Induced CD from chiral Schiff base metal complexes involving azo-dye groups to gold nanoparticles

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Manuscript received 02 October 2017, revised 12 November 2017, accepted 14 November 2017

Abstract : We reported on synthesis, characterization, and docking of supramolecular systems of azo-group containing chiral salen-type Schiff base NiII, CuII and ZnII complexes and colloidal gold nanoparticles (AuNPs) of 10 nm diameters. Appropriate conditions enabled some of them to exhibit induced CD from chiral species adsorbed on the surface of AuNPs. We have compared differences of dipole-dipole interactions of cis-trans isomerization as well as coordination geometries of these complexes associated with induce CD spectra around plasmon region. This optical features will be promising light absorption mechanism of dyes for solar cells developing new concept of organic/inorganic hybrid functional materials.

Keywords : Chirality, azobenzene, Schiff base complexes, gold nanoparticles, TD-DFT.

Sensing of TbIII and EuIII in aqueous medium by a phenanthroline based ligand

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Manuscript received 25 October 2017, revised 13 November 2017, accepted 15 November 2017

Abstract : A simple phenanthroline based fluorescent receptor (PTRIS) has been shown to act as a sensor for the recognition of TbIII and EuIII in absolute water. UV-Vis absorption as well as fluorescence studies support the recognition phenomena. The complexation of these lanthanides with PTRIS has been proven by the changes of phosphorescence emission related to the metal centre. Strong complexation has been found for TbIII and PTRIS resulting in very strong turn-on phosphorescence effect related to TbIII.

Keywords : Phenanthroline based receptor, fluorescent sensor, EuIII, TbIII sensors, water soluble.
Synthesis, characterization and biological assay of vanillin and o-hydroxy-acetophenone based terpolymer resin and its chelates with transition and inner transition metal ions

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Manuscript received 26 August 2017, revised 12 October 2017, accepted 20 October 2017

Abstract : Polymer metal complexes of three transition and two rare earth elements were prepared by condensation polymerization technique using o-hydroxyacetophenone, vanillin and formaldehyde. As-synthesized terpolymer and its metal complexes were subjected to spectral characterization by UV-Visible, FTIR, \textsuperscript{1}H NMR and \textsuperscript{13}C NMR. The molecular weight of terpolymer was determined by gel permeation chromatography. The thermal stability of the terpolymer and metal complexes were determined by TGA and DSC techniques. \textit{In vitro} biological tests were performed for both; the ligand and its polymer metal complexes against certain pathogenic bacteria such as \textit{E. coli}, \textit{P. aeruginosa}, \textit{S. aureus}, \textit{S. pyogenes} and fungi such as \textit{C. albicans}, \textit{A. niger} and \textit{A. clavatus}.

Keywords : Terpolymer, metal complexes, thermogravimetric analysis, antimicrobial activity.
single crystals suitable for X-ray crystal structure could not be achieved. However, from spectroscopic data and on the basis of the structures of the related zinc(II) complexes reported earlier in the literature, the complexes could be proposed to adopt four co-ordinated tetrahedral geometry. The complexes were also screened for their in vitro antibacterial activities against various bacterial strains and were compared with standard drug. Complexes 1 and 2 were found to exhibit effective antibacterial activity against all the tested bacterial strains.

Keywords : Water soluble zinc(II) azide complexes, (E)-N-(thiophen-2-ylmethylene)anilines, antibacterial activities.

J. Indian Chem. Soc.,
Vol. 94, November 2017, pp. 1195-1201

Synthesis, crystal structure and magnetic properties of tetranuclear dysprosium(III) cluster

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Manuscript received 01 November 2017, accepted 17 November 2017

Abstract : Single-molecular magnets (SMMs) formed from metal-organic complexes are very promising candidates for information storage devices. A new tetranuclear cubane like DyIII coordination compound, [Dy₄(L)₆(µ3-OH)₄(µ₂-OH)(H₂O)₄]Cl.7H₂O (complex 1) has been synthesized by using Schiff base ligand 2-[(2-hydroxy-3-methoxyphenyl)methylidene]amino]benzoic acid (L) and characterized by single crystal X-ray crystallography. Magnetic studies reveal that complex 1 exhibits single-molecule magnet (SMM) behavior at temperature lower than 1.8 K.

Keywords : Dysprosium cluster, Schiff base ligand, crystal structure, single-molecule magnet.

J. Indian Chem. Soc.,
Vol. 94, November 2017, pp. 1203-1212

Clean green synthesis of silver nanoparticles with shape/size control using aquatic weed Pistia stratiotes and their antioxidant, antibacterial and catalytic activity

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Manuscript received 20 June 2017, revised 19 July 2017, accepted 17 November 2017

Abstract : The paper presents studies towards development of simple, one-pot, yet rapid processes of generating silver nanoparticles of desired shapes/sizes utilizing the highly invasive
aquatic weed, Pistia stratiotes. In an attempt to utilize the entire plant, the extracts of all its parts – aerial as well as submerged parts – were employed with the silver precursor, AgNO₃ solution, for the synthesis. The formation of AgNPs and their characteristics were studied using UV-Vis spectroscopy, electron microscopy, Fourier transform infra-red spectroscopy, Energy dispersive spectroscopy and X-ray diffraction. It was seen that by varying Ag-extract stoichiometry, pH and temperature AgNPs of different shapes and sizes can be reproducibly generated. The synthesized AgNPs displayed marked antimicrobial, catalytic and free radical scavenging ability.

Keywords: Silver nanoparticles, Pistia stratiotes, antioxidant, antibacterial and catalytic activity.


Enhanced energy efficiency of photogalvanic cell with mixture of two dyes as photosensitizers in EDTA-DSS system

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Manuscript received 22 November 2017, accepted 07 December 2017

Abstract: In this paper photocurrent and photovoltage generation using mixture of two dyes (Sudan Black-B+Azur-B) in liquid phase photogalvanic cell at different concentrations have been studied. Photogalvanic cells are aqueous phase electrochemical device capable of solar energy conversion and storage using alkaline solution of photosensitizer and reductant. The observed photopotential and photocurrent values in this system were 965.0 mV and 340.0 µA respectively. The conversion efficiency of the system was observed 0.8157% and fill factor determined as 0.2585. The cell performance was observed 110.0 min in dark. The effects of different parameters on the electrical output of the cell were observed and current-voltage (i-V) characteristics of the cell were also studied.

Keywords: Photogalvanic effect, Sudan Black-B, Azur-B, EDTA, DSS, fill factor, conversion efficiency.


Conventional and MW induced synthesis of some bridgehead nitrogen containing triazolo-dithiadiazines by sulphur-sulphur bond formation through cyclocondensation and antimicrobial study

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Manuscript received 19 July 2017, revised 11 November 2017, accepted 14 November 2017
Abstract: Conventional and MW induced synthesis of 3-aryl/alkylimino-6-pyridin-4-yl-[1,2,4]-triazolo-(3,4-c)-[1,2,4,5]-dithiadiazines have been carried out by reacting 4-amino-3-mercapto-5-pyridin-4-yl-4H-[1,2,4]-triazole with N-aryl/alkyl-S-chloro isothiocarbamoyl chlorides followed by the basification with dilute ammonium hydroxide solution. 4-Amino-3-mercapto-5-pyridin-4-yl-4H-[1,2,4]-triazole was synthesized by the interaction of isoniazide with carbondisulphide and potassium hydroxide followed by the addition of hydrazine hydrate. The structures of synthesized compounds have been established on the basis of chemical transformation, elemental analysis, equivalent weight determination and IR, 1H NMR, mass spectral studies. The title compounds have been assayed for their antimicrobial activity against Gram-positive as well as Gram-negative micro-organisms.

Keywords: Conventional, MW, synthesis, triazolo-dithiadiazines, antimicrobial study.


Status of urinary porphyrins and inverse correlation of porphyrins with serum B vitamins in arsenic endemic area of West Bengal, India

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Abstract: Chronic arsenic toxicity through drinking water is still one of the major problems across the world. Bangladesh and India (particularly the state of West Bengal) are the worst affected countries with such problem. Millions of people all over the world are affected by arsenic related diseases. In our study, concentration of ground water arsenic, urine arsenic, hair arsenic and nail arsenic from adult individuals were measured from exposed areas of West Bengal, India respectively by flow injection atomic spectroscopy and transversely-heated graphite atomiser techniques. Porphyrins, uroporphyrin III, heptacarboxyporphyrin I, hexacarboxy-porphyrin I, pentacarboxy-porphyrin I, coproporphyrin III in urine were analysed separately by HPLC using fluorescence detector as well as level of vitamin B6, vitamin B9 and vitamin B12 were carried out in serum samples among the population in the selected area in North 24-Parganas, West Bengal, India. Concentration of uro III, hepta I, copro III and copro III/uro III were observed to increase irrespective of gender and also in total; whereas level of B vitamins were found to decrease with increase in exposure to arsenic contaminated drinking water from underground sources. The difference of vitamin B6 (p < 0.01) between the population exposed to <50 and >50 µg/L arsenic in drinking water was found to be significant. Significant difference was also noticed in case of uro III (p < 0.05), copro III (p < 0.01) and copro III/uro III (p < 0.05) between two exposure categories. This study demonstrated increasing tendency in urinary porphyrins as well as inverse relationships of serum B vitamins with increased water arsenic concentration.

Keywords: Water arsenic, urine arsenic, hair arsenic, nail arsenic, porphyrin, vitamin.
Non-aqueous potentiometric determination of pharmaceutically potent drug diphenhydramine hydrochloride

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Abstract: The non-aqueous potentiometric determination of pharmaceutically potent drug diphenhydramine hydrochloride by performing the titrations using isopropyl alcohol as the solvent and KOH in isopropyl alcohol as the titrant has been carried out. The effect of solvent and concentration on potentiometric determination of this drug has been studied followed by its estimation in single component tablets. A pair of glass and calomel electrode was used to do the titrations. The method was found to be precise for assay of diphenhydramine hydrochloride and results obtained are comparable with those obtained by Indian Pharmacopoeia (I.P.) method.

Keywords: Non-aqueous, potentiometric determination, diphenhydramine hydrochloride.
arsenic, >250 µg/L, having exposure, ≥ 15 years, irrespective of gender. Significant differences between urinary porphyrins and duration of exposure of the subjects was noticed in the cases, uro III ($p < 0.001$), penta I ($p < 0.05$), copro III ($p < 0.001$) and the ratio of copro III/ uro III ($p < 0.05$). An increasing trend of urinary porphyrins noticed with exposure to arsenic, though the difference between urinary porphyrins and exposure to water arsenic was insignificant. The study suggests that urinary porphyrins may serve as biomarker of chronic exposure to arsenic among population in the endemic area.

Keywords: Water arsenic, urinary arsenic, porphyrins, heme biosynthetic pathway, arsenic toxicity.