Research Article

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# Fluorescence study of 5-nitroisatin Schiff base immobilized on SBA-15 for sensing $Fe^{3+}$

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**Abstract:** *N*'-(5-nitro-2-oxoindolin-3-ylidene) thiophene-2-carbohydrazide **(NH)** was successfully synthesized as a ligand, then grafted onto the surface of mesoporous silica **SBA-15** *via* an aminopropyl bridge. The successful grafting of ligand **NH** onto the hybrid nanomaterial (**SBA-15/APTES-NH**) was confirmed by infrared spectroscopy. On excitation at 276 and 370 nm, the ligand **NH** and the hybrid nanomaterial **SBA-15/APTES-NH** showed a strong and narrow emission peak centered at 533 nm. By dispersing **SBA-15/APTES-NH** in an aqueous solution containing metal ions, the resulting solid materials showed a higher binding of **NH** sensing site to $Fe^{3+}$ ions as compared to the others with a quench of the emission intensity up to 84%. This result showed that the hybrid nanomaterial is a potential chemosensor that requires development for the detection of metal ions.

**Keywords:** chemosensor; hybrid material; metal ions; SBA-15; Schiff base.

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## 1 Introduction

Amongst heavy metals, iron plays an important function in living organisms and their metabolism such as oxygen-carrying and the formation of the hemoglobin [1]. However, excessive $Fe^{3+}$ in the human body causes various problems such as cancers and dysfunction of organs while an iron deficiency can lead to anemia [2,3]. For these reasons, detecting iron ions have been an interesting area of research. For example, several analytical techniques for detecting iron ions have been generally developed using instrumental techniques such as Voltammetry, Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES), and Flame Atomic Absorption Spectrometry (FAAS) [4,5]. However, these techniques become inaccessible because of some inherent limitations such as being expensive, complicated sample pretreatments and due to usage of harmful solvents [2,6]. Recently, fluorescent chemosensors have significantly became an interest because these compounds or materials can be used in environmental research with high sensing capabilities such as easy detection, quick response, good selectivity, high sensitivity, and low costs [7,8].

Schiff base derivatives have played an important role as a chemosensor due to their chromogenic and azomethine groups [9,10]. Schiff base could be easily prepared by condensation between a primary amine and an aldehyde or a ketone group [11]. The lone pair of electrons at the cyanide and carbonyl groups provided a good possibility for chelating to transition metal ions. It is due to the formation of $\pi$ electrons in the six-membered rings [12–14]. Therefore, Schiff base can be applied as a chelating agent for the detection of many metal ions. For examples, Schiff base derived from isatin has been widely reported for chemosensors such as isatin *N*-phenylsemicarbazone [15], rhodamine-isatin [16], 2',7'-diamino-2-oxo-1',4'-dihydrospiro[indoline3,4'-quinoline]-3'-carbonitriles [17], and *N*-methyl isatin [18].

Functionalized mesoporous silica has gained wide attention due to their applications such as membranes,

drug delivery, chemosensor, and biosensor [19–22]. **SBA-15**, one of the mesoporous silica, is a promising material to be used as inorganic support because of the high thermal stability, large pore size and high surface area [20,23,24]. Besides that, the presence of OH groups from the silanol on the surface of **SBA-15** can be attached by various organic chromophores [25,26]. Moreover, for chemosensor applications [27–33], the regularly arranged pores in its **SBA-15** mesostructure can enhance the selectivity to particular guests like organic substance and/or metal ions [34]. For Schiff base ligands as fluorescent chemosensors in the hybrid mesoporous silica materials, several reports have been published for sensing $Al^{3+}$ [35], $Hg^{2+}$ [36], $Pb^{2+}$ [37], $Zn^{2+}$ [38–40], and $Cu^{2+}$ ions [41–43]. In particular, Wang et al. [44] and Afshani et al. [45] have reported that the grafting of *bis*-Schiff base *N,N′*-(1,4-phenylenedimethyli-dyne)bis(1,4-benzenediamine) (PMBA) and salicylaldehyde with **SBA-15** can be used for sensing $Fe^{3+}$ at a less intense blue-emission peak of the binding site consisting of a broad peak. By using isatin-isonicotinohydrazide functionalized **SBA-15**, Lashgari et al. in 2017 [46] showed that the hybrid nanomaterial can be used as a chemosensor of the same metal ion. However, the sensing capability was only found up to 70% quenching of its less intense and broad emission peak at 420 nm. Hence, it is necessary to develop chemosensors with more bright emission especially in the area closed to near infrared so that the identification and evaluation can be easily carried out and is more sensitive. On the other hands, Schiff-base from 5-nitroisatin type fluorescent chemosensors have been rarely reported [44–46] and 2-thiophene carboxylic acid hydrazide was reported as Schiff base for the fluorescent probe of 2-hydroxy-1-naphthaldehyde in the detection of $Al^{3+}$ ions with a broad green-emission at 476 nm [47]. To the best of our knowledge, 5-nitroisatin Schiff base immobilized on **SBA-15** hybrid nanomaterials for sensing $Fe^{3+}$ is one of the potential chemosensor with bright fluorescence and high sensing capability. Herein, we report the first example of hybrid fluorescent chemosensors with strong and intense emission at the green-to-red (533 nm) area using **SBA-15** with a Schiff-base nitroisatin based on 2-thiophene carboxylic acid hydrazide, called as *N*'-(5-nitro-2-oxoindolin-3-ylidene) thiophene-2-carbohydrazide, for the detection of $Fe^{3+}$ ions. In particular, the new hybrid chemosensor shows high sensing capability up to 84% with low limit of detection and high reusability.

# 2 Experimental

## 2.1 Materials and Method

The materials, 5-nitroisatin (Aldrich N17807), 2-thiophenecarboxylic acid hydrazide (Aldrich T1388), aquades, dimethyl sulfoxide anhydrous (Merck 8.02912), ethanol (Merck 1.00983), sulfuric acid, ethyl acetate, acetone, *n*-hexane, chloroform, and **SBA-15** were obtained in the previous study [48]. Infrared spectra are measured using FT-IR JASCO 6800 with ATR disc, UV-Vis spectra were measured using spectrophotometer JASCO V-760, and fluorescence analysis were measured using spectrofluorometer JASCO FP-8500ST. $^{1}$H-NMR spectra were obtained at 500 MHz and $^{13}$C-NMR spectra were measured at 125 MHz using JMN-ECA 500 NMR machine. DMSO-*d6* was used as an internal standard and solvent. Mass spectra were obtained using Waters LCT Premier XE instrument.

## 2.2 Synthesis of Schiff base

Schiff base ligand **NH** was synthesized by diluting 5-nitroisatin (0.15 g; 0.80 mmol) in 20 mL of ethanol and placed in a round bottom flask as shown in scheme 1. Three drops of sulfuric acid were added and then refluxed for 20 minutes. 2-Thiophenocarboxylic acid hydrazide (0.11 g; 0.80 mmol) in 10 mL ethanol was added to the mixture and it was refluxed further at 78°C for 2 hours (the current reaction was monitored with thin layer chromatography). The mixture was cooled to room temperature and the solvent was evaporated. The remaining solid was washed with cold ethanol (2x5 mL), dried thoroughly desiccator, and identified by FT-IR, NMR and MS spectrometers.

## 2.3 Synthesis of SBA-15/APTES

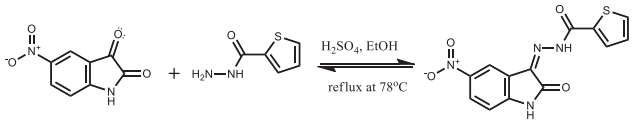
The mesoporous silica, **SBA-15**, was prepared in the previous study [48]. 3-Aminopropyl triethoxysilane (**APTES**) was used as the silylation reagent on the aminopropyl grafting onto **SBA-15**. Typically, one gram of **SBA-15** was mixed to **APTES** (2.2 mL) in 50 mL chloroform and then stirred at room temperature for 12 hours. After that, the mixture was filtered, washed with chloroform and dried at room temperature. The resulting white solid was characterized by using FT-IR spectrometer.

### 2.4 Synthesis of SBA-15/APTES-NH

For the grafting of an organic compound, **SBA-15/APTES** (200 mg) and ligand **NH** thiophene-2-carbohydrazide (57 mg) were refluxed in ethanol solution (50 mL) for 24 hours. This mixture was filtered with a Whatman paper and washed with ethanol until the filtrate did not show yellow color. The resulting yellow solid was dried at room temperature and characterized by FT-IR and fluorescent spectrometers.

### 2.5 Fluorescent Chemosensor of Metal Ions

Sensing properties of **SBA-15/APTES-NH** were evaluated by using the solid method. Iron ions in chloride salt ($FeCl_3$) were dissolved in water with a concentration of 50, 100, 150, and 200 mM. After that, 1 mL of $Fe^{3+}$ ion was mixed with 5 mg of **SBA-15/APTES-NH** and sonicated for 5 minutes. The mixture was centrifuged for 15 minutes, decantated and dried at 50ºC. The resulting solid sample was measured their changes in emission and excitation by using fluorescence spectroscopy. Other metal ions such as $Ca^{2+}$, $Co^{2+}$, $Cu^{2+}$, $Fe^{3+}$, $K^{+}$, $Mg^{2+}$, $Mn^{2+}$, and $Zn^{2+}$ in 100 mM were also evaluated with the same experiment procedure.




**Scheme 1:** Synthesis route of *N*'-(5-nitro-2-oxoindolin-3-ylidene) thiophene-2-carbohydrazide.

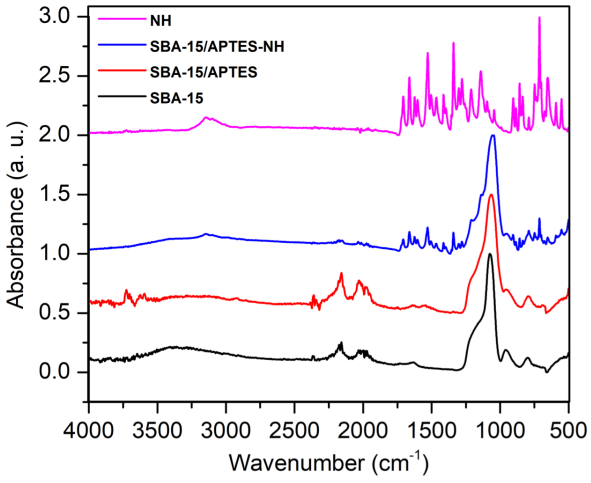



**Figure 1:** FT-IR spectrum of **SBA-15** (black line), **SB-15/APTES** (red line), **SBA-15/APTES-NH** (blue line) and ligand **NH** (pink line).

## 3 Result and Discussion

The synthesis of ligand **NH** was prepared by adapting the previous method [49]. Typically, as shown in Scheme 1, 5-nitroisatin was refluxed with 2-thiophenocarboxylic hydrazide in ethanol under acidic conditions using sulfuric acid to give ligand **NH** in 92% yield. Figure 1 shows the FT-IR spectrum of the ligand **NH**, **SBA-15, SBA-15/APTES** and the hybrid materials **SBA-15/APTES-NH**. The vibration peaks at 3149 and 1529 $cm^{-1}$ were assigned to N-H and C=N functional groups, indicating the formation of Schiff base as the ligand **NH**. Other important vibration peaks of the ligand **NH** were identified at 1662 and 1340 $cm^{-1}$ for carbonyl (C=O) and C=C aromatic groups. Moreover, the $^1$H-NMR spectrum shows a singlet signal of NH hydrazide proton at chemical shift ($\delta$) of 13.12 ppm and NH isatin proton at $\delta$ of 11.93 ppm. In addition, aromatic protons have shown their signals at $\delta$ of 7.15, 7.31, 7.97, 8.10, 8.29 and 8.30 ppm with a number of protons for 6H from isatin and thiophene rings. Mass spectrum shows the molecular ion peaks $[M+H]^+$ at *m/z* 317.3164 Da and $[M+Na]^+$ at *m/z* 339.3615 Da. The calculation of exact mass for ligand **NH** shows the molecular ion peaks $[M+H]^+$ at *m/z* 317.3000 Da and $[M+Na]^+$ at *m/z* 339.2818 Da that are closed to the observed ones. These results confirm that the ligand **NH** has been successfully formed.

In the synthesis of hybrid nanomaterial, the unmodified **SBA-15** was firstly characterized using FT-IR spectrometer. It showed the vibration bands at 3300-3750, 1080, 970-950 and 461 $cm^{-1}$ for OH, Si–O–Si, Si–OH, and Si–O, respectively. When compared with **SBA-15**, the intensity of silanol groups at 3467 $cm^{-1}$ was decreased in **SBA-15/APTES** concomitant with increasing intensity of N-H bands of the **APTES** aminopropyl groups. Besides that, the presence of original vibration bands in the range of 2881–2990 $cm^{-1}$ for stretching of methylene vibrations from the propyl chain were still observed, indicating the successful grafting of **APTES** with **SBA-15** to give **SBA-15/APTES**. Moreover, since the characteristics of vibration peaks for ligand **NH** and **SBA-15/APTES** were still observed, the ligand **NH** was successfully grafted onto the surface of **SBA-15/APTES** to give **SBA-15/APTES-NH**.

Figure 2 shows the fluorescent studies of ligand **NH** and hybrid material **SBA-15/APTES-NH**. The fluorescence of these hybrid materials appears at a definite excitation wavelength because the ligand **NH** can produce strong fluorescence. Commonly, **SBA-15** did not show fluorescence

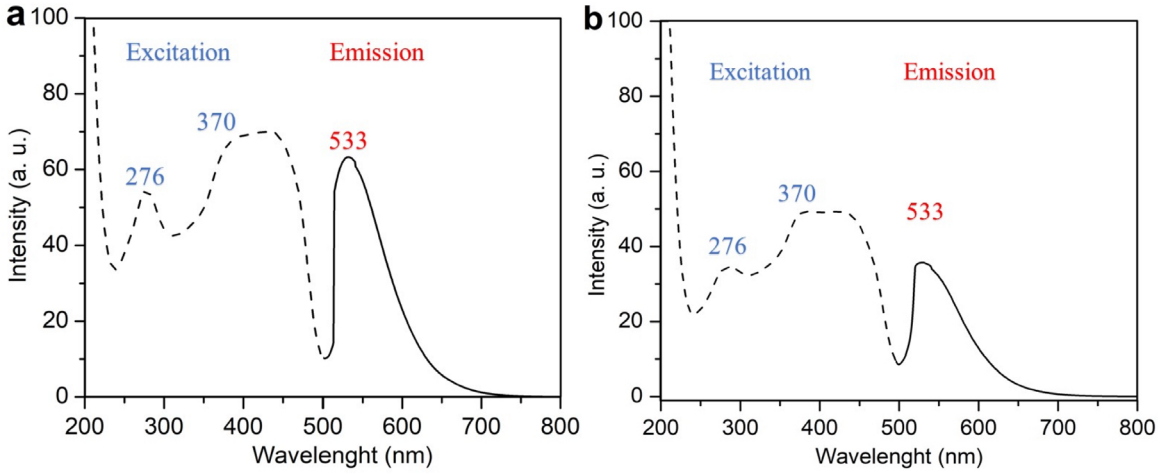



**Figure 2:** Excitation (dash line) and emission (straight line) spectrum of (a) ligand **NH** and (b) hybrid material **SBA-15/APTES-NH**.

due to the absence of chromophore groups. By excitation at 276 and 370 nm for the ligand **NH**, it gave emission peaks centered at 308 and 533 nm from respective isatin and thiophene chromophores [47,50]. By using the same excitation peaks, the monitoring spectrum for the hybrid materials showed the same narrow and intense emission peak. Such small decrease in the emission intensity in the hybrid material can be observed due to the degree of loading for the organic moieties not only onto the surface but also in the silicate channels as found in many reports of functionalization mesoporous silica with functional groups [51].

The sensing properties of **SBA-15/APTES-NH** were conducted by the solid method. Solid methods or solid-contact have major advantages such as minimizing waste from organic solvents when compared to chemosensors which were used as organic solvents such as dimethylsulfoxide and acetonitrile [52,53]. Besides that, the organic solvent can interfere with the sensing process and change the responsive optical properties of certain chemosensors [54]. Figure 3 shows that the changes in excitation and emission properties of hybrid material **SBA-15/APTES-NH** after getting mixed with the solution of 100 mM metal ions ($Ca^{2+}$, $Co^{2+}$, $Cu^{2+}$, $Fe^{3+}$, $K^{+}$, $Mg^{2+}$, $Mn^{2+}$, and $Zn^{2+}$). By using the same excitation for monitoring emission properties of the hybrid material, it was found that the **SBA-15/APTES-NH** showed a decrease in its emission intensities for $Fe^{3+}$ in 77% (Figure 3a) and 84% (Figure 3b) at 276 and 374 nm. In this case, $DI/I_0$ described as the sensing capability of the host (**SBA-15/APTES-NH**) for sensing same guest (metal ions) [25,55] where the value $\Delta I$ is $I\text{-}I_0$, ($I_0$ is the fluorescent intensity for the only composite **SBA-15/APTES-NH** while I is the fluorescent intensity for the sensor with metal ions). As can be seen in Figure 4a, the largest $\Delta I/I_0$ (approximately 0.84) is observed in the presence of $Fe^{3+}$, whereas a small change was observed in the presence of other metal ions. Thus, hybrid material **SBA-15/APTES-NH** shows a remarkable sensitivity for the fluorescent chemosensor of $Fe^{3+}$ ions.

Interestingly, as shown in Figure 4a, the **SBA-15/APTES-NH** showed the second highest in the decrease of emission intensity for sensing $Cu^{2+}$ ions in 33% and 45% upon monitoring at 276 and 370 nm. Such sensing capability is almost half of the performance in the detection of $Fe^{3+}$. Of interest to the real sample, the **SBA-15/APTES-NH** was used to detect the mixture of both ions with the same concentration (100 mM) in order to evaluate the selectivity and/or interference. Since the decrease of the emission intensity is between the response of the hybrid chemosensor for sensing sample containing $Cu^{2+}$ and $Fe^{3+}$ ions, the presence of $Cu^{2+}$ ions in the mixture was found to reduce the performance of the hybrid material around 7% only in the detection of $Fe^{3+}$ ions (as shown in Figure 4b). From this finding, it can also be concluded that the hybrid chemosensor is more selective to detect $Fe^{3+}$ than $Cu^{2+}$ ions with only small interference to the presence of $Cu^{2+}$ ions.

The sensing capability of **SBA-15/APTES-NH** was studied by addition of various concentrations of $Fe^{3+}$ ions in the range of 50-200 mM. Figure 5a and 5b shows the changes in the emission intensities of **SBA-15/APTES-NH** upon monitoring at excitation wavelengths of 276 and 370 nm. From that evaluation, the chemosensor showed gradually quenching of its emission intensity with an increasing concentration of $Fe^{3+}$ ions up to 200 mM. Moreover, the Stern-Volmer plot (as shown in Figure 5c) with a variation of the concentration indicates that the

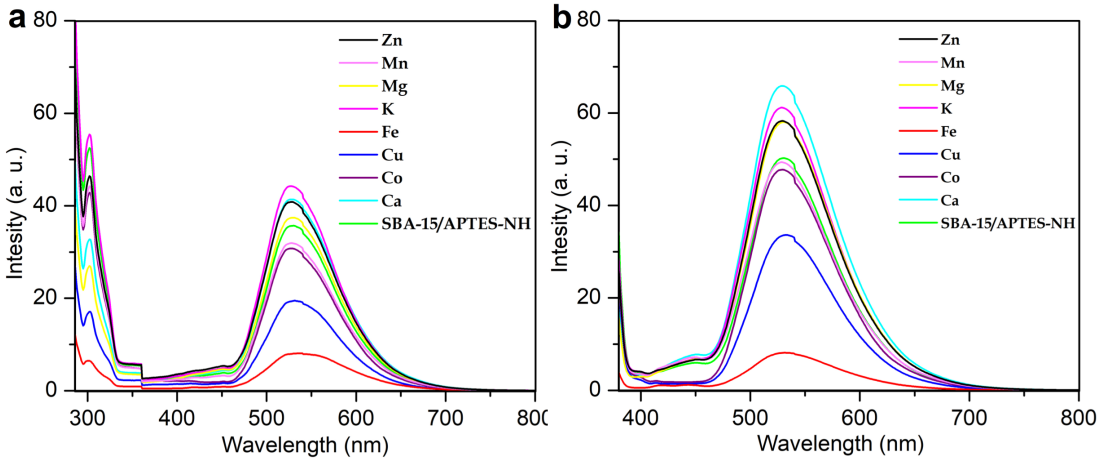



**Figure 3:** Emission spectral changes of the hybrid material **SBA-15/APTES-NH** with excitation wavelengths at (a) 276 and (b) 370 nm after sensing various metal ions.

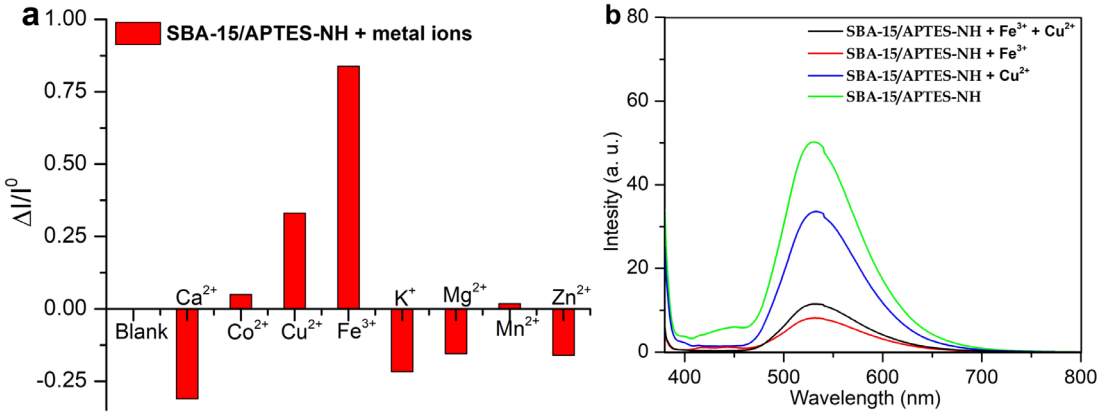



**Figure 4:** (a) Sensing capability ($DI/I_0$) of **SBA-15/APTES-NH** for the detection of various metal ions and (b) changes in emission intensity in the presence of a mixture of $Fe^{3+}$ and $Cu^{2+}$ in an equal concentration of 100 mM with an excitation at 370 nm.

changes in emission intensities upon detection of the $Fe^{3+}$ ions are linearly dependent on the increase in the concentration of the guest for both excitation wavelengths. Such changes can be identified as dynamical interaction of the sensing site toward the presence of $Fe^{3+}$ ions. The limit of detection (LOD) of **SBA-15/APTES-NH** can be calculated with the equation LOD = 3 $SD/K_{sv}$ [56,57], where SD is the standard deviation of the blank signals and $K_{sv}$ is the quenching constant of Stern-Volmer. The result of SD and $K_{sv}$ is 0.006905426 and 0.0139 $mM^{-1}$, respectively. Therefore, the detection limit of **SBA-15/APTES-NH** is 1.49 mM, which indicates that the **SBA-15/APTES-NH** is potentially used for detection of $Fe^{3+}$ ions even in the lower concentration. Otherwise, the **SBA-15/APTES-NH** sensor can be potentially applied to detect $Fe^{3+}$ ions in the environmental and pharmaceutical fields [58,59]. Moreover, limit of quantification (LOQ) can be also calculated with the equation of LOQ = 10 $SD/K_{sv}$ [60]. The LOQ value of **SBA-15/APTES-NH** is 6.32 mM. By using the calibration curve as the relative emission intensity of **SBA-15/APTES-NH** at 533 nm versus $Fe^{3+}$ concentration, the quantitative analysis can be performed in the presence of real samples. In the linear range between 50 to 200 mM, the calibration curve is not straightforward with a high relative coefficient due to the inhomegenous distribution of organic moieties in the grafting with **SBA-15/APTES**. Such drawback in the loading of organic functional groups has been discussed in many reports [52]. Of interest, the good reproducibility of **SBA-15/APTES-NH** was shown with the small RSD value in 2.7 and 7.4% for both excitation wavelengths of 276 and 370 nm (Figure 5d).

Reusability testing is important factors for the development of novel chemosensors in practical applications. Previously, chemosensors for the detection

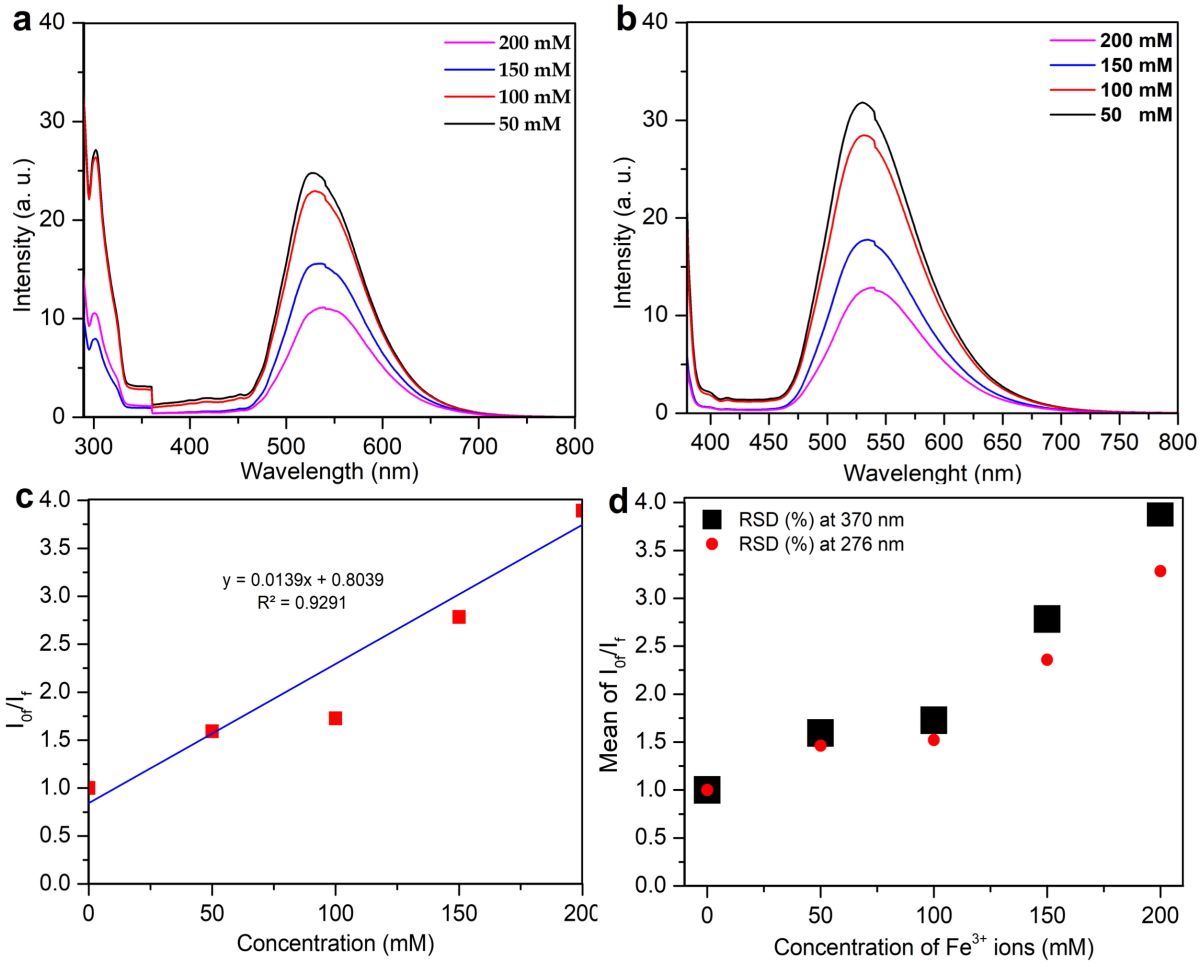



**Figure 5:** Effect of $Fe^{3+}$ concentrations on the emission spectra changes of **SBA-15/APTES-NH** at (a) 276 and (b) 370 nm and (c) Stern-Volmer plot (wavelength excitation at 370 nm) between relative emission intensity at 533 nm as well as (d) changes in emission intensity with variation concentration of $Fe^{3+}$ ions at 276 and 370 nm with SD error bars.

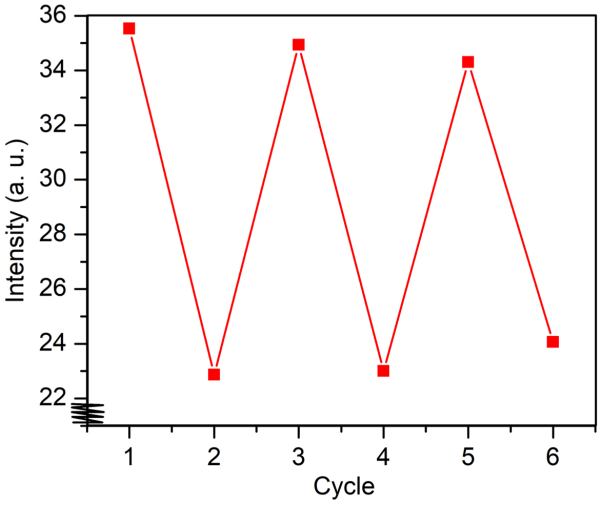



**Figure 6:** Reversibility testing with changes in fluorescent intensity of **SBA-15/APTES-NH** at 533 nm upon addition to KSCN in HCl solution.

of $Fe^{3+}$ ions based on functionalized **SBA-15** have not yet reported the reversibility testing [44,61]. In this study, the reversibility of the $Fe^{3+}$ was treated by the addition of the binding agent of potassium thiocyanate (KSCN) in hydrochloric acid (HCl) (pH = 1) to the hybrid chemosensor consisting of $Fe^{3+}$ ions. The testing was performed until the color of the solution of KSCN in HCl changes from red to a colorless solution. As shown in Figure 6, the hybrid chemosensor can be recycled up to three times with only a small decrease in the performance. Such reusability result is an important achievement for the fabrication of $Fe^{3+}$ fluorescent chemosensors.

The FT-IR spectrum of the **SBA-15/APTES-NH** with the absence and presence of $Fe^{3+}$ ions was particularly analyzed in the range of 1800-400 $cm^{-1}$ using ATR (Figure 7a). The FT-IR spectrum of **SBA-15/APTES-NH** shows characteristic vibration peaks at 1707, 1662, 1341 and 751 $cm^{-1}$, which are assigned to the vibrations of carbonyl amide,

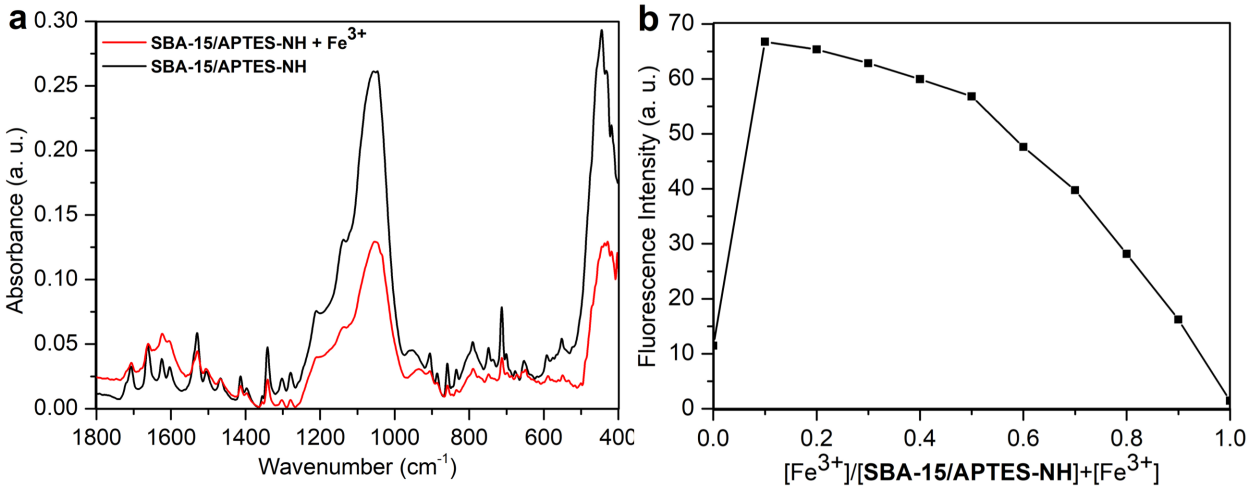



**Figure 7:** (a) FT-IR spectrum of the **SBA-15/APTES-NH** with the absence and presence of $Fe^{3+}$ ions and (b) Job's plot for $Fe^{3+}$ ions versus nett volume of ligand **NH** to $Fe^{3+}$ ion.

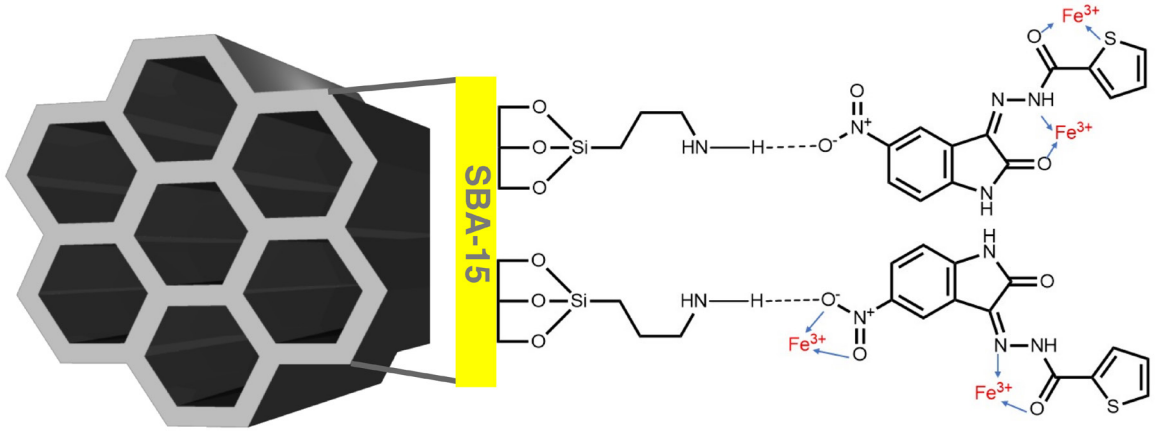



**Figure 8:** Proposed plausible mechanism for the interaction of ligand **NH** as the sensing site in the hybrid material **SBA-15/APTES-NH** for the detection of $Fe^{3+}$ ions.

C=N, C-N and C-S groups, respectively. Moreover, the vibration peak of N-H bending from isatin ring, Schiff base, and aminopropyl (from **APTES**) groups were observed at 1624, 1603, and 1530 $cm^{-1}$. Upon addition of $Fe^{3+}$ ions to the chemosensor, the N-H bending of Schiff base and C=O peaks slightly shifted with small changes in their intensities from 1707 to 1706 $cm^{-1}$, 1603 to 1605 $cm^{-1}$ and 1530 to 1529 $cm^{-1}$. In shall be noted that the vibration peak of the N-H from Schiff base was increased in 1.25 times of its intensity while vibration peak for C=N was broadened and vibration peaks for C-N and C-S were reduced significantly. Such changes clearly suggest that $Fe^{3+}$ ions have formed strong interactions with the Schiff base and thiophene ring while a weak interaction can also be possible with aminopropyl-bridged nitro isatin group [53]. Further analysis with Job's plot for binding analysis of the ligand **NH** to $Fe^{3+}$ ions in the solution phase as shown in Figure 7b confirmed that the interaction were initially closed to 1:1 of $Fe^{3+}$ ions to ligand **NH** and then gradually changed to 1:4 to form the stable binding interactions. Based on the above finding, the interactions of $Fe^{3+}$ ions with the sensing site of hybrid material **SBA-15/APTES-NH** can be proposed as shown in Figure 8.

## 4 Conclusion

The organic-inorganic hybrid **SBA-15/APTES-NH** was synthesized and characterized using the mesoporous silica **SBA-15** and the new nitroisatin (ligand **NH**). This

hybrid **SBA-15/APTES-NH** was successfully applied as a chemosensor and showed a good sensing capability towards $Fe^{3+}$ ions from its emission changes at 533 nm with an quenching phenomenon up to 84%, low LOD, and RSD as well as high reusability. From the Stern-Volmer diagram, the **SBA-15/APTES-NH** showed a linear graphic with the excitation of wavelengths at 276 and 370 nm for a good relationship of the emission changes with the increasing concentration of $Fe^{3+}$ ions. All of the obtained results suggest that the new hybrid material **SBA-15/APTES-NH** with an intense and narrow emission peak is a potential fluorescent chemosensor for the detection of $Fe^{3+}$ ions.

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**Conflict of interest:** Authors declare no conflict of interest.

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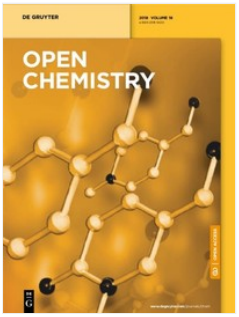


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# Volume 17 (2019): Issue 1 (Jan 2019)

in Open Chemistry

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Wen-Lan Li, Jing-Xin Ding, Jing Bai, Yang Hu, Hui Song, Xiang-Ming Sun and Yu-Bin Ji

Pages: 1–12 | Published online: 08 Jan 2019


ABSTRACT

LC technology is a recognized method used worldwide to evaluate the quality of traditional Chinese medicines (TCM). The quality of TCM has a d

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**Efficacy of *Pyrus elaeagnifolia* subsp. *elaeagnifolia* in acetic acid–induced colitis model**

Mert Ilhan, Esra Küpeli Akkol, Hakkı Taştan, Fatma Tuğçe Gürağaç Dereli and Ibrahim Tümen

Pages: 13–22 | Published online: 08 Jan 2019


ABSTRACT

In Turkish folk medicine, the fruits of *Pyrus elaeagnifolia* subsp. *elaeagnifolia* have been used to treat diarrhea and detoxify poisonous

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**Anti-inflammatory and antinociceptive features of *Bryonia alba* L.: As a possible alternative in treating rheumatism**

Mert Ilhan, Fatma Tuğçe Gürağaç Dereli, Ibrahim Tümen and Esra Küpeli Akkol

Pages: 23–30 | Published online: 05 Jan 2019


ABSTRACT

*Bryonia* species have traditionally been used as a diuretic and laxative, to reduce edema and relieve joint pain. *B. alba* roots are used especia

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**High efficiency liposome fusion induced by reducing undesired membrane peptides interaction**

Tingting Zheng, Yun Chen, Yu Shi and Huanhuan Feng

Pages: 31–42 | Published online: 22 Feb 2019


ABSTRACT

A full membrane fusion model which attains both complete lipid mixing and content mixing liposomal membranes mediated by coiled-coil forming lip

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**Prediction of the Blood-Brain Barrier Permeability Using RP-18 Thin Layer Chromatography**

Anna W. Sobańska, Karolina Wanat and Elżbieta Brzezińska

Pages: 43–56 | Published online: 02 Feb 2019


ABSTRACT

The Blood-Brain Barrier (BBB) permeability is an important factor governing a drug's ability to act upon the Central Nervous System. The measure o

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**Phytic Acid Extracted from Rice Bran as a Growth Promoter for *Euglena gracilis***

Jiangyu Zhu, Dang Diem Hong and Minato Wakisaka

Pages: 57–63 | Published online: 11 Mar 2019

ABSTRACT

A significant promotion of growth and accumulation of metabolites of freshwater microalga *Euglena gracilis* was obtained by adding phytic acid

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**Development of a validated spectrofluorimetric method for assay of sotalol hydrochloride in tablets and human plasma: application for stability-indicating studies**

Fawzia A. Ibrahim, Amina M. El-Brashy, Mohamed I. El-Awady and Nora. A. Abdallah

Pages: 64–74 | Published online: 23 Feb 2019

ABSTRACT

The native fluorescence of sotalol hydrochloride (SOT) was used as a basis for establishing a new method of analysis for SOT in tablets and spiked

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**Topological Indices of Hyaluronic Acid-Paclitaxel Conjugates' Molecular Structure in Cancer Treatment**

Lina Zheng, Yiqiao Wang and Wei Gao

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ABSTRACT

A large number of medical experiments have confirmed that the features of drugs have a close correlation with their molecular structure. Drug pr

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Mohammad Sattari and Leila Mahdavian

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ABSTRACT

Saturated pool boiling in a two-component water-ethanol solution was studied at a pressure of one atmosphere in a horizontal stainless steel c

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**Critical Roles of the PI3K-Akt-mTOR Signaling Pathway in Apoptosis and Autophagy of Astrocytes Induced by Methamphetamine**

Han-Qing Liu, Ya-Wen An, A-Zhen Hu, Ming-Hua Li, Jue-Lian Wu, Li Liu, Yu Shi, Guang-Hui Cui and Yun Chen

Pages: 96–104 | Published online: 22 Feb 2019

ABSTRACT

This study aimed to reveal potential roles of the phosphatidylinositol 3 kinase (PI3K)-protein kinase B (Akt)-mammalian target of rapamy

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**Characteristics of Stable Hydrogen and Oxygen Isotopes of Soil Moisture under Different Land Use in Dry Hot Valley of Yuanmou**

Jiao-Jiao Han, Xu Duan, Yang-Yi Zhao and Meng Li

Pages: 105–115 | Published online: 22 Feb 2019

ABSTRACT

Soil moisture, stable hydrogen, and oxygen isotopes were sampled and determined in a demonstration area of soil and moisture conservation at th

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**Specific, highly sensitive and simple spectrofluorimetric method for quantification of daclatasvir in HCV human plasma patients and in tablets dosage form**

Ramadan Ali and Mohamed M Elsutohy

Pages: 116–126 | Published online: 22 Feb 2019

ABSTRACT

A simple, selective and highly sensitive spectrofluorimetric method for the quantitative detection of an antiviral drug, daclatasvir (DCV) has been

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**Chromium-modified cobalt molybdenum nitrides as catalysts for ammonia synthesis**

Paweł Adamski, Marlena Nadziejko, Agata Komorowska, Adam Sarnecki, Aleksander Albrecht and Dariusz Moszyński

Pages: 127–131 | Published online: 29 Mar 2019

ABSTRACT

The influence of chromium compounds on the properties of cobalt molybdenum nitrides was studied. $CoMoO_4$ obtained by precipitation from cobalt a

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**Langerhans cell-like dendritic cells treated with ginsenoside $Rh_2$ regulate the differentiation of Th1 and Th2 cells *in vivo***

Ying Liu, Qian Wu, Peng Li, Weijie Liu, Yongri Jin, Xuwen Li and Xiaolei Shi

Pages: 142–150 | Published online: 29 Mar 2019

ABSTRACT

Ginsenoside $Rh_2$ is one of the rare ginsenosides extracted from *Panax ginseng* C. A. Mey. The anti-allergic activity of ginsenoside $Rh_2$ has been do

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**Identification of Powdery Mildew *Blumeria graminis* f. sp. *tritici* Resistance Genes in Selected Wheat Varieties and Development of Multiplex PCR**

Agnieszka Tomkowiak, Roksana Skowrońska, Dorota Weigt, Michał Kwiatek, Jerzy Nawracała, Przemysław Łukasz Kowalczewski and Mateusz Pluta

Pages: 157–165 | Published online: 22 Mar 2019

ABSTRACT

The aim of the study was to identify the *Pm2*, *Pm3a*, *Pm4b* and *Pm6* genes and to develop multiplex PCR reaction conditions to reduce time and lim

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**Computational Analysis of new Degree-based descriptors of oxide networks**

Zafar Hussain, Mobeen Munir, Muhammad Bilal, Alam Ameer, Shazia Rafique and Shin Min Kang

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ABSTRACT

Oxide networks have diverse applications in the polymer and pharmaceutical industries. Polynomials and degree-based topological indices have tenden

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**The Use Of Chemical Composition And Additives To Classify Petrol And Diesel Using Gas Chromatography–Mass Spectrometry And Chemometric Analysis: A Uk Study**

Praew Suppajariyawat, Ana Flavia Belchior de Andrade, Mathieu Elie, Mark Baron and Jose Gonzalez-Rodriguez

Pages: 183–197 | Published online: 29 Mar 2019

ABSTRACT

The identification of the fuel found in a crime scene and establishing its source is important for forensic investigations. In this study petrol

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**Minimal Energy Tree with 4 Branched Vertices**

Saira Hameed and Uzma Ahmad

Pages: 198–205 | Published online: 03 Apr 2019

ABSTRACT

The energy of a graph is defined as the sum of absolute values of the eigenvalues of its adjacency matrix. Let $\Omega(n,4)$ be the class of all tree

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**Jatropha seed oil derived poly(esteramide-urethane)/ fumed silica nanocomposite coatings for corrosion protection**

Manawwer Alam, Naser M Alandis, Naushad Ahmad, Mohammad Asif Alam and Eram Sharmin

Pages: 206–219 | Published online: 10 Apr 2019

ABSTRACT

Jatropha oil [JO] based poly (esteramide-urethane) coatings embedded with fumed silica nanoparticles were prepared. JO was converted to N,N-bis(2-h

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**Calculating topological indices of certain OTIS interconnection networks**

Adnan Aslam, Safyan Ahmad, Muhammad Ahsan Binyamin and Wei Gao

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ABSTRACT

Recently, increasing attention has been paid to The Optical Transpose Interconnection System (OTIS) network because of its prospective application

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Qiang Wang and Shengli Tang

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The efficiency of thermodynamic cycles can be improved by using the optimized working fluid. In the present paper, classic molecular dynamics si

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**Velvet Antler compounds targeting major cell signaling pathways in osteosarcoma - a new insight into mediating the process of invasion and metastasis in OS**

Zhengyao Zhang, Pengfei Li, Tie Li, Changwei Zhao and Guoxiang Wang

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ABSTRACT

Velvet antler is the only renewable bone tissue of mammalian animals, which consists of a variety of growth factors, amino acids and polypeptides.

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**Effects of Azadirachta Indica Leaf Extract, Capping Agents, on the Synthesis of Pure And Cu Doped ZnO-Nanoparticles: A Green Approach and Microbial Activity**

Dawit Tamire Handago, Enyew Amare Zereffa and Bedasa Abdisa Gonfa

Pages: 246–253 | Published online: 24 Apr 2019

ABSTRACT

The current studies presented the green synthesis of zinc oxide and copper doped ZnO nanoparticles (NPs) using different ratios of Neem leaf ext

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**Aqueous Micro-hydration of $Na^+(H_2O)_{n=1-7}$ Clusters: DFT Study**

Tahoon M.A., Gomaa E.A. and Suleiman M.H.A.

Pages: 260–269 | Published online: 24 Apr 2019

ABSTRACT

Sodium ion micro-solvated clusters, $[Na(H_2O)\ n]^+$ , $n$ = 1–7, were completed by (DFT) density functional theory at B3LYP/6-311+G(d,p) level in t

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Maria Janine Juachon, Justine Grace Regala, John Matthew Marquez and Mark Xavier Bailon

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ABSTRACT

Pesticides pose a serious public health risk due to their toxicity, such as in the case of the widely distributed organophosphorus pesticide met

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**Phytochemical screening and estrogenic activity of total glycosides of *Cistanche deserticola***

Wen-Lan Li, Jing-Xin Ding, Bing-Mei Liu, Da-Lei Zhang, Hui Song, Xiang-Ming Sun, Gui-Yu Liu, Jing-Ya Wang and Yu-Bin Ji

Pages: 279–287 | Published online: 24 Apr 2019

ABSTRACT

Over the decades, there have been continuous efforts to enhance the quality of human life. Postmenopausal syndrome is a serious concern for th

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Belgin Sever, Mehlika Dilek Altıntop, Ahmet Özdemir, Nurhayat Tabanca, Alden S. Estep, James J. Becnel and Jeffrey R. Bloomquist

Pages: 288–294 | Published online: 07 Jun 2019

ABSTRACT

*Aedes aegypti* is associated with the transmission of numerous human and animal diseases, such as yellow fever, dengue fever, chikungunya, and mor

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**Chemical pretreatments of *Trapa bispinosa's* peel (TBP) biosorbent to enhance adsorption capacity for Pb(II)**

Muhammad Nadeem Zafar, Muzna Saeed, Raziya Nadeem, Sajjad Hussain Sumrra, Syed Salman Shafqat and Muhammad Abdul Qayyum

Pages: 325–336 | Published online: 24 Apr 2019

ABSTRACT

In this study, *Trapa bispinosa's* peel (TBP) biomass is exploited as an effective, low cost and new adsorbent to remove Pb(II) from aqueous solution

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**Dynamic Changes in MMP1 and TIMP1 in the Antifibrotic Process of Dahuang Zhechong Pill in Rats with Liver Fibrosis**

Jiayu Lin, Chaowen Deng, Yanzhong Peng, Jie Zheng, Liya Wei, Yu Shi, Zhenghua Gong and Guoxin Hu

Pages: 346–356 | Published online: 01 Jun 2019

ABSTRACT

On the basis of carbon tetrachloride ($CCl_4$)induced liver fibrosis in rats, this study aims to investigate the dynamic chang

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**The Optimization and Production of Ginkgolide B Lipid Microemulsion**

Xiao Wu, Zhenpeng Wang, Zhenwen Zhao, Lei Chen, Fengyun Tao, Qian Zhang, Tuo Zhou, Junpu Cui, Meng Liu and Qing Huo

Pages: 357–364 | Published online: 07 Jun 2019

ABSTRACT

In this study, we introduce a method to formulate Ginkgolide B lipid microemulsion (GB-LM). We have assessed its general characteristics and pharma

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**Photodynamic Therapy Enhanced the Antitumor Effects of Berberine on HeLa Cells**

Han-Qing Liu, Ya-Wen An, A-Zhen Hu, Ming-Hua Li and Guang-Hui Cui

Pages: 413–421 | Published online: 12 Jun 2019

ABSTRACT

In this study we investigated the antineoplastic effects of Berberine (BBR)-mediated photodynamic therapy (PDT) on HeLa cells and its related mecha

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**Chiral and Achiral Enantiomeric Separation of (±)-Alprenolol**

M.M. López Guerrero, A. Navas Díaz, F. García Sánchez and H. Corrall

Pages: 429–437 | Published online: 12 Jun 2019

ABSTRACT

The chiral separation of enantiomers is crucial for pharmacovigilance within drug discovery. Although a large number of prescribed medicati

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**Correlation of Water Fluoride with Body Fluids, Dental Fluorosis and $FT_4$, $FT_3$ –TSH Disruption among Children in an Endemic Fluorosis area in Pakistan**

Sadia Zulfiqar, Shafiq ur Rehman, Humayun Ajaz, Shan Elahi, Waheed uz Zaman, Nayyab Batool and Farhat Yasmeen

Pages: 465–474 | Published online: 01 Jul 2019

ABSTRACT

In the present study 134 children were studied for comparison and correlation between an endemic fluorotic village Rukh Mudke (RM), $n = 7$

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**A one-step incubation ELISA kit for rapid determination of dibutyl phthalate in water, beverage and liquor**

Quing Sun, Yanli Chen, Fuxue Li, Minghong Jia and Guoqing Shi

Pages: 392–400 | Published online: 08 Jul 2019

ABSTRACT

A one-step incubation ELISA kit based on monoclonal antibody against dibutyl phthalate (DBP) was developed. After optimizing concentrations of coat

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**Free Radical Scavenging Activity of Essential Oil of *Eugenia caryophylata* from Amboina Island and Derivatives of Eugenol**

Hanoch Julianus Sohilait and Healthy Kainama

Pages: 422–428 | Published online: 08 Jul 2019

ABSTRACT

Essential oil from *Eugenia caryophylata* was normally used to heal many different deseaces. Various chemical compositions of essential oil d

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Xiao-Xue Fan, Feng Xue, Bo Song, Long-Zheng Chen, Gang Xu and Hai Xu

Pages: 456–464 | Published online: 12 Jul 2019

ABSTRACT

This study investigated the effects of blue and red light on metabolites of nitrate, key enzymes, and the gene expression of key enzymes in pakchoi

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**miRNA-199a-5p functions as a tumor suppressor in prolactinomas**

Wang Jichao, Guo Jing, Wang Fei, Cao Lei, Liu Qian, Feng Jie, Wang Hongyun, Gao Hua and Zhang Yazhuo

Pages: 506–515 | Published online: 13 Jul 2019

ABSTRACT

Prolactinomas are the most frequently observed pituitary adenomas (PAs), and 5%–18% tumors were resistant to the dopamine agonists (DAs). Micro

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**Solar photodegradation of carbamazepine from aqueous solutions using a compound parabolic concentrator equipped with a sun tracking system**

Ahmadreza Yazdanbakhsh, Reza Nemati, Mohamadreza Massoudinejad, Mohamadjavad Jafari and Masoomeh Dashtdar

Pages: 477–484 | Published online: 27 Aug 2019

ABSTRACT

The primary purpose of this study was to investigate the efficiency of a Compound Parabolic Concentrator (CPC) equipped with a sun tracking sys

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**Influence of sub-inhibitory concentration of selected plant essential oils on the physical and biochemical properties of *Pseudomonas orientalis***

Katarzyna Leja, Agnieszka Drożdżyńska, Małgorzata Majcher, Przemysław Łukasz Kowalczewski and Katarzyna Czaczyk

Pages: 492–505 | Published online: 19 Jul 2019

ABSTRACT

Plant essential oils have bacteriostatic activity in very low concentrations, thus they can be used as natural preservative in food products. Th

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**Preparation and spectroscopic studies of Fe(II), Ru(II), Pd(II) and Zn(II) complexes of Schiff base containing terephthalaldehyde and their transfer hydrogenation and Suzuki-Miyaura coupling reaction**

Nevin Turan, Kenan Buldurun, Naki Çolak and İsmail Özdemir

Pages: 571–580 | Published online: 25 Sep 2019

ABSTRACT

This study describes synthesis, spectroscopic characterization and catalytic activities of Fe(II), Ru(II), Pd(II) and Zn(II) complexe

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**Complex formation in a liquid-liquid extraction-chromogenic system for vanadium(IV)**

Kiril B. Gavazov, Vassil B. Delchev, Nikolina P. Milcheva and Galya K. Toncheva

Pages: 599–608 | Published online: 25 Sep 2019

ABSTRACT

The azo dye 4-(2-thiazolylazo)orcinol (TAO) and the cationic ion-pair reagent 2,3,5-triphenyl-2*H*-tetrazolium chloride (TTC) were examined as constit

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**Synthesis, characterization (IR, $^{1}H$, $^{13}C$ & $^{31}P$ NMR), fungicidal, herbicidal and molecular docking evaluation of steroid phosphorus compounds**

Mahboob Alam, Youngwon Kim and Soonheum Park

Pages: 621–628 | Published online: 27 Aug 2019

ABSTRACT

Phosphorus containing steroidal derivatives such as 3β-oxo-[diazaphosphalidine-2'-one] stigmast-5-ene and 3β-oxo-[diazaphosphalidine-2'-one

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**Analysis and Biological Evaluation of Arisaema Amuremse Maxim Essential Oil**

Guiying Li, Yueyao Jiang, Yingjun Li, Tong He, Ying Wang, Tianyi Ji, Wanchen Zhai, Lichun Zhao and Xiaoping Zhou

Pages: 647–654 | Published online: 25 Sep 2019

ABSTRACT

The chemical composition and antitumor activity of essential oil were compared for four parts of the Arisaema Amuremse Maxim. Chemical constituent o

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**A preliminary assessment of potential ecological risk and soil contamination by heavy metals around a cement factory, western Saudi Arabia**

Mohsen M. El-Sherbiny, Ali I. Ismail and Mohamed E. EL-Hefnawy

Pages: 671–684 | Published online: 25 Sep 2019

ABSTRACT

Twenty surface soil samples (0-10 cm) and shoots of a perennial shrub *Zygophyllum coccineum* L. were collected around a cement factory on the

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**Anti- inflammatory effect of Prunus tomentosa Thunb total flavones in LPS-induced RAW264.7 cells**

Chen Xi, Liu Yuanyuan, Zhao Dongshuang, Fan Ziwei, Cao Shuang, Chen Jianguang and Zhang Chengyi

Pages: 685–693 | Published online: 25 Sep 2019

ABSTRACT

In this research, we investigated possible anti-inflammatory roles of Prunus tomentosa Thunb Total Flavones (PTTTF) in LPS-induced RAW264.7 cells.

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**Collaborative Influence of Elevated $CO_2$ Concentration and High Temperature on Potato Biomass Accumulation and Characteristics**

Yao Yubi, Lei Jun, Niu Haiyang and Zhang Xiuyun

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ABSTRACT

An experiment with OTC (Open-top Chamber) was conducted to study the influence of elevated $CO_2$ concentration and high temperature on potato yield

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**Methods of extraction, physicochemical properties of alginates and their applications in biomedical field – a review**

Magdalena Beata Łabowska, Izabela Michalak and Jerzy Detyna

Pages: 738–762 | Published online: 29 Oct 2019

ABSTRACT

In this paper, the current state-of-art of extraction of alginates and the determination of their physico-chemical properties as well as their

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**Characteristics of liposomes derived from egg yolk**

Anna Kondratowicz, Marek Weiss, Wojciech Juzwa, Łukasz Majchrzycki and Grażyna Lewandowicz

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ABSTRACT

Liposomes are nanocapsules successfully applied in pharmacy and medicine. Their usage in the food industry could be increased by the development o

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**Preparation of ternary ZnO/Ag/cellulose and its enhanced photocatalytic degradation property on phenol and benzene in VOCs**

Xiao-Hang Zou, Si-Wei Zhao, Ji-Guo Zhang, Hui-Liang Sun, Qing-Jiang Pan and Yuan-Ru Guo

Pages: 779–787 | Published online: 25 Sep 2019

ABSTRACT

The ZnO/Ag/cellulose composite (ZAC) with excellent photocatalytic activity of degrading benzene and phenol in VOCs has been successfully

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**Influence of Human Serum Albumin Glycation on the Binding Affinities for Natural Flavonoids**

Liangliang Liu, Yi Liu, Aiping Xiao, Shiyong Mei and Yixi Xie

Pages: 806–812 | Published online: 02 Oct 2019

ABSTRACT

Increasing the degree of glycation in diabetes could affect the ability of plasma proteins in binding to small molecules and active compounds. In

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**Synthesis and antioxidant activity of 2-methylthio-pyrido[3,2-*e*][1,2,4] triazolo[1,5-*a*]pyrimidines**

Hatem A. Abuelizz, Hanan A.A. Taie, Mohamed Marzouk and Rashad Al-Salahi

Pages: 823–830 | Published online: 12 Oct 2019

ABSTRACT

A series of 2-methylthio-pyrido-triazolopyrimidines (**1**-**17**) were prepared by the reaction of dimethyl-*N*-cyanoimidodithiocarbonate with hydr

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**Comparative study on the antioxidant activities of ten common flower teas from China**

Xiao-Fang Hu, Zong-Bao Ding, Yue Chen, Jiang-Fu Luo, Jian-Min He and Tian-Peng Yin

Pages: 841–848 | Published online: 16 Oct 2019

ABSTRACT

Flower teas are widely consumed across the world because of their beneficial health effects. The antioxidant activities of methanol extracts from

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**Molecular Properties of Symmetrical Networks Using Topological Polynomials**

Xing-Long Wang, Jia-Bao Liu, Maqsood Ahmad, Muhammad Kamran Siddiqui, Muhammad Hussain and Muhammad Saeed

Pages: 849–864 | Published online: 29 Oct 2019

ABSTRACT

A numeric quantity that comprehend characteristics of molecular graph $\Gamma$ of chemical compound is known as topological index. This number is,

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**Synthesis of $Co_3O_4$ Nano Aggregates by Co-precipitation Method and its Catalytic and Fuel Additive Applications**

Muhammad Ramzan Saeed Ashraf Janjua

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ABSTRACT

The nano aggregates of cobalt oxide ($Co_3O_4$) are synthesized successfully by adopting simple a co precipitation approach. Th

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**Phytochemical analysis, Antioxidant and Antiprotoscolices potential of ethanol extracts of selected plants species against *Echinococcus granulosus*: In-vitro study**

Sumbal Haleem, Sadaf Niaz, Naveeda Akhtar Qureshi, Riaz Ullah, Hafiz Majid Mahmood and Abdelaaty A. Shahat

Pages: 874–883 | Published online: 16 Oct 2019

ABSTRACT

Cystic Echinococossis is a serious zoonotic parasitic infection caused by *Echinococcus granulosus* species complex. The current study was des

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**Silver nanoparticles enhanced fluorescence for sensitive determination of fluoroquinolones in water solutions**

Hongling Wang, Xuejing Si, Tunhua Wu and Ping Wang

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ABSTRACT

A new type of silver nanoparticle (AgNPs) was prepared with simple and fast methods and low-toxic compounds. With the addition of different concent

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Abdulsallam Bakdash

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ABSTRACT

A gas chromatography-mass spectrometry (GC-MS) method for simultaneous quantification of 3-fluoromethcathinone (3-FMC), (±)-3-fluorophenmetrazin

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**Biodiesel Production by Lipids From Indonesian strain of Microalgae *Chlorella vulgaris***

Purkan Purkan, Ersalina Nidianti, Abdulloh Abdulloh, Abdillah Safa, Wiwin Retnowati, Wiwie Soemarjati, Hamida Nurlaila and Seung Wook Kim

Pages: 919–926 | Published online: 29 Oct 2019

ABSTRACT

The fatty acid methyl ester (FAME) production from *Chlorella vulgaris* has been studied by sequential investigation such as microalgae cul

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**Miscibility studies of polystyrene/polyvinyl chloride blend in presence of organoclay**

Jumaa Aseeri, Naser M. Alandis, Waffa Mekhamer and Manawwer Alam

Pages: 927–935 | Published online: 29 Oct 2019

ABSTRACT

Polystyrene (PS)/ polyvinyl chloride (PVC) blends of different compositions, with and without organoclay (OC) were prepared by a solution ca

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**Antibacterial Activities of Transition Metal complexes of Mesocyclic Amidine 1,4-diazacycloheptane (DACH)**

Sadia Rehman, Muhammad Ikram, Fazle Subhan, Mutasem Sinnokrot and Waliullah Khan

Pages: 936–942 | Published online: 23 Oct 2019

ABSTRACT

The titled compound 1,4-diazacycloheptane have vibrational freedom which allows it to coordinate to metal through 1$^{st}$ and 4$^{th}$ positions. Copper (

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**Novel 1,8-Naphthyridine Derivatives: Design, Synthesis and *in vitro* screening of their cytotoxic activity against MCF7 cell line**

Abeer N. Al-romaizan, Thoraya S. Jaber and Nesreen S. Ahmed

Pages: 943–954 | Published online: 06 Nov 2019

ABSTRACT

A series of new 2-phenyl-7-methyl-1,8-naphthyridine derivatives with variable substituents at C3 were synthesized for an *in vitro* evaluatio

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**Investigation of Stress Corrosion Cracking Behaviour of Mg-Al-Zn Alloys in Different pH Environments by SSRT Method**

Recep Catar and Hikmet Altun

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ABSTRACT

In this study, stress corrosion behaviors of AZ31, AZ61 and AZ91 Mg alloys which contain different amounts of Al were investigated under acidic, ba

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**Various Combinations of Flame Retardants for Poly (vinyl chloride)**

Ayşe Çetin, S.Gamze Erzengin and F. Burcu Alp

Pages: 980–987 | Published online: 06 Nov 2019

ABSTRACT

Various combinations of zinc borate (ZB), alumina trihydrate (ATH) and magnesium hydroxide (MH) were used to retard the flammability of PVC composi

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**Phenolic compounds and biological activities of rye (*Secale cereale* L.) grains**

Katarína Kulichová, Jozef Sokol, Peter Nemeček, Mária Maliarová, Tibor Maliar, Michaela Havrlentová and Ján Kraic

Pages: 988–999 | Published online: 31 Oct 2019

ABSTRACT

The rye flour is, together with the wheat flour, the basic ingredient used in traditional bread baking. The rye grain contains many compounds wit

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**Oxidative degradation of gentamicin present in water by an electro-Fenton process and biodegradability improvement**

Mohamed Réda Arhoutane, Muna Shueai Yahya, Miloud El Karbane and Kacem El Kacemi

Pages: 1017–1025 | Published online: 13 Nov 2019

ABSTRACT

In the context of environmental protection, where there is a need to develop effective operations for carrying out appropriate treatment of pollute

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**Optimizing Suitable Conditions for the Removal of Ammonium Nitrogen by a Microbe Isolated from Chicken Manure**

Yan Zhang, Chun-Yan Fu, Xin-Hua Li, Pei-Pei Yan, Tian-Hong Shi, Jia-Qiang Wu, Xiang-Fa Wei and Xue-Lan Liu

Pages: 1026–1033 | Published online: 13 Nov 2019

ABSTRACT

Strain C was isolated from chicken manure, and its phenotypic characteristics were gram-stain negative, yellow-pigmented, aerobic bacteri

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**Anti-inflammatory, antipyretic, analgesic, and antioxidant activities of *Haloxylon salicornicum* aqueous fraction**

Riaz Ullah, Mansour S. Alsaid, Ali S. Alqahtani, Abdelaaty A. Shahat, Almoqbil A. Naser, Hafiz Majid Mahmood, Syed Rizwan Ahamad, Abdullah A. Al-Mishari and Shabir Ahmad

Pages: 1034–1042 | Published online: 13 Nov 2019

ABSTRACT

The medicinal plant *Haloxylon salicornicum* is utilized for therapeutic purposes. We previously reported the antioxidant potential of hexane fr

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**The anti-corrosion behaviour of *Satureja montana L.* extract on iron in NaCl solution**

Zora Pilić, Ivan Dragičević and Ivana Martinović

Pages: 1087–1094 | Published online: 10 Dec 2019

ABSTRACT

The effect of *Satureja montana L.* extract (SM) and phenolic fraction of *Satureja montana* L. (PF) on the corrosion behaviour of iron in 0.1 mol $L^{-1}$

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**Interleukin-4, hemopexin, and lipoprotein-associated phospholipase A2 are significantly increased in patients with unstable carotid plaque**

Peter Stefanic, Vladimir Sihotsky, Zdenka Hertelyova, Ivan Kopolovets, Abraham John Mathews, Stefan Toth, Maria Kubikova, Peter Svajdler, Rastislav Mucha, Lukas Vasko, Michal Virag, Vit Pribula, Dominik Pella and Maria Frankovicova

Pages: 1105–1115 | Published online: 06 Dec 2019

ABSTRACT

Objective

This study aimed to compare the plasma levels of lipoprotein-associated phospholipase A2 (Lp-PLA2), hemopexin (Hpx), and interleukin-4 (

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**A comparative study of the crystal structures of 2-(4-(2-(4-(3-chlorophenyl)pipera -zinyl)ethyl) benzyl)isoindoline-1,3-dione by synchrotron radiation X-ray powder diffraction and single-crystal X-ray diffraction**

Jin-Hui Zhou, Mao-Jian Shi, Lin Ding, Guo-Qiang ShangGuan and Jun Xu

Pages: 1116–1123 | Published online: 06 Dec 2019

ABSTRACT

The crystal structures of the title compound, $C_{27}H_{26}ClN_3O_2$, were established by single-crystal X-ray diffraction and synchrotron rad

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**Conceptual DFT as a Novel Chemoinformatics Tool for Studying the Chemical Reactivity Properties of the Amatoxin Family of Fungal Peptides**

Norma Flores-Holguín, Juan Frau and Daniel Glossman-Mitnik

Pages: 1133–1139 | Published online: 10 Dec 2019

ABSTRACT

The chemical structures and molecular reactivities of the Amatoxin group of fungi-derived peptides have been determined by means of the considera

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**Occurrence of Aflatoxin M1 in Milk-based Mithae samples from Pakistan**

Narjis Naz, Mateen Abbas, Anam Rubab and Kinza Kanwal

Pages: 1140–1145 | Published online: 18 Dec 2019

ABSTRACT

Milk products with aflatoxin M1 (AFM1) contamination are a lethal dilemma worldwide due to their carcinogenic and mutagenic effects especially in

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**Kinetics of Iron Removal From Ti-Extraction Blast Furnace Slag by Chlorination Calcination**

Siqi He, Tongjiang Peng, Hongjuan Sun, Dongshan Luo, Qing Xiao and Qian Geng

Pages: 1146–1156 | Published online: 18 Dec 2019

ABSTRACT

In this research, ammonium chloride was used to calcine Ti-extraction blast furnace slag (EBFS) with the aim of removing iron from it. The inf

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**Increasing the activity of DNAzyme based on the telomeric sequence: 2'-OMe-RNA and LNA modifications**

J. Kosman, K. Żukowski and B. Juskowiak

Pages: 1157–1166 | Published online: 19 Dec 2019

ABSTRACT

2'-OMe-RNA analogues and LNA point modifications of DNA oligonucleotides were applied for the modulation of the G-quadruplex topology and enha

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**Exploring the optoelectronic properties of a chromene-appended pyrimidone derivative for photovoltaic applications**

Mohammed A. Assiri

Pages: 1167–1172 | Published online: 18 Dec 2019

ABSTRACT

In the present study, a chromene-appended pyrimidone derivative (**PBA**) has been synthesized in order to account for the relationship between

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**Effect of He Qi San on DNA Methylation in Type 2 Diabetes Mellitus Patients with Phlegm-blood Stasis Syndrome**

Chu Shufang, Zhou Yinan, Li Huilin, Zhao Hengxia, Liu Deliang and Liu Xuemei

Pages: 1213–1221 | Published online: 31 Dec 2019

ABSTRACT

This study was performed to elucidate the potential influence of He Qi San (HQS) on glucose and lipid metabolism in type 2 diabetes mellit

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**Cyclodextrin potentiometric sensors based on selective recognition sites for procainamide: Comparative and theoretical study**

Haitham AlRabiah, Atef Homoda, Ahmed Bakheit and Gamal AE Mostafa

Pages: 1222–1234 | Published online: 31 Dec 2019

ABSTRACT

Polyvinyl chloride (PVC) membrane sensors were constructed and developed for the determination of procainamide HCl (PR). Three membrane sensors i

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**Greener synthesis of dimethyl carbonate from carbon dioxide and methanol using a tunable ionic liquid catalyst**

Atul A. Pawar, Avinash A. Chaugule and Hern Kim

Pages: 1252–1265 | Published online: 31 Dec 2019

ABSTRACT

Several types of ionic liquids (ILs) performance towards dimethyl carbonate (DMC) synthesis using cheap reactant (methanol) and waste $CO_2$ which

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**Nonisothermal Cold Crystallization Kinetics of Poly(lactic acid)/Bacterial Poly(hydroxyoctanoate) (PHO)/Talc**

Omaima Alhaddad, Safaa H. El-Taweel and Yasser Elbahloul

Pages: 1266–1278 | Published online: 31 Dec 2019

ABSTRACT

The effects of bacterial poly(hydroxyoctanoate) (PHO) and talc on the nonisothermal cold crystallization behaviours of poly(lactic acid) (PLA) w

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**Enhanced adsorption of sulfonamide antibiotics in water by modified biochar derived from bagasse**

Pinzhu Qin, Dawei Huang, Rong Tang, Fangqun Gan, Ying Guan and Xiaoxiao Lv

Pages: 1309–1316 | Published online: 31 Dec 2019

ABSTRACT

In this study, biochars derived from bagasse were prepared and their ability for the adsorption of four kinds of sulfonamide antibiotics (sulfame

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**Study on the Mechanism of Shugan Xiaozhi Fang on Cells with Non-alcoholic Fatty Liver Disease**

Yufeng Xing, Chuantao Zhang, Fenfen Zhai, Tianran Zhou, Xiang Cui, Zhiyi Han, Deti Peng and Guangdong Tong

Pages: 1328–1338 | Published online: 31 Dec 2019

ABSTRACT

Cells with non-alcoholic fatty liver disease (NAFLD) were studied to determine the mechanism of liver deficiency via the AdipoR2-PPARa pathway.

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**Comparative Effects of Salt and Alkali Stress on Antioxidant System in Cotton (*Gossypium Hirsutum* L.) Leaves**

Huijuan Guo, Zhiqiang Hu, Huimin Zhang, Wei Min and Zhenan Hou

Pages: 1352–1360 | Published online: 31 Dec 2019

ABSTRACT

This pot experiment was to evaluate how salts (NaCl, $Na_2SO_4$) and alkali ($Na_2CO_3$+$NaHCO_3$) affect the physiological and biochemical characteri

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**Optimization of chromatographic systems for analysis of selected psychotropic drugs and their metabolites in serum and saliva by HPLC in order to monitor therapeutic drugs**

K. Wróblewski, A. Petruczynik, T. Tuzimski, K. Prajsnar, D. Przygodzka, G. Buszewicz, H. Karakuła-Juchnowicz, J. Róg, J. Morylowska-Topolska and M. Waksmundzka-Hajnos

Pages: 1361–1373 | Published online: 31 Dec 2019

ABSTRACT

Retention, separation selectivity and system efficiency of selected basic psychotropic drugs (clozapine, aripiprazole, vortioxetine and zolpidem)

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**Electrocatalytic Properties of Ni-Doped $BaFe_{12}O_{19}$ for Oxygen Evolution in Alkaline Solution**

Mohammad Khotib, Bambang Soegijono, Zainal Alim Mas'ud and Komar Sutriah

Pages: 1382–1392 | Published online: 31 Dec 2019

ABSTRACT

Transition metal oxide (TMO) continues to be studied and developed as an oxygen evolution reaction (OER) electrocatalyst due to its abundance a

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**Study on the removal of high contents of ammonium from piggery wastewater by clinoptilolite and the corresponding mechanisms**

Liu Nan, Li Yingying, Li Jixiang, Ouyang Dujuan and Wang Wenjuan

Pages: 1393–1402 | Published online: 31 Dec 2019

ABSTRACT

In this study, a clinoptilolite was applied to remove ammonium from piggery wastewater. The performance of ammonium removal and the correspo

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**Phytochemistry and toxicological assessment of *Bryonia dioica* roots used in north-African alternative medicine**

Mohammed Bourhia, Ahmed Bari, Syed Saeed Ali, Laila Benbacer and Naima khlil

Pages: 1403–1411 | Published online: 31 Dec 2019

ABSTRACT

To investigate the phytochemical composition, acute and sub-acute toxicity of the aqueous extract of *B. dioica* roots. The phytochemical analys

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**The essential oil composition of selected *Hemerocallis* cultivars and their biological activity**

Katarzyna Szewczyk, Danuta Kalemba, Małgorzata Miazga-Karska, Barbara Krzemińska, Agnieszka Dąbrowska and Renata Nowak

Pages: 1412–1422 | Published online: 31 Dec 2019

ABSTRACT

The horticultural cultivars of *Hemerocallis* (daylily) have been used to treat diseases such as insomnia, inflammation and depression, and al

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**Mechanical Properties of Carbon Fiber Reinforced Nanocrystalline Nickel Composite Electroforming Deposit**

Wanghuan Qian, Zhangyong Yu and Tao Zhang

Pages: 1466–1472 | Published online: 31 Dec 2019

ABSTRACT

In order to obtain higher strength fiber reinforced composite electroforming deposit, carbon fiber reinforced nanocrystalline nickel compos

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**Anti-c-myc efficacy block EGFL7 induced prolactinoma tumorigenesis**

Xiaolei Lan, Qian Liu, Hua Gao, Zhenye Li and Yazhuo Zhang

Pages: 1501–1508 | Published online: 31 Dec 2019

ABSTRACT

Resistance to Dopamine agonists therapy is still a key factor that hinders the clinical treatment of prolactinoma. Consequently, a large numb

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### Zagreb Connection Number Index of Nanotubes and Regular Hexagonal Lattice

Ansheng Ye, Muhammad Imran Qureshi, Asfand Fahad, Adnan Aslam, Muhammad Kamran Jamil, Asim Zafar and Rida Irfan

Pages: 75–80 | Published online: 22 Feb 2019

#### ABSTRACT

Topological indices are the fixed numbers associated with the graphs. In recent years, mathematicians used indices to check the pharmacology cha

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### The Sanskruti index of trees and unicyclic graphs

Fei Deng, Huiqin Jiang, Jia-Bao Liu, Darja Rupnik Poklukar, Zehui Shao, Pu Wu and Janez Žerovnik

Pages: 448–455 | Published online: 24 Aug 2019

#### ABSTRACT

The Sanskruti index of a graph $G$ is defined as $S\left(G\right) = \sum_{uv\in E(G)} \left(\frac{s_G(u)s_G(v)}{s_G(u)+s_G(v)-2}\right)^3$, where $s_G(u)$ is the sum of the degrees of the neighbors of

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### Valency-based molecular descriptors of Bakelite network $BN_m^n$ $B\text N_{m}^{n}$

Maqsood Ahmad, Muhammad Javaid, Muhammad Saeed and Chahn Yong Jung

Pages: 663–670 | Published online: 25 Sep 2019

#### ABSTRACT

Bakelite network $BN_m^n$ is a molecular graph of bakelite, a pioneering and revolutionary synthetic polymer (Thermosetting P

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### Computing Topological Indices for Para-Line Graphs of Anthracene

Zhiqiang Zhang, Zeshan Saleem Mufti, Muhammad Faisal Nadeem, Zaheer Ahmad, Muhammad Kamran Siddiqui and Muhammad Reza Farahani

Pages: 955–962 | Published online: 13 Nov 2019

#### ABSTRACT

Atoms displayed as vertices and bonds can be shown by edges on a molecular graph. For such graphs we can find the indices showing their bioactivity

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### Zagreb Polynomials and redefined Zagreb indices of Dendrimers and Polyomino Chains

Adeel Farooq, Mustafa Habib, Abid Mahboob, Waqas Nazeer and Shin Min Kang

Pages: 1374–1381 | Published online: 31 Dec 2019

#### ABSTRACT

Dendrimers have an incredibly strong potential because their structure allows multivalent frameworks, i.e. one dendrimer molecule has many possible

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**Topological Descriptor of 2-Dimensional Silicon Carbons and Their Applications**

Muhammad Nadeem, Sarfraz Ahmad, Muhammad Kamran Siddiqui and Muhammad Naeem

Pages: 1473–1482 | Published online: 31 Dec 2019

ABSTRACT

The Chemical graph theory is extensively used in finding the atomic supplementary properties of different chemical stuructures. Many results of grap

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**Topological invariants for the line graphs of some classes of graphs**

Xiaoqing Zhou, Mustafa Habib, Tariq Javeed Zia, Asim Naseem, Anila Hanif and Ansheng Ye

Pages: 1483–1490 | Published online: 31 Dec 2019

ABSTRACT

Graph theory plays important roles in the fields of electronic and electrical engineering. For example, it is critical in signal processin

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**Words for maximal Subgroups of $Fi_{24}'$**

Faisal Yasin, Adeel Farooq and Chahn Yong Jung

Pages: 1491–1500 | Published online: 31 Dec 2019

ABSTRACT

Group Theory is the mathematical application of symmetry to an object to obtain knowledge of its physical properties. The symmetry of a molecule p

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**Generators of Maximal Subgroups of Harada-Norton and some Linear Groups**

Jia-Bao Liu, Faisal Yasin, Adeel Farooq and Absar Ul Haq

Pages: 1509–1518 | Published online: 31 Dec 2019

ABSTRACT

Group theory, the ultimate theory for symmetry, is a powerful tool that has a direct impact on research in robotics, computer vision, comput

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**Influence of Production Parameters on the Content of Polyphenolic Compounds in Extruded Porridge Enriched with Chokeberry Fruit (*Aronia melanocarpa* (Michx.) Elliott)**

Tomasz Oniszczuk, Gabriela Widelska, Anna Oniszczuk, Kamila Kasprzak, Agnieszka Wójtowicz, Marta Olech, Renata Nowak, Karolina Wojtunik- Kulesza, Grzegorz Jóźwiak and Monika Waksmundzka- Hajnos

Pages: 166–176 | Published online: 22 Mar 2019

ABSTRACT

Chokeberry fruit (*Aronia melanocarpa* (Michx.) Elliott) is known for its antioxidant properties and generally beneficial impact on human healt

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**Effects of Supercritical Carbon Dioxide Extraction (SC-$CO_2$) on the content of tiliroside in the extracts from *Tilia* L. flowers**

Aleksandra Pieczykolan, Wioleta Pietrzak, Edward Rój and Renata Nowak

Pages: 302–312 | Published online: 03 Jun 2019

ABSTRACT

Tiliroside is one of the main flavonoid compounds responsible for a wide spectrum of biological activity of *Tilia* L. Up to now, several

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**Impact of xanthan gum addition on phenolic acids composition and selected properties of new gluten-free maize-field bean pasta**

Gabriela Widelska, Agnieszka Wójtowicz, Kamila Kasprzak, Ahlem Dib, Tomasz Oniszczuk, Marta Olech, Karolina Wojtunik-Kulesza, Renata Nowak, Agnieszka Sujak, Bohdan Dobrzański and Anna Oniszczuk

Pages: 587–598 | Published online: 01 Sep 2019

ABSTRACT

Replacing the gluten network to produce high quality pasta is a great technological challenge. One of known solutions to the problem is the additi

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**Impact of storage temperature and time on Moldavian dragonhead oil – spectroscopic and chemometric analysis**

Tomasz Oniszczuk, Arkadiusz Matwijczuk, Alicja Matwijczuk, Sławomir Kocira, Agnieszka Niemczynowicz, Maciej Combrzyński, Agnieszka Wójtowicz, Maciej Kuboń, Andrzej Kusz and Anna Oniszczuk

Pages: 609–620 | Published online: 27 Aug 2019

ABSTRACT

Moldavian dragonhead (*Dracocephalum moldavica L.*) is a plant endemic to Asia where it has been used for centuries for the production of essential

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**The effect of selected substances on the stability of standard solutions in voltammetric analysis of ascorbic acid in fruit juices**

Radosław Kowalski, Artur Mazurek, Urszula Pankiewicz, Marzena Włodarczyk-Stasiak, Monika Sujka, Jakub Wyrostek and Klaudia Kałwa

Pages: 655–662 | Published online: 01 Sep 2019

ABSTRACT

The objective of the study was to identify suitable additives stabilizing standard solutions of ascorbic acid (AA) that would not cause in

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**Determination of the content of Pb, Cd, Cu, Zn in dairy products from various regions of Poland**

Monika Sujka, Urszula Pankiewicz, Radosław Kowalski, Artur Mazurek, Katarzyna Ślepecka and Magorzata Góral

Pages: 694–702 | Published online: 25 Sep 2019

ABSTRACT

The toxicity of heavy metals and their capacity for accumulation in the human organism make it necessary to conduct monitoring of their co

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## SPECIAL ISSUE ON IC3PE 2018 CONFERENCE

### The Photocatalytic Activity of Zns-$TiO_2$ on a Carbon Fiber Prepared by Chemical Bath Deposition

Fitria Rahmawati, Fatmawati R. Putri and Abu Masykur

Pages: 132–141 | Published online: 10 Apr 2019

#### ABSTRACT

This research prepared a $TiO_2$, ZnS, and ZnS-$TiO_2$ film on a carbon fiber, to produce $TiO_2$/C-fiber, ZnS-C-fiber, and ZnS-$TiO_2$/C-fiber by Ch

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### *N*-octyl chitosan derivatives as amphiphilic carrier agents for herbicide formulations

Azlan Kamari and Siti Najiah Mohd Yusoff

Pages: 365–380 | Published online: 01 Jun 2019

#### ABSTRACT

This study investigates the potential of *N*-octyl chitosan derivatives, namely *N*-octyl-*O*-sulfate chitosan (NOOSC), *N*-octyl-*N*-succinyl chitosan (N

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### Kinetics and Mechanistic Study of Hydrolysis of Adenosine Monophosphate Disodium Salt ($AMPNa_2$) in Acidic and Alkaline Media

Yoke-Leng Sim and Beljit Kaur

Pages: 544–556 | Published online: 24 Aug 2019

#### ABSTRACT

Phosphate ester hydrolysis is essential in signal transduction, energy storage and production, information storage and DNA repair. In thi

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### Antimalarial Activity of *Andrographis Paniculata Ness's* N-hexane Extract and Its Major Compounds

Nurcahyo Iman Prakoso, Zahrah Nur Zakiyah, Arida Liyanita, Dwiarso Rubiyanto, Dhina Fitriastuti, Arba Pramundita Ramadani, Azlan Kamari and Sim Kooi Mow

Pages: 788–797 | Published online: 25 Sep 2019

#### ABSTRACT

*Andrographis paniculata Ness* is one of the plants that is under explored and could contain potentially active substances to serve as an antimalari

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## SPECIAL ISSUE ON ABB2018 CONFERENCE

### Theoretical Diagnostics of Second and Third-order Hyperpolarizabilities of Several Acid Derivatives

A. Karakas, Y. Ceylan, M. Karakaya, M. Taser, B. B. Terlemez, N. Eren, Y. El Kouari, M. Lougdali, A. K. Arof and B. Sahraoui

Pages: 151–156 | Published online: 10 Apr 2019

ABSTRACT

The density functional theory (DFT) at B3LYP/6-31G(*d*) level has been utilized to achieve the electric dipole moment $(\mu)$, static

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### Determination of Gamma Rays Efficiency Against *Rhizoctonia solani in* Potatoes

Aslı Kara and Şerife Evrim Arici

Pages: 254–259 | Published online: 24 Apr 2019

ABSTRACT

There are many diseases in potatoes that cause loss of quality and yield in the world. One of them is the Rhizoctonia stem canker and black sc

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### Studies On Compatibilization Of Recycled Polyethylene/Thermoplastic Starch Blends By Using Different Compatibilizer

Barıs Oner, Tolga Gokkurt and Ayse Aytac

Pages: 557–563 | Published online: 24 Aug 2019

ABSTRACT

In this study, the aim was to examine the effects of three different compatibilizers on the recycled polyethylene/ thermoplastic starch (r-LDPE/TP

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### Liquid–Liquid Extraction of Linalool from Methyl Eugenol with 1-Ethyl-3-methylimidazolium Hydrogen Sulfate [EMIM][$HSO_4$] Ionic Liquid

Tuğba Erkoç, Lutfullah M. Sevgili and Selva Çavuş

Pages: 564–570 | Published online: 24 Aug 2019

ABSTRACT

The liquid–liquid equilibrium (LLE) data for a ternary system {methyl eugenol + linalool +1-ethyl-3-methylimidazolium hydrogen sulfate [EMIM]

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### Synthesis of Graphene Oxide Through Ultrasonic Assisted Electrochemical Exfoliation

Canser Aksoy and Duygu Anakli

Pages: 581–586 | Published online: 27 Aug 2019

ABSTRACT

We report a ‘green’, simple and efficient approach for the production of graphene oxide (GO) by ultrasonic assisted electrochemical exfoliation o

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**Synthesis and antiproliferative evaluation of some 1,4-naphthoquinone derivatives against human cervical cancer cells**

Aysecik Kacmaz, Nahide Gulsah Deniz, Serdar Goksin Aydinli, Cigdem Sayil, Evren Onay-Ucar, Elif Mertoglu and Nazli Arda

Pages: 337–345 | Published online: 24 Apr 2019

ABSTRACT

In the course of biological properties of quinone derivatives, the N(H)-, S- and S,S-substituted-1,4-naphthoquinones were synthesized by

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**The influence of the grafted aryl groups on the solvation properties of the graphyne and graphdiyne - a MD study**

Avni Berisha

Pages: 703–710 | Published online: 25 Sep 2019

ABSTRACT

The mechanism of the adsorption and grafting of diazonium cations onto the surface of graphyne and graphdiyne was investigated using Density Func

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**Electrochemical modification of platinum and glassy carbon surfaces with pyridine layers and their use as complexing agents for copper (II) ions**

Veton Haziri, Avni Berisha and Fetah I. Podvorica

Pages: 722–727 | Published online: 25 Sep 2019

ABSTRACT

The electrochemical grafting of the "*in-situ*" prepared diazopyridinium salt have permitted the attachment of pyridine moieties onto platinum

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**Effect of Electrospinning Process on Total Antioxidant Activity of Electrospun Nanofibers Containing Grape Seed Extract**

Rabia Faki, Oguz Gursoy and Yusuf Yilmaz

Pages: 912–918 | Published online: 13 Nov 2019

ABSTRACT

Electrospinning is a common technique used for the production of nanofibers, and it is based on the fact that the electrically charged li

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**Effect Of Thermal Treatment Of Trepel At Temperature Range 800-1200˚C**

Arianit A. Reka, Blagoj Pavlovski, Egzon Ademi, Ahmed Jashari, Blazo Boev, Ivan Boev and Petre Makreski

Pages: 1235–1243 | Published online: 31 Dec 2019

ABSTRACT

Trepel is the local name for a mixture of diatomaceous earth and clay minerals. It represents a greyish, soft, very light, weakly cemented, fine bi

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**The effect of *Cladophora glomerata* exudates on the amino acid composition of *Cladophora fracta* and *Rhizoclonium* sp.**

Marta Pikosz, Joanna Czerwik-Marcinkowska and Beata Messyasz

Pages: 313–324 | Published online: 24 Apr 2019

ABSTRACT

Filamentous green algae (FGA) frequently forms dense mats which can be either mono- or polyspecies. While various defense mechanisms of competit

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**Influence of the Static Magnetic Field and Algal Extract on the Germination of Soybean Seeds**

Sylwia Lewandowska, Izabela Michalak, Katarzyna Niemczyk, Jerzy Detyna, Henryk Bujak and Pelin Arik

Pages: 516–525 | Published online: 26 Jul 2019

ABSTRACT

This study examines the effect of a separate static magnetic field (SMF) and algal extract and their synergistic effect on soybean seeds germination

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**The use of UV-induced fluorescence for the assessment of homogeneity of granular mixtures**

Dominika Barbara Matuszek

Pages: 485–491 | Published online: 24 Aug 2019

ABSTRACT

This paper presents the results of fluorescence-based analysis of homogeneity of five multicomponent granular mixtures. Analyses were perform

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**The use of microorganisms as bio-fertilizers in the cultivation of white lupine**

Hanna Sulewska, Karolina Ratajczak, Alicja Niewiadomska and Katarzyna Panasiewicz

Pages: 813–822 | Published online: 29 Oct 2019

ABSTRACT

The agricultural usability of bio-fertilizers, particularly including microbiological seed vaccines meet the recommendations for integrated protec

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**Lyophilized apples on flax oil and ethyl esters of flax oil - stability and antioxidant evaluation**

Kinga Śpitalniak-Bajerska, Robert Kupczyński, Antoni Szumny, Alicja Zofia Kucharska and Andrzej Vogt

Pages: 831–840 | Published online: 12 Oct 2019

ABSTRACT

The research aimed to assess the effect of whole lyophilized apples added to flax oil or flax ethyl esters for oxidation processes and fatty acid pr

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**Production of phosphorus biofertilizer based on the renewable materials in large laboratory scale**

Małgorzata Wyciszkiewicz, Marcin Sojka and Agnieszka Saeid

Pages: 893–901 | Published online: 16 Oct 2019

ABSTRACT

This paper discusses the effect of the utilization of *Bacillus megaterium* in the microbial solubilization process where poultry bones or ash

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**Human health risk assessment of potential toxic elements in paddy soil and rice (*Oryza sativa*) from Ugbawka fields, Enugu, Nigeria**

Chidinma C. Ezeofor, Janefrances N. Ihedioha, Oguejiofo T.Ujam, Nwachukwu R. Ekere and Charles O. Nwuche

Pages: 1050–1060 | Published online: 13 Nov 2019

ABSTRACT

The potential toxic elements (Cu, Zn, Pb, Ni, Fe, Cr, Cd, Mn and Hg) were accumulated from rice grains and soil from an Ugbawka farm, Enugu State,

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**Recovery of phosphates(V) from wastewaters of different chemical composition**

Nina Hutnik, Anna Stanclik, Krzysztof Piotrowski and Andrzej Matynia

Pages: 1071–1079 | Published online: 06 Dec 2019

ABSTRACT

Phosphate(V) ions were recovered from wastewaters of different chemical compositions in a continuous reaction crystallization of struvite.

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SPECIAL ISSUE ON THE 4TH GREEN CHEMISTRY 2018

**Dead zone for hydrogenation of propylene reaction carried out on commercial catalyst pellets**

M. Szukiewicz, E. Chmiel-Szukiewicz, K. Kaczmarski and A. Szałek

Pages: 295–301 | Published online: 03 Jun 2019

ABSTRACT

Heterogeneous catalytic processes have for years been of crucial importance in the chemical industry, while biocatalitic processes have become m

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**Improved thermally stable oligoetherols from 6-aminouracil, ethylene carbonate and boric acid**

Elżbieta Chmiel-Szukiewicz

Pages: 1080–1086 | Published online: 10 Dec 2019

ABSTRACT

Syntheses of oligoetherols with a 1,3-pyrimidine ring and boron atoms using 6-aminouracil, ethylene carbonate and boric acid has been proposed.

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**The role of a chemical loop in removal of hazardous contaminants from coke oven wastewater during its treatment**

Anna Kwiecińska-Mydlak, Marcin Sajdak, Katarzyna Rychlewska and Jan Figa

Pages: 1288–1300 | Published online: 31 Dec 2019

ABSTRACT

Coke oven liquor is one of the most contaminated liquid streams generated by the coal processing industry, thus its proper treatment and utiliz

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**Combating paraben pollution in surface waters with a variety of photocatalyzed systems: Looking for the most efficient technology**

Joaquin R. Dominguez, Teresa Gonzalez, Eduardo M. Cuerda-Correa and Maria J. Muñoz-Peña

Pages: 1317–1327 | Published online: 31 Dec 2019

ABSTRACT

The constant presence of parabens in natural surface waters has raised a growing concern of the potential long-term toxic effects that parabens ma

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### Applying Discriminant and Cluster Analyses to Separate Allergenic from Non-allergenic Proteins

L. Naneva, M. Nedyalkova, S. Madurga, F. Mas and V. Simeonov

Pages: 401–407 | Published online: 03 Jun 2019

#### ABSTRACT

As a result of increased healthcare requirements and the introduction of genetically modified foods, the problem of allergies is becoming a gro

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### Chemometric Expertise Of Clinical Monitoring Data Of Prolactinoma Patients

Miroslava Nedyalkova, Dimitar Dimitrov, Borjana Donkova and Vasil Simeonov

Pages: 408–412 | Published online: 03 Jun 2019

#### ABSTRACT

The present investigation indicates hidden relationships between the several clinical parameters usually monitored on prolactinoma patients usi

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### Chemomertic Risk Assessment of Soil Pollution

Miroslava Nedyalkova and Vasil Simeonov

Pages: 711–721 | Published online: 15 Sep 2019

#### ABSTRACT

In this study, an interpretation and modeling of the soil quality by monitoring data using an intelligent data analysis is presented. On an annu

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### New composite sorbent for speciation analysis of soluble chromium in textiles

Penka Vasileva, Ivanka Dakova, Tanya Yordanova and Irina Karadjova

Pages: 1095–1104 | Published online: 19 Dec 2019

#### ABSTRACT

Micrometer-sized silica spheres coated with a layer of Cr(VI) imprinted methylimidazolium ionic liquid were synthesized and applied for fast

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### Photocatalytic activity of $NiFe_2O_4$ and $Zn_{0.5}Ni_{0.5}Fe_2O_4$ modified by Eu(III) and Tb(III) for decomposition of Malachite Green

M. P. Tsvetkov, I. R. Ivanova, E. P. Valcheva, J. Ts. Zaharieva and M. M. Milanova

Pages: 1124–1132 | Published online: 18 Dec 2019

#### ABSTRACT

The mixed metal oxides $NiFe_2O_4$ and $Zn_{0.5}Ni_{0.5}Fe_2O_4$ with a spinel-like structure, pure and modified with the lanthanide ions Eu(III) and Tb(III)

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**Photophysical and antibacterial activity of light-activated quaternary eosin Y**

Desislava Staneva, Stanislava Yordanova, Evgenia Vasileva-Tonkova, Stanimir Stoyanov and Ivo Grabchev

Pages: 1244–1251 | Published online: 31 Dec 2019

ABSTRACT

The functional characteristics of a new eosin dye with biocidal quaternary ammonium group (**E**) were studied in aqueous solution and in organic

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**Spectral properties and biological activity of La(III) and Nd(III) Monensinates**

I. Pantcheva, R. Dimitrova, V. Ivanova, A. Nedzhib, P. Dorkov, D. Dinev, R. Spasov and R. Alexandrova

Pages: 1423–1434 | Published online: 31 Dec 2019

ABSTRACT

The present research is focused on evaluation of complexation ability of Monensic acid (MonH) towards $La^{3+}$ and $Nd^{3+}$ ions.

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Jinquan Huang, Changwei Zhang, Dongbing Cheng, Bo Hu, Pingcang Zhang, Zhigang Wang, Jigen Liu and Zhongwu Li

Pages: 381–391 | Published online: 12 Jun 2019

ABSTRACT

The dynamics of eroded and retained soil organic carbon (SOC) may provide critical clues for evaluating impacts of soil erosion on global carb

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**A potential reusable fluorescent aptasensor based on magnetic nanoparticles for ochratoxin A analysis**

Pinzhu Qin, Dawei Huang, Zihao Xu, Ying Guan, Yongxin Bing and Ang Yu

Pages: 1301–1308 | Published online: 31 Dec 2019

ABSTRACT

An aptasensor for the detection of ochratoxin A (OTA) in environmental samples was developed. It displayed high sensitivity and good selectivit

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**Fluorescence study of 5-nitroisatin Schiff base immobilized on SBA-15 for sensing $Fe^{3+}$**

Muhammad Riza Ghulam Fahmi, Adroit T.N. Fajar, Nurliana Roslan, Leny Yuliati, Arif Fadlan, Mardi Santoso and Hendrik O. Lintang

Pages: 438–447 | Published online: 24 Aug 2019

ABSTRACT

*N*'-(5-nitro-2-oxoindolin-3-ylidene) thiophene-2-carbohydrazide **(NH)** was successfully synthesized as a ligand, then grafted onto the

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**Thermal and Morphology Properties of Cellulose Nanofiber from TEMPO-oxidized Lower part of Empty Fruit Bunches (LEFB)**

Mahendra I.P., Wirjosentono B., Tamrin, Ismail H. and Mendez J.A.

Pages: 526–536 | Published online: 12 Aug 2019

ABSTRACT

Cellulose nanofiber (CNF) gel has been obtained from TEMPO-oxidized differently treated lower part of empty fruit bunches (LEFB) of oil palm

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**Encapsulation of Vitamin C in Sesame Liposomes: Computational and Experimental Studies**

Dwi Hudiyanti, Noor Ichsan Hamidi, Daru Seto Bagus Anugrah, Siti Nur Milatus Salimah and Parsaoran Siahaan

Pages: 537–543 | Published online: 24 Aug 2019

ABSTRACT

An experimental and computational study was carried out for encapsulation of vitamin C in sesame, *Sesamum indicum* L., liposomes. Based on computati

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**A comparative study of the utilization of synthetic foaming agent and aluminum powder as pore-forming agents in lightweight geopolymer synthesis**

Ufafa Anggarini, Suminar Pratapa, Victor Purnomo and Ndaru Candra Sukmana

Pages: 629–638 | Published online: 19 Aug 2019

ABSTRACT

Lightweight geopolymer concrete was synthesized using fly ash as an aluminosilicate source with the addition of a pore-forming agent. The synthe

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**Synthesis of high surface area mesoporous silica SBA-15 by adjusting hydrothermal treatment time and the amount of polyvinyl alcohol**

Ridhawati Thahir, Abdul Wahid Wahab, Nursiah La Nafie and Indah Raya

Pages: 963–971 | Published online: 31 Dec 2019

ABSTRACT

The high surface area of mesoporous silica SBA-15 has been synthesized successfully by hydrothermal treatment with direct addition of PVA, triblo

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**Review of large-pore mesostructured cellular foam (MCF) silica and its applications**

Lilis Hermida, Joni Agustian, Ahmad Zuhairi Abdullah and Abdul Rahman Mohamed

Pages: 1000–1016 | Published online: 13 Nov 2019

ABSTRACT

The unique properties of mesostructured cellular foam (MCF) silica such as, large pore size, continuous three-dimensional (3D) pore system and hyd

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**Ion Exchange of Benzoate in Ni-Al-Benzoate Layered Double Hydroxide by Amoxicillin**

Dian Windy Dwiasi, Mudasir Mudasir and Roto Roto

Pages: 1043–1049 | Published online: 13 Nov 2019

ABSTRACT

The Ni-Al-$NO_3$ layered double hydroxide (LDH) compound has been intercalated with benzoate anion through an anion exchange process for amoxicil

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**Synthesis And Characterization Of CoMo/Mordenite Catalyst For Hydrotreatment Of Lignin Compound Models**

Khoirina Dwi Nugrahaningtyas, Nining Rahmawati, Fitria Rahmawati and Yuniawan Hidayat

Pages: 1061–1070 | Published online: 19 Dec 2019

ABSTRACT

The synthesis of CoMo/Mordenite (CoMo/MOR) catalysts was conducted using a co-impregnation method at a various Co/Mo ratios. The produced catal

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**Production of Biodiesel from Nyamplung (*Calophyllum inophyllum* L.) using Microwave with CaO Catalyst from Eggshell Waste: Optimization of Transesterification Process Parameters**

Ansori Ansori, Sasmitha Ayu Wibowo, Heri Septya Kusuma, Donny Satria Bhuana and Mahfud Mahfud

Pages: 1185–1197 | Published online: 31 Dec 2019

ABSTRACT

Fossil fuel is the main energy resource in Indonesia with oil as the dominant fuel (44.1% of primary energy consumption) in 2017. But fossil fue

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Teguh Endah Saraswati, Umam Hasan Setiawan, Mohammad Rifki Ihsan, Isnaeni Isnaeni and Yuliati Herbani

Pages: 1198–1212 | Published online: 31 Dec 2019

ABSTRACT

$C_{60}$ fullerene exhibits unique optical properties that have high potential for wide photo-optical applications. To analyze the optical properties o

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**Composite Material Consisting of HKUST-1 and Indonesian Activated Natural Zeolite and its Application in $CO_2$ Capture**

Witri Wahyu Lestari, Irwinsyah, Teguh Endah Saraswati, Yuni Krisyuningsih Krisnandi, Ubed Sonai Fahrudin Arrozi, Eddy Heraldy and Grandprix T. M. Kadja

Pages: 1279–1287 | Published online: 31 Dec 2019

## ABSTRACT

In this study, composite materials consisting in HKUST-1 [$Cu_3(BTC)_2$] (BTC: benzene 1, 3, 5-tricarboxylate) and an Indonesian activated natural

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Yun Hong, Yanxiong Fang, Dalei Sun and Xiantai Zhou

Pages: 639–646 | Published online: 21 Aug 2019

#### ABSTRACT

The industrial oxidation of cyclohexane is currently performed with very low conversion level, i.e. 4-6% conversion and poor selectivity fo

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Yonggui Liu, Yang Zhang, Jing Yan, Tao Song and Yongjun Xu

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#### ABSTRACT

Traditional water-in-oil drilling fluids are limited by their shear thinning behavior. In this article, we propose the synthesis of a thermal

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Lingyue Zhu, Jing Dong, Wei Jiang, Dandan Yuan, Hong Jiang, Chao Yan and Baohui Wang

Pages: 1442–1448 | Published online: 31 Dec 2019

#### ABSTRACT

For an increasing implementation of the low-temperature transportation in oilfield, it is urgent priority initially to study the physical and

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Gao Zhixiang, Guo Hongyu, Dong Zhiwei, Luo Yuan and Xia Daping

Pages: 1449–1458 | Published online: 31 Dec 2019

#### ABSTRACT

In order to analyze the feasibility of chemical softening on low rank coals, bituminous coal was collected from the Qianqiu mine in Henan Province,

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Xuedong Feng, Jing Yi and Peng Luo

Pages: 1459–1465 | Published online: 31 Dec 2019

#### ABSTRACT

With the purpose of studying the influence of $NO/O_2$ on the $NO_x$ storage activity, a Pt-Ba-Ce/γ-$Al_2O_3$ catalyst was synthesized by an a

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### Design of $SiO_2/TiO_2$ that Synergistically Increases The Hydrophobicity of Methyltrimethoxysilane Coated Glass

Alfa Akustia Widati, Nuryono Nuryono and Indriana Kartini

Pages: 798–805 | Published online: 25 Sep 2019

#### ABSTRACT

This research work presents the design of a mixture of $SiO_2/TiO_2$ that increases the surface roughness and hydrophobicity of methyltrimethoxys

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### Antidiabetes and Antioxidant agents from *Clausena excavata* root as medicinal plant of Myanmar

T. M. Thant, N. S. Aminah, A. N. Kristanti, R. Ramadhan, H. T. Aung and Y. Takaya

Pages: 1339–1344 | Published online: 31 Dec 2019

#### ABSTRACT

All around the world, patients with diabetes and the prevalence of its disease are currently growing. Due to these side effects of oral hyp

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### Development of a Gold Immunochromatographic Assay Method Using *Candida* Biofilm Antigen as a Bioreceptor for Candidiasis in Rats

Masfufatun, Loo Hariyanto, Harsono and Afaf Baktir

Pages: 1345–1351 | Published online: 31 Dec 2019

#### ABSTRACT

The gold immunochromatography assay (GICA), a new immunochromatography technique, uses a nitrocellulose membrane as a carrier and a collo

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## SPECIAL ISSUE ON APPLIED BIOCHEMISTRY AND BIOTECHNOLOGY 2019

### Adsorption of copper ions on *Magnolia officinalis* residues after solid-phase fermentation with *Phanerochaete chrysosporium*

Fengyun Tao, Yangping Liu, Junliang Chen, Peng Wang and Qing Huo

Pages: 1173–1184 | Published online: 18 Dec 2019

#### ABSTRACT

The disposal of residues while manufacturing Chinese medicine has always been an issue that concerns pharmaceutical factories. Phanerochaete

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## ERRATUM

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S. Anas Boussaa, A. Kheloufi and N. Boutarek Zaourar

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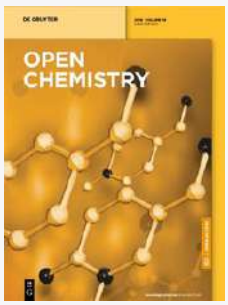


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