

## ISSUE CONTENTS LIST WITH GRAPHICAL ABSTRACTS

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### PHYSICAL CHEMISTRY AND CHEMICAL PHYSICS

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#### THE STOICHIOMETRIC UNIQUENESS OF MULTIPLE CHEMICAL REACTION SYSTEMS IN CHEMICAL THERMODYNAMICS, KINETICS AND CATALYSIS – CONTRIBUTIONS OF PROFESSOR ILIE FISHTIK

Igor Povar

The main scientific achievements of great significance accomplished by Profesor Ilie Fishtik at the University of Iowa and the Worcester Polytechnic Institute, in several fields of the physical chemistry as chemical thermodynamics, kinetics and heterogeneous catalysis were revealed and briefly analyzed. Fundamental equations of chemical thermodynamics within the De Donder (stoichiometric) approach were reformulated in terms of a special class of chemical reactions, called as response reactions. Using this approach, the unusual behaviour of chemical equilibrium systems, to interpret the apparent contradictions to Le Chatelier principle and to discover hitherto unnoticed thermodynamic identities, was rationalized. A completely new approach for the generation and simplification of kinetic mechanisms for complex reaction systems was developed and applied. Based on a new type of reaction networks, referred to as reaction route graphs, a systematic method of analysis and reduction of a microkinetic mechanism was established and employed.

### RESEARCH PAPER

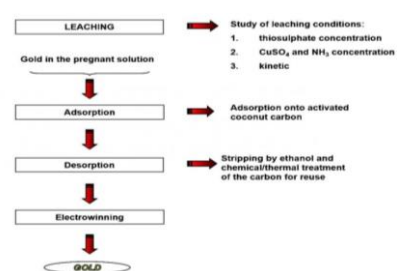
### ECOLOGICAL CHEMISTRY

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#### APPLICATION OF INNOVATIVE PROCESSES FOR GOLD RECOVERY FROM ROMANIAN MINING WASTES

Stefano Ubaldini, Igor Povar, Tudor Lupascu, Oxana Spinu, Francesca Trapasso, Daniele Passeri, Serena Carloni, Daniela Guglietta

The application of a new hydrometallurgical process for gold extraction by thiosulphate leaching from Romanian mining wastes, coming from Balan and Deva deposits, was studied. There was obtained 85% of Au extraction after leaching; moreover, an integrated flow-sheet, including recycling of process solution and carbon, was outlined, based on results obtained at a laboratory scale, using a schematic chemical circuit of treatment. Global recovery of the process (leaching-adsorption-desorption-electrodeposition) of about 75-80% of Au was achieved. The developed integrated flow-sheet, allows recycling the reagents during the process, with a loss of only 5-10%, in particular thiosulphate and alcohol, for each complete circuit of treatment.



### RESEARCH PAPER

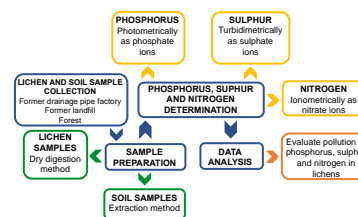
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#### VARIATIONS OF PHOSPHORUS, SULPHUR AND NITROGEN CONTENT IN LICHENS IN THE FORMER MANUFACTURING AREAS

Vitālijs Lazarenko, Zenta Balcerbule, Vita Rudoviča, Arturs Viksna

This research work presents the evaluation of the pollution level of phosphorus, sulphur and nitrogen levels using lichens as bioindicators in the former manufacturing areas (the former Kuprava drainage pipe factory and landfill site) in comparison to Sita forest area. Additionally, the correlation between the content of these elements in lichens and soil was examined. The research results show that in the former drainage pipe factory area and landfill site, the levels of phosphorus, sulphur and nitrogen content were elevated in comparison with Sita forest.



### RESEARCH PAPER

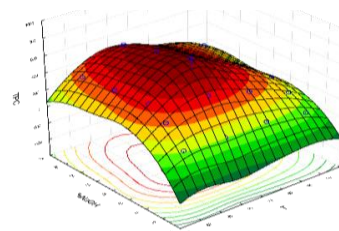
### FOOD CHEMISTRY

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#### EXTRACTING CONDITIONS OPTIMIZATION AND BIOACTIVITY OF POLYSACCHARIDES FROM THE PODS OF HARICOT VERT

Nguyen Thi Thu Thuy, Do Hoang Giang, Pham Khac Linh, Nguyen Tien Dat

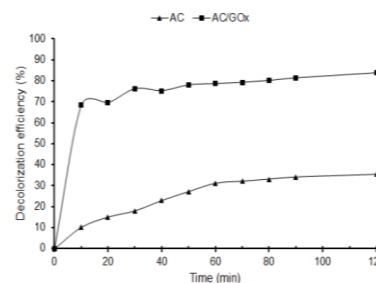
Polysaccharides from the pods of haricot vert (*Phaseolus vulgaris* L.) were extracted using a simple heating method, by varying extracting temperature, heating time, solid-to-liquid ratio, and solvent compositions. The obtained results were processed using statistical analysis that helped to identify the optimal conditions for the polysaccharides' extraction process. This study represents a promising production method of bioactive polysaccharides extract in the food and pharmaceutical industry.



### DECOLOURISATION OF BEET SUGAR SYRUP USING ACTIVATED CARBON AND GLUCOSE OXIDASE ENZYME

Pezhman Zolfaghari, Neda Imani Payandeh, Mortaza Golizadeh, Afzal Karimi, Amirali Ebadi Fard Azar

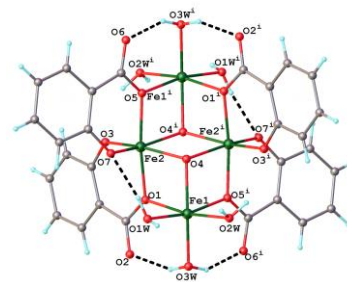
This paper presents the development and optimization of a new approach which combines the utilization of activated carbon and glucose oxidase enzyme for decolourisation of beet sugar syrup. The combining of the physical adsorption with the enzymatic reaction was managed to improve the decolourisation of beet sugar syrup from 35.29 to 83.68% compared to the basic adsorption by activated carbon after 120 min of operation under the optimum conditions. The maximum decolourisation efficiency by the combined process was achieved at glucose oxidase dosage of 0.07 g, 20 mM glucose, and solution pH 7 at the temperature of 30°C using 0.01 g of activated carbon particles. Given the high effectiveness, reusability, and the eco-friendly nature of the process, the proposed method can serve as an alternative to ordinary decolourisation techniques.



### SYNTHESIS AND STRUCTURAL CHARACTERIZATION OF THE TETRANUCLEAR IRON(III) CLUSTER WITH SALICYLIC ACID

Viorina Gorinchoy

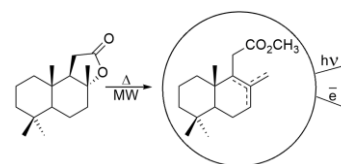
A new tetra-homonuclear iron(III) cluster,  $[\text{Fe}_4\text{O}_2(\text{Sal})_4(\text{H}_2\text{O})_6] \cdot 4\text{DMA} \cdot 0.75\text{H}_2\text{O}$  (where, Sal= salicylic acid and DMA= *N,N*-dimethylacetamide), consolidated via two  $\mu_3$ -oxo- and four salicylate-bridges was synthesized and characterized by IR spectroscopic method as well as by single crystal X-ray diffraction analysis. The structure of the obtained tetranuclear compound consists of four  $\text{Fe}^{\text{III}}$  atoms in a “butterfly” arrangement. The coordination sphere of each of the two central  $\text{Fe}^{\text{III}}$  atoms is generated by two  $\mu_3$ -oxo-bridging atoms and four oxygen atoms provided by the tridentate-bridging  $\text{Sal}^{2-}$  ligands, while the coordination polyhedron of another two iron atoms involve six oxygen atoms from three water molecules, two salicylic and one  $\mu_3$ -oxygen atom. The Fe-O distances within Fe-O-Fe bridge are of 2.102(3) Å (for wing-body) and 2.038(3) Å (for body-body).



### THE USE OF SOME NON-CONVENTIONAL METHODS IN CHEMISTRY OF BICYCLOHOMOFARNESENIC METHYL ESTERS

Alexandru Ciocarlan, Lidia Lungu, Svetlana Blaja, Ion Dragalin, Aculina Aricu

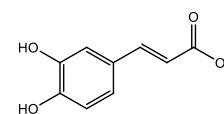
The present paper reports the results of microwave irradiation assisted method for the preparation of bicyclohomofarnesenic methyl esters versus classical Stoll and Hinder method. Moreover, the chemical transformations of bicyclohomofarnesenic methyl esters via anodic electrooxidation and dye-sensitized photooxidation were performed. A new method for the preparation of methyl 7-oxo-13,14,15,16-tetranorlabd-6,8(8)-dien-12-oate and the mechanism of electrochemical products formation are presented. The structure of all synthesized compounds was fully confirmed by spectral methods.



### LC-MS ANALYSIS AND ANTIOXIDANT ACTIVITY OF THE HYDRO-ALCOHOLIC EXTRACT OF MELISSA OFFICINALIS L. FROM ALGERIA

Brahim Ben Aicha, Rachid Rouabhi, Salim Gasmi, Chawki Bensouici, Hichem Mohammedi, Imad Mennai

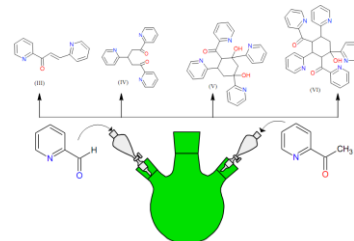
The present work focuses on evaluating the chemical composition and antioxidant activity of the hydro-methanolic extract of *Melissa officinalis* from Algeria. Liquid chromatography-mass spectrometry analysis allowed the identification of six compounds: caffeic acid, caftaric acid, hydroxyjasmonic acid glucoside, caftaric acid glucoside, rosmarinic acid and sagerinic acid. These results suggest that *Melissa officinalis* L. could be considered a potential source of natural antioxidants with potential interest in the agrochemical and pharmaceutical industries.



**COMPOUNDS REMOVED FROM THE CONDENSATION REACTION BETWEEN 2-ACETILPYRIDINE AND 2-FORMILPYRIDINE. SYNTHESIS, CRYSTAL STRUCTURE AND BIOLOGICAL EVALUATION**

Roman Rusnac, Maria Botnaru, Nicanor Barba, Peter Petrenko, Yurii Chumakov, Aurelian Gulea

The research is devoted to the study of unexpected products that formed as a result of the condensation reaction between 2-acetylpyridine and 2-formylpyridine under the Claisen-Schmidt reaction conditions. As a result, a sequence of reactions leading to the following compounds has been proposed: 1,3-bis(pyridin-2-yl) prop-2-en-1-one; 1,3,5-tri(pyridin-2-yl)pentane-1,5-dione; (2,4-dihydroxy-2,4,6-tri(pyridin-2-yl)cyclohexyl)(pyridin-2-yl)methanone and (4-hydroxy-2,4,6-tri(pyridin-2-yl)cyclohexane-1,3-diyl)bis(pyridin-2-yl)methanone) as well as 2-formylpyridine and 2-acetylpyridine. The plausible mechanism of these chemical transformations has been proposed. All the obtained compounds demonstrate moderate antimicrobial, antifungal and antioxidant activity.



**FACILE AND EFFICIENT SYNTHESIS OF XANTHENE DERIVATIVES MEDIATED BY LANTHANUM(III) NITRATE HEXAHYDRATE UNDER SOLVENT FREE CONDITIONS**

Kabeer Ahmed Shaikh and Uddhav Nivrutti Chaudhar

The present paper shows that lanthanum(III) nitrate hexahydrate can be used as mild and environment friendly homogeneous catalyst for an efficient one-pot multi-component synthesis of biologically active 1,8-dioxo-octahydroxanthene and 14*H*-dibenzo[*a,j*]xanthene derivatives. The solvent free condensation reaction of aromatic aldehydes and dimedone or  $\beta$ -naphthol was carried out at 70-80°C during 10-30 min. The advantages of this eco-friendly synthesis route are numerous, and include the use of an inexpensive catalyst, high to excellent yield, short reaction time and high catalytic activity that can make this method an interesting alternative to multi-step approaches.

