR, IR.



Molecular Structure of the $[Co^{II}(TTMPP)(3\text{-}A\text{-}2Clpy)]$ complex.

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Cleome amblyocarpa Barratte & Murb induced cytotoxic effects in HCT116 cells by generation of ROS, Rh123 and DNA damage

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Despite advancements in anti-cancer medicines, colon cancer continues to be one of the top causes of mortality [1]. The natural product *Cleome amblyocarpa* Barratte & Murb, an aromatic plant medicine, possesses strong antioxidant and anti-inflammatory properties [2, 3]. Also, the anti-cancer properties of *C. amblyocarpa* attracted widespread attention, but its molecular mechanism has not been systematically explained.

The main purpose of this study is to explore the possible anti-cancer properties of this natural product at the cellular level HCT116, a human colorectal cancer cell, was used to assess the possible toxicity of *C. amblyocarpa*. The research indicated that the plant has a notable cytotoxic effect on cancer cell lines, reducing cell viability in a concentration-dependent manner, and the IC_{50} value was 480 µg/mL after 24 h of exposure. In addition, this plant promoted intracellular ROS production in colorectal cells. We also examined the variation in mitochondrial transmembrane potential (ΔΨm) using the Rh123 fluorescence. Our result showed a significant decrease in the ΔΨm of cells treated. Additionally, we have shown that plants can cause DNA fragmentation.

Key words: Colon cancer, HCT116, *Cleome amblyocarpa* Barratte & Murb, ROS, Rh123, DNA damage

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