

Synthesis, spectral characterization and antimicrobial studies of some new binuclear complexes of Cu^{II} and Ni^{II} Schiff base

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Abstract : Heterobinuclear alkali metal complexes of Cu^{II} or Ni^{II} with Schiff base derived from condensation of 1,2-propylenediamine with *o*-hydroxyacetophenone in 1 : 2 molar ratio have been synthesized. They were characterized by elemental analysis, IR spectra, UV-Visible spectral analysis, magnetic and molar conductance measurements. The synthesized binuclear Cu^{II} and Ni^{II} complexes of Schiff base are found to have square planar geometry. No change in the stereochemistry of Cu^{II} and Ni^{II} complexes was observed after formation of adduct with the alkali metal salts of the organic acids. The antimicrobial activity of some of the heterobinuclear complexes are assayed which demonstrated inhibitory effect against some bacteria and fungi.

Keywords : Heterobinuclear alkali metal complexes, IR, UV-Visible spectra, antimicrobial studies, MIC.

Synthesis and spectroscopic studies of some mixed ligand complexes of titanium(IV)

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Abstract : Some new titanium(IV) complexes with alkyl xanthates of the type [(m-Cl)₂Ti₂(h²-S₂COR)₂Cl₄] (1), [(m-Cl)₂Ti₂(h²-S₂COR)₄Cl₂] (2) and [CITi(h²-S₂COR)₃] (3) have been synthesized by simple metathetic reaction. The complexes [(m-Cl)₂Ti₂(h²-S₂COR)₂Cl₄] have been further treated with sodium salts of Schiff bases (derived from isatin and aniline) and sodium tetraisopropoxyaluminate to produce mixed ligand complexes of the type [(sb)TiCl₂(h²-S₂COR)] (4) and [(h²-S₂COR)TiCl₂(m-OPrⁱ)₂{Al(OPrⁱ)₂}] (5). All these complexes are characterized by elemental analysis (Ti, C, H, N, S and Cl) and spectroscopic data, i.e. UV-Visible, IR, NMR (¹H and ¹³C) and FAB-MS studies. The above data due to the metal binding sites of the ligands suggested coordination number six for complexes 1, 2, 4 and 5 and coordination 5 for complex 3, tentatively.

Keywords : Chloro-Ti^{IV}-alkyl xanthate, Schiff base, mixed ligand complexes.

Synthesis and crystal structure of copper(II) complex with Schiff base from salicylaldehyde and 1,2-phenylenediamine

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Abstract : A new complex $[\text{Cu}(\text{saloph})][\{\text{Cu}(\text{salobp})_2\text{Cl}\}]$ (**1**) was synthesized by the reaction of CuCl and the Schiff base ligand (saloph) derived from salicylaldehyde and 1,2-phenylenediamine. Under hydrothermal conditions, in the presence of Cu^{I} ion and methanol, saloph is converted into the benzimidazole ligand (salobp). The single crystal X-ray diffraction analyses reveal that **1** contains discrete $[\text{Cu}(\text{saloph})]$ (**A**), $[\text{Cu}(\text{salobp})_2\text{Cl}]$ (**B**) in the asymmetric unit. In **A**, the geometry around the Cu^{II} is almost square planar with two nitrogens and two oxygens from saloph providing the tetradentate coordination, while in **B**, the geometry around the Cu^{II} is linear with two nitrogens from two different monodentate benzimidazole ligands (salobp).

Keywords : Crystal structures, copper complexes, salicylaldehyde, Schiff base.

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Analysis of interionic potentials in chalcogenide crystals with sodium chloride structure [†]

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Abstract : Values of cohesive energy, atomization energy, force constant, IR absorption frequency, Debye temperature, Grüneisen parameter, Anderson-Grüneisen parameter and Moelwyn-Hughes parameter for 45 chalcogenide crystals of NaCl-structure are reported here. These parameters have been obtained by using the Born-Mayer and Varshini-Shukla interionic short-range repulsive interactions. Calculations have also been performed for the computation of first order volume dependence of Grüneisen parameter commonly known as second Grüneisen parameter using expressions of higher order derivatives of interaction potential within the frame work of Dugdale and MacDonald theory. The high pressure behaviour of these crystals have also been studied.

Keywords : Crystalline state properties, Grüneisen parameter, second Grüneisen parameter.

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Volumetric and ultrasonic studies of diglycine in binary aqueous solutions of saccharide at 288.15, 298.15 and 308.15 K

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Abstract : Densities, speeds of sound and viscosities of diglycine have been measured at 288.15, 298.15 and 308.15 K in aqueous saccharides solutions ranging from 1.0 to 5.0 mass% of saccharide. The saccharides used are mannose, maltose and raffinose. From density, viscosity and speed of sound data, apparent molar volumes V_f , relative viscosity h_r and adiabatic compressibilities $K_{f,s}$ of diglycine have been determined. The viscosity data have been analysed using the Jones-Dole equation. Partial molar volumes V_f^0 and partial molar adiabatic compressibilities $K_{f,s}^0$ of diglycine at infinite dilution were evaluated. These values are required for calculating hydration number n_H of diglycine. Transfer volumes DV_f^0 , and transfer adiabatic compressibilities $DK_{f,s}^0$ from water to aqueous saccharide solutions have been calculated. The results have been discussed in terms of solute-solute and solute-solvent interactions and the structural changes of the solutes in solutions.

Keywords : Apparent molar volume, adiabatic compressibility, viscosity, diglycine, aqueous saccharide solutions.

Apparent molar volumes of tartaric acid in water and in aqueous solutions of mono- and disaccharides at 293.15, 303.15, 313.15 and 323.15 K

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Abstract : Apparent molar volumes (V_f) have been determined for tartaric acid in water and in aqueous solutions of mono- and disaccharides at different concentrations by measuring the densities at 293.15, 303.15, 313.15 and 323.15 K. The limiting apparent molar volume, V_f^0 , (which is equal to the partial molar volume, V_2^0 at infinite dilution) and experimental slope (S_v) have been obtained in each case. The partial molar volumes (V_2^0) have been used to calculate the partial molar volumes of transfer (ΔV_f^0) of tartaric acid from water to aqueous solutions of mono- and disaccharides at different temperatures. The values of limiting apparent molar expansibilities (ϵ_E^0) and that of $(\partial^2 V_f^0 / \partial T^2)_p$ have been determined from temperature-dependence of V_f^0 . The values of pair and triplet coefficients have been determined from DV_f^0 . It is concluded that tartaric acid behaves as structure maker in water as well as in aqueous solutions of mono- and disaccharides.

Keywords : Apparent molar volumes, tartaric acid, aqueous solutions of saccharides.

Solid phase extraction, preconcentration of Cu^{II} and its separation from environmentally toxic metal ions with high molecular mass liquid cation exchanger, Versatic 9

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Abstract : A selective method has been developed for the extraction chromatographic trace level separation of Cu^{II} with Versatic 9 (liquid cation exchanger) coated on silanised silica gel. Cu^{II} has been extracted from 0.1 M acetate buffer at the range of pH 4.0–5.5. The effects of foreign ions, pH, flow-rate, stripping agents on extraction and elution have been investigated. Exchange capacity of the prepared exchanger at different temperatures with respect to Cu^{II} has been determined. The extraction equilibrium constant (K_{ex}) and different standard thermodynamic parameters have also been calculated by temperature variation method. The effect of pH on R_f values in ion exchange paper chromatography has been investigated. In order to investigate the sorption isotherm, two equilibrium models, the Freundlich and Langmuir isotherms, were analyzed. Cu^{II} has been separated from synthetic binary and multi-component mixtures containing various metal ions associated with it in ores and alloy samples. The method effectively permits sequential separation of Cu^{II} from synthetic quaternary mixture containing its congeners Bi^{III} , Sn^{II} , Pb^{II} and Hg^{II} , Cd^{II} , Pb^{II} of same analytical group. The method was found effective for removal and recovery of Cu^{II} from industrial waste and standard alloy samples following its preconcentration on the column. A plausible mechanism for the extraction of Cu^{II} has been suggested.

Keywords : Versatic 9, Cu^{II} , separation, preconcentration, sorption isotherm.

Studies of kinetics and isotherm effect on Brilliant Green dye with activated carbon

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Abstract : Activated carbon prepared from low cost coconut fiber has been utilized as the adsorbent for the removal of basic dyes from aqueous solution. A basic dye, Brilliant Green has been used as the adsorbate. Experiments were conducted at different initial concentration, different adsorbent dose, temperature, pH and different contact time. The most effective removal of color was at pH 7 and the percentage removal increased with the increase in carbon dose, while the percentage removal decreased with increasing initial dye concentration. The adsorption data best fitted with Langmuir than Freundlich isotherm. Kinetic study was also undertaken and it was found that the interaction follows the pseudo-second order than pseudo-first order. Thermodynamic parameters were also calculated.

Keywords : Adsorption, Brilliant Green dye, activated carbon, Freundlich isotherm, Langmuir isotherm.

Oxidation of some thioacids by tetraethylammonium chlorochromate : A kinetic and mechanistic study

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Abstract : The oxidation of thioglycollic, thiolactic and thiomalic acids by tetraethylammonium chlorochromate (TEACC) is first order both in TEACC and thioacids. The reaction is catalysed by hydrogen ions. The hydrogen ion dependence has taking the form : $k_{obs} = a + b [H^+]$. The oxidation of thiolactic acid has been studied in nineteen different organic solvents. The solvent effect has been analysed by using Kamlet's and Swain's multiparametric equations. A mechanism involving the formation of a thioester and its decomposition in slow step has been proposed.

Keywords : Kinetics, mechanism, halochromate, oxidation, thioacids.

Photoinduced reactions: Phototransformations of 2-aryl-3-(methoxymethoxy)-chromones

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Abstract : Photochemical cyclisation of 3-methoxymethyl ethers of 3-hydroxychromones to angular tetracyclic dihydro- and dehydrogenated compounds is studied. The product formation is explained on the basis of type-II hydrogen abstraction by the excited C=O group.

Keywords : 3-Alkoxyalkoxychromone, H-abstraction, 1,4-biradical.

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Coated wire ion selective electrodes for determination of cationic and anionic surfactants

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Abstract : In this paper two new coated wire ion selective electrodes are reported, one of which, prepared by aliquot permanganate as electroactive material, found to be useful for the determination of cationic surfactants. The other one, which was prepared using the ion-pair complex formed between cetyl trimethylammonium bromide (CTAB) and sodium dodecylsulfate (SDS) was found to be useful for the determination of anionic surfactants. Dip coating technique was used for the preparation of these electrodes. The characteristics of electrodes in terms of electrode response, response time, and working range of pH have been evaluated.

Keywords : Coated wire ion selective electrodes, cationic surfactants, anionic surfactants, surfactant selective electrodes.

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Kinetic study of solvent effects on the hydrolysis of di-2-chloroaniline phosphate in dioxane and dimethyl sulfoxide-water medium

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Abstract : Kinetic study of di-2-chloroaniline phosphate was carried out in dioxane and dimethyl sulfoxide-water mixtures of varying compositions 20–50% (v/v). The rate of reaction increases with increasing proportion of dioxane and dimethyl sulfoxide at 80 and 90 °C. The activation parameters (E_a , DH^\ddagger , DG^\ddagger , $-DS^\ddagger$) have been evaluated and variations of these parameters have been explained on the basis of solvent-solute interaction, solvent of the transition state of the medium.

Keywords : Kinetics, hydrolysis, solvent effects, di-2-chloroaniline phosphate.

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Evaluation of antibacterial activity of some Schiff bases

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Abstract : From 4-amino phenol, some Schiff bases were synthesized. By IR and NMR spectral data, the structural characterization of these synthesized compounds were done. The antibacterial activity of all these synthesized Schiff bases was studied against *B. cereus*-ATCC 11778, *P. aero*-ATCC 27853, *E. coli*-ATCC 25922, *K pneu*-NCIM 2719 and *S. aureus*-ATCC 25923, by agar ditch method in dimethyl formamide and dimethyl sulfoxide. It is observed that antibacterial activity depends on the molecular structure of Schiff base, solvent used and bacterial strain under consideration. Out of two solvents studied, dimethyl formamide is proved to be best and salicylaldehyde as side chain to 4-amino phenol could be used as lead molecule in drug designing i.e. in inhibiting above bacterial strains.

Keywords : Schiff bases, antibacterial activity.

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Isoquinolinium bromochromate; new, efficient and stable reagent for oxidation of aromatic amines and phenols

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Abstract : The new chromium(VI) oxidizing reagent isoquinolinium bromochromate (IQBC) was prepared and characterized. This new compound has been found to be an efficient reagent for oxidation of primary amines and phenols. The oxidation of primary amines and phenols with isoquinolinium bromochromate proceeded smoothly to afford corresponding azobenzenes and quinones in good to excellent yield. The synthesized isoquinolinium bromochromate is more ideal reagent, with number of specifications including higher yield, mild conditions and easy preparation. The results obtained with isoquinolinium bromochromate are satisfactory and suggest that this new reagent is valuable addition to the existing chromium(VI) reagents.

Keywords : Isoquinolinium bromochromate, oxidation, anilines, phenols.

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A comparative study: One pot synthesis of some prochiral ketones using conventional and microwave assisted methods

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Abstract : Polyphosphoric acid (PPA) has been used to synthesize a number of prochiral aryl ketones as well as a,b- unsaturated diaryl ketones by conventional and microwave assisted methods in moderate to good yield. The microwave assisted method is advantageous due to increased yield and high purity of products within incredible short period of time.

Keywords : Acylation, chalcone, microwave, polyphosphoric acid, prochiral ketone.

Chemical examination of *Citrus pectinifera* juice

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Abstract : Phytochemical study of *Citrus pectinifera* juice has resulted in the isolation of three compounds : nobiletin, dotriacontanol and hexadecandioic acid. Nobiletin is already a known compound from the juice of *C. pectinifera*. The other two known compounds namely hexadecandioic acid and dotriacontanol are being reported for the first time from the juice of this plant. Biochemical parameters in the juice were found to be comparable with those of Mandarin species.

Keywords : *Citrus pectinifera*, Rutaceae, nobiletin, dotriacontanol, hexadecandioic, biochemical parameters.