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Synthesis, Characterisation and Biological Activity of Schiff Base and its Cu(II), Pd(II), Pt(II) Complexes Derived from Tyrosine and Aromatic Aldehyde

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(received February 15, 2016; revised October 17, 2017; accepted October 18, 2017)

Abstract. Schiff base derived from the condensation of tyrosine and the salicylaldehyde has been synthesised and its Cu(II), Pd(II) and Pt(II) complexes have been prepared. The prepared Schiff base and its complexes were analysed and characterised by using different instrumental techniques, such as elemental analysis, FTIR, UV-Vis, ¹H NMR, thermal analysis and XRD. The analytical data revealed that the ligand L-1 can coordinate in tridentate manner via the phenolate-O, azomethine-N and tyrosine O-atoms, resulting in the formation of 1:1 [metal: ligand] complexes. Thermal analysis revealed the presence of water molecules in the complexes. In vitro antibacterial activity of the complexes was evaluated against different bacterial strains e.g., *Pseudomonas aeruginosa* and *Bacillus subtilis* by the well-diffusion method. The data showed that transition metal complexes have significant improved antibacterial activity than parent drug.

Keywords: Schiff base, amino acid, antibacterial activity, transition metal complexes

Thermodynamics and Kinetics of Reduction of Fe(III) Acetohydroxamic Acid Complex by Ascorbic Acid

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(received December 19, 2016; revised January 4, 2018; accepted January 5, 2018)

Abstract. Kinetic and thermodynamic studies of reduction of Fe(III) acetohydroxamic acid ([Fe(III)-AHA]) complex by ascorbic acid (AA) was performed at pH values ranging from 3.00-4.50 \pm 0.1 (ionic strength 0.2) and temperature 05.0 - 25.0 \pm 0.5 °C. The redox reactions were studied, spectrophotometrically, under pseudo first order conditions of [AA] over the [Fe(III)-AHA] under the experimental conditions. The redox reaction was found to be highly pH dependent. The values of 2nd order rate constants (k_2), at 25 °C and pH 3.0, 3.5, 4.0 and 4.5 were found out to be 2.3920, 2.1550, 2.0122, 1.7596 M⁻¹s⁻¹, respectively. At 20 °C the values were 1.7290, 1.4000, 1.3400, 1.2650 M⁻¹s⁻¹ at pH 3.0, 3.5, 4.0 and 4.5, respectively. The results at 15 °C and pH 3.0, 3.5, 4.0 and 4.5 were 1.1410, 0.9459, 1.0390, 0.9126 M⁻¹s⁻¹, respectively. While, the values of rate constants at 10 °C were 0.7847, 0.7697, 0.6810, 0.7096 M⁻¹s⁻¹ and at 5 °C were 0.6167, 0.5106, 0.4775, 0.4833 M⁻¹s⁻¹, respectively. In addition to that, the following rate law was evaluated. Rate = dp/dt = k_2 [Fe(III)-AHA] [AA]. Moreover, the thermodynamic activation parameters of the reaction were also determined. The values of ΔE_a^\ddagger at pH 3.0, 3.5, 4.0 and 4.5 were found out to be 22.4058, 16.3243, 19.9636, 14.6050 J/mol, respectively. While, the values of ΔH^\ddagger were 58.5056, 42.6258, 52.1288, 38.1363 J/mol, respectively at pH 3.0 to 4.5. Values of ΔS^\ddagger were also evaluated as -23.0297, -68.7567, -37.8287, -84.1377 J/mol/K at pH 3.0, 3.5, 4.0 and 4.5, respectively.

Keywords: acetohydroxamic acid, ascorbic acid, hydroxamate, siderophore, thermodynamics

Antibacterial Potential Assessment of Schiff Bases Derived from 1-Aminoanthracene-9, 10-Dione

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(received June 4, 2017; revised June 20, 2017; accepted June 22, 2017)

Abstract. A variety of Schiff bases **1-17** of 1-aminoanthracene-9, 10-dione were synthesized using a reported catalytic method and evaluated for their antibacterial potential against *Staphylococcus aureus* multidrug resistant (MDR), *Escherichia coli* (MDR), *Klebsiella* species (MDR), *Salmonella typhimurium* (MDR), *Pseudomonas aeruginosa* (MDR), *Escherichia coli* ATCC-8739, *Staphylococcus aureus* ATCC-25923, *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella* species and *Pseudomonas aeruginosa*. Compounds **2**, **3**, **4**, **13** and **14** were found to be potent against (MDR) bacterial strains when compared with the cefotaxime standard, however compound **8** exhibited good activities against *S. aureus* and *Klebsiella* species. Compounds **2** and **15** were found to be good to moderately active against *P. aeruginosa* and compounds **4** and **15** demonstrated moderate activity against *S. aureus*. All the remaining compounds except **11** and **17** showed weak antimicrobial activity against non-MDR strains of bacterial isolates.

Keywords: Schiff base, 1-aminoanthracenedione, antibacterial activity, multidrug resistant

Structural, Electrical and Thermal Properties of Lead Borate Glass Doped by V₂O₅ Content

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(received March 13, 2017; revised November 11, 2017; accepted February 6, 2018)

Abstract. Glass samples of compositions $xV_2O_5 + y Pb + [100-(x+y)] B_2O_3$ with the number of moles x varying from 0 to 2.5% and y varying from 0.2 to 0.195% are prepared by the technique of melting and quenching. The structural analysis of glass is achieved by studying the density and the molar volume. The glass density is increased from 1.8748 to 1.9347 g/cm according to the increase of the vanadium pentoxide contents. Also, the structural analysis of these glasses points out the conversion of structural units of BO_3 into BO_4 , which leads to increased density and molar volume. However, the transition temperature, the crystallization temperature, and the glass stability are decreased. The VO_4 and VO_5 structural units of vanadium are formed in the structural network. The electronic conduction of borate glass can be explained using Polaron hopping between V^{+4} and V^{+5} . On the other hand, ionic conduction takes place by the Pb ion movement in all of the studied samples.

Keywords: glasses, density, molar volume, thermal properties, conductivity

Influence of Chemical Surface Modifications on Mechanical Properties of *Combretum dolichopetalum* Fibre - High Density Polyethylene (HDPE) Composites

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(received February 11, 2016; revised December 22, 2017; accepted January 8, 2018)

Abstract. Maximizing the use of natural fibres as ecofriendly materials in polymer composite applications reduces its threat posed to human through increased biomass in the environment. In this study, the effect of chemical surface modifications using acetic anhydride and sodium hydroxide solution on the mechanical properties of *Combretum dolichopetalum* fibre-HDPE composites was aimed to be investigated. Fibres were treated with 6 % acetic anhydride and 12 % NaOH solutions for 30 minutes at room temperature based on optimum treatment conditions after water retting extraction process, then, the composites were prepared. The mechanical properties (tensile strength, tensile modulus, flexural strength, flexural modulus, hardness and impact strength) of the *C. dolichopetalum* fibre reinforced HDPE matrix composites and scanning electron microscope analysis were studied. *C. dolichopetalum* fibre was not only effective as reinforcement of HDPE matrix but mercerization and acetylation of *C. dolichopetalum* fibre ultimately enhanced the mechanical properties of HDPE composites. Scanning electron microscope analysis revealed that HDPE matrix possess better adhesive interaction with acetylated and mercerized *C. dolichopetalum* fibre compared with untreated *C. dolichopetalum* fibre at ultimate tensile strength.

Keywords: *Combretum dolichopetalum*, fibre, mechanical properties, HDPE matrix, mercerization, acetylation

Enhanced Storage Capacity and Quality of Haleji and Hadero Lakes Connecting with Indus River for their Sustainable Revival

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(received September 7, 2017; revised December 29, 2017; accepted December 29, 2017)

Abstract. Over 50% of wetlands in the world have been lost in the past century, and the remaining wetlands have been degraded to different degrees because of the adverse influences of human activities and climate change impacts. Though protected under Ramsar convention, the situation of Haleji wetland complex and Hadero wildlife sanctuary is not very promising. The current paper is focusing to revitalize the abandoned and devastated Ramsar site “Haleji Wetland Complex” and a forgotten wetland “Hadero Wildlife Sanctuary”, situated in Thatta district, Sindh province of Pakistan. Both these wetlands are of great importance for natural habitat and reducing risk of coastal disasters and floods. The study mainly employed Arc-Hydro tools using remotely sensed data of ASTER GDEM 2 to determine the topography of both wetlands and their possibilities to connect with freshwater sources, and leeway to increase their respective water holding capacity. The study reveals that all the three wetlands can be re-connected with Indus River to turn them into fresh water bodies for sustaining natural habitat and increasing water harvesting capacities to cater human drinking water needs

Keywords: wetlands, groundwater quality, natural habitat, remote sensing

Monthly Monitoring of Physicochemical and Radiation Properties of Kufa River, Iraq

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(received September 8, 2017; revised December 14, 2017; accepted January 19, 2018)

Abstract. Increasing anthropogenic activities can lead to a dramatic effect on the quality of the planet surface water such as river, lake and wetland among others (i.e. groundwater and atmospheric water). Water samples were collected from Kufa river during six months (i.e. started from November, 2015 to April, 2016). Six stations were selected alongside the river flow. The samples were analysed for physicochemical and radiation properties (air temperature, water temperature, pH, total hardness, Ca^{+2} , Mg^{+2} , total dissolved solids, dissolved oxygen, biological oxygen demand, turbidity, total alkalinity, electrical conductivity and radon concentration). The resulted data of various physicochemical parameters indicate that in some water samples, the EC, total hardness, BOD, turbidity, and total dissolved solids were found to be high when compared with the limits of WHO standards. Regarding the radon concentration, the results reveal that the radon level of all studied areas were lower than those published in literature. Finally, the findings the river's water could be unsafe for drinking when the physicochemical analysis taken into account.

Keyword: physicochemical properties, radon concentrations, Kufa river

Evaluation of Metals and Organic Contents in Locally Available Eye Shadow Products in Lahore, Pakistan

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Department of Environmental Science, Lahore College for Women University, Lahore, Pakistan

(received February 7, 2017; revised June 2, 2017; accepted August 16, 2017)

Abstract. This study was conducted to evaluate the concentration of some heavy metals (lead, cadmium, chromium and zinc) and synthetic organic contents in non branded eye shadows locally available in Lahore, Pakistan. Twenty five samples of five eye shadow colours (red, golden, orange, white and pink) were purchased from local market in Lahore. Samples were pre-treated and atomic absorption spectrometer was used to determine the concentration of lead (Pb), cadmium (Cd), chromium (Cr) and zinc (Zn). Total organic content in these samples was determined by wet oxidation technique. Maximum concentration of Pb in eye shadow samples was detected to be 15.33 $\mu\text{g/g}$. Concentration of Pb in 80% of samples was found to be higher as compared to the permissible limit (10 $\mu\text{g/g}$) of Pb in cosmetics provided by Health Canada. 26% samples showed Cd concentration higher than permissible limit (3 $\mu\text{g/g}$). Although there are no available internationally acceptable maximum limits for Cr and Zn, but these metals were found to be present in detectable limits ranging from 5.5-8.23 $\mu\text{g/g}$ and 7.9-11.84 $\mu\text{g/g}$, respectively. Total organic content (TOC) in the samples was found to be ranging from 2.15-2.92 mg/g.

Keywords: eye shadows, heavy metals, permissible limit, organic contents

Short Communication

Cleaning of Dalwal-Punjab Coal by Using Shaking Table

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Mining Engineering Department, University of Engineering & Technology, Lahore, Pakistan

(received August 2, 2016; revised October 9, 2017; accepted October 13, 2017)

Abstract. The aim of this research is to evaluate the cleaning amenability of Dalwal-Punjab coal by using tabling technique. Total eighteen tabling tests were performed on two size fractions; 3.327×1.168 and 1.168×0.295 mm. The effects of table tilt (0 to 10 mm/m) and water flow rate (14 to 36 l/min) on clean coal yield and ash were investigated. It was found that both clean coal yield and ash were increased with increasing table tilt and water flow rate.

Keywords: Dalwal coal, shaking table, coal cleaning, gravity concentration

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(Park, 2005; Aksu and Kabasakal, 2004; Evans *et al.*, 2000)

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