

Synthesis, spectral, thermal and antimicrobial studies of oxomolybdenum(V) and dioxomolybdenum(VI) complexes with 2,3-dimethyl-1-phenyl-4-(5-chloro-2-hydroxy-4-methylphenylazo)-5-pyrazolone

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Abstract : Some novel oxomolybdenum(V) and dioxomolybdenum(VI) complexes of the formulae $[\text{MoO}(\text{CMCAAP})\text{Cl}_2]$, $[\text{MoO}(\text{CMCAAP})(\text{NCS})\text{Cl}]$, $[\text{MoO}(\text{CMCAAP})(\text{NO}_3)\text{Cl}]$, $[\text{MoO}(\text{CMCAAP})(\text{ClO}_4)\text{Cl}]$, $[\text{MoO}_2(\text{CMCAAP})\text{Cl}]$, $[\text{MoO}_2(\text{CMCAAP})(\text{NCS})]$, $[\text{MoO}_2(\text{CMCAAP})(\text{NO}_3)]$ and $[\text{MoO}_2(\text{CMCAAP})(\text{ClO}_4)]$ (where CMCAAP = para-chlorometacresolazoantipyrine) have been synthesised and characterized by elemental analysis, molar conductance, magnetic susceptibility data, IR, UV-visible, ESR and ^1H NMR spectral studies. The thermal properties of the complex was investigated by thermogravimetric technique. The ligand and the complexes were screened for their possible antibacterial and antifungal activities. The complexes are found to be monomeric with distorted octahedral geometry.

Keywords : Oxomolybdenum(V), dioxomolybdenum(VI), thermal studies.

Synthesis and characterization of UO_2^{2+} , ZrO^{2+} and Th^{4+} complexes with 3-(p-substituted aryl)-2-thiohydantoin

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Abstract : A few complexes of the type $[\text{ML}_2(\text{H}_2\text{O})_2]$ and $[\text{ThL}_2(\text{H}_2\text{O})_2(\text{NO}_3)_2]$, where $\text{M}=\text{UO}_2^{2+}$ and ZrO^{2+} ; $\text{HL} = 3\text{-benzylideneimino-2-thiohydantoin}$, $3\text{-p-nitrobenzylideneimino-2-thiohydantoin}$, $3\text{-p-methoxybenzylideneimino-2-thiohydantoin}$, $3\text{-p-chlorobenzylideneimino-2-thiohydantoin}$ have been synthesized and characterized on the basis of elemental analysis, thermal analysis, conductance, magnetic moment studies and spectroscopic data (^1H NMR, IR and electronic). The results indicate that the complexes of UO_2^{2+} and ZrO^{2+} are hexacoordinated where as those of Th^{4+} ions are octacoordinated.

Keywords : 3-Substituted thiohydantoin, UO_2^{2+} , ZrO^{2+} , Th^{4+} .

Vanadium(V) initiated graft co-polymerization of vinyl monomers onto poly(vinyl alcohol)

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Abstract : The graft co-polymerization of vinyl monomers onto poly(vinyl alcohol) (PVA) by ammonium vanadate (AV) was studied as a function of H₂O₂/AV mole ratio, PVA/monomer weight ratio, sulfuric acid concentration, and reaction time and temperature. The presence of hydrogen peroxide at 2 N H₂SO₄ improves the grafting efficiency of vanadium(V). The optimum time and temperature of the grafting reaction was found to be 3.5 h and 55 °C respectively for the most reactive vinyl monomer studied. FT-IR spectroscopy was used for the confirmation of grafting. The thermal stability of the grafted polymer was evaluated. A generalized reaction scheme has been suggested to elucidate the role of vanadium(V) and hydrogen peroxide.

Keywords : Grafting, co-polymerization, pentavalent vanadium, FTIR, TGA, DSC.

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AIBN initiated free radical homopolymerization of *N*-(1-naphthyl)maleimide and copolymerization with MMA : synthesis and characterization

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Abstract : Free radical homopolymerization of *N*-(1-naphthyl)maleimide (NMI) and copolymerization with MMA were performed in THF at 65 °C with AIBN as the initiator. Nine copolymer samples were prepared using different feed ratios of comonomers. The prepared polymer sample have been characterized by solubility test, intrinsic viscosity, FT-IR and ¹H NMR spectral analysis. The thermal properties have been studied by thermogravimetric analysis.

Keywords : *N*-(1-Naphthyl)maleimide, AIBN, polymerization, TGA.

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Kinetics and mechanism of oxidation of pyruvic acid by peroxomonophosphate in acid perchlorate medium

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Abstract : Kinetics of oxidation of pyruvic acid by peroxomonophosphate (PMP) has been studied in a wider pH range. The stoichiometry corresponds to the reaction as represented by the eq. (1)



The pattern of reactivity of peroxomonophosphate species has been delineated. A plausible reaction mechanism is suggested. The energy and entropy of activation were calculated to be (72 ± 7) kJ mol⁻¹ and (-40 ± 4) JK⁻¹ mol⁻¹ respectively.

Keywords : Peroxomonophosphate, kinetics, pyruvic acid, oxidation.

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Chromic acid oxidation of oxalic acid catalysed by manganese(II) – kinetic method of estimation of manganese(II) and water soluble and extractable manganese in soil

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Abstract : The catalytic effect of manganese(II) on the oxidation of oxalic acid by chromic acid has been pressed into use for its determination. A simple kinetic method has been developed using fixed time and iodometric procedures. The method is found to be suitable for the estimation of water soluble and exchangeable manganese in soil and the results have been compared with those of Atomic Absorption Spectrophotometer (AAS).

Keywords : Manganese(II), oxidation, chromic acid, soil.

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QSAR based modeling of a new class of RNA polymerase inhibitors

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Abstract : Quantitative structure-activity relationship studies were performed on a series of RNA-polymerase inhibitors which show activity against *Rifampicin* resistant *Staphylococcus aureus*. Physico-chemical parameters together with indicator variable, gave the best model having significant statistical features including cross-validated parameters. Pogliani factor Q and the results of LOO (leave one out) method confirm the reliability and predictability of the proposed models and it may be concluded that larger and polar groups will favour the inhibitory activity (pIC_{50}).

Keywords : RNA-polymerase inhibitors, QSAR, inhibitory activity, physico-chemical parameters.

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Extraction chromatographic studies of cadmium(II) with SRS-100, a high molecular mass carboxylic acid

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Abstract : A selective method has been developed for the extraction chromatographic separation of Cd^{II} with SRS-100 (liquid cation exchanger) coated on silanised silica gel. Quantitative extraction of Cd^{II} has been achieved from acetate buffer at the pH range 6.5–7.5. The effects of pH, stripping agents, flow-rate, on extraction and elution have been investigated. Exchange capacity of the prepared exchanger at different temperatures with respect to Cd^{II} has been determined. Cd^{II} has been separated from synthetic binary and multi-component mixtures containing various elements by exploiting the differences in pH for extraction and elution. The method effectively permits sequential separation of Cd^{II} from synthetic mixture containing its congeners Cu^{II} , Hg^{II} , Zn^{II} and Pb^{II} of same analytical group.

Keywords : SRS-100, cadmium(II), extraction.

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Atomic absorption spectrophotometric determination of tryptophan and cysteine^y

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Abstract : A novel method for determination of cysteine and tryptophan using atomic absorption spectrophotometry has been developed in which these substances are allowed to react with methanol solution of iodine there by iodide ions are released quantitatively and the released iodide ions are allowed to react with excess amount of silver nitrate for formation of equivalent amount of silver iodide precipitate. The excess of silver ions were determined by atomic absorption spectrophotometry and from total amount of silver ions added, the concentration of liberated iodide ions was calculated. The equivalent amount of cysteine or tryptophan was then calculated.

Values obtained using this method were found to be comparable with the values obtained by conductometric titration.

Keywords : Cysteine, tryptophan, atomic absorption spectrophotometry.

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Sorption of aqueous fluoride by active silica-carbon from rice husk

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Abstract : Fluoride in drinking water in excess of desirable levels has been a serious threat to public health in many places in India. Distilled water containing 5 ppm fluoride (dissolved as NaF) passed through a glass column (2.5 cm id) packed with 10 g of iron-impregnated active silica-carbon composite char derived from rice husk, yielded treated water with fluoride concentrations between 1 and 2.5 ppm, that are desirable as per drinking water standards in India and elsewhere.

Keywords : Drinking water standards, fluorides, rice-husk, silica-carbon composite char.

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Inhibition of stainless steel by use of thiourea derivative as inhibitors in 20% HCl

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Abstract : The stainless steel is very important material for petroleum industry and it is used in several processing units like oil recovery, refining of crude oil, transportation, storage and petroleum products. The corrosion inhibitors are used to reduce corrosion damage in sub-surface equipments in both oil and gas well. For this work inhibition activity is studied by use of inhibitors, *N,N*-di-*o*-tolylthiourea, *N,N*-diphenylthiourea and *N*-phenylthiourea and experimental work can be done by gravimetric method and potentiostatic polarization at different temperature in 20% HCl solution.

Keywords : Stainless steel, inhibitors, gravimetric, potentiostatic polarization.

Rhodium(III) catalyzed oxidation of dextrose and maltose by acidic solution of sodium periodate : A kinetic study

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Abstract : The kinetics of rhodium(III) catalyzed oxidation of dextrose and maltose by sodium periodate in acidic medium has been studied in the temperature range 30–45 °C. The reaction is carried out in the presence of mercuric acetate as a scavenger for iodide ion. The rate shows first order kinetics with respect to the oxidant, sodium periodate and Rh^{III} for both dextrose and maltose. A suitable mechanism in conformity with the kinetic observations has been proposed and the thermodynamic parameters computed.

Keywords : Kinetics, rhodium(III), oxidation, sugars, acidic sodium periodate.

2,4-Dinitrophenoxides of zirconium(IV)

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Abstract : Complexes of composition $ZrCl_{4-n}(dnp)_n$ (where dnp is anion of 2,4-dinitrophenol i.e. $OC_6H_3(NO_2)_2^-$, 2,4) have been synthesized by the reaction of zirconium tetrachloride with equimolar and bimolar amounts of 2,4-dinitrophenol (dnpH) in toluene under reflux and characterized by elemental analysis, conductivity measurements, infrared and proton NMR spectral studies. Thermal behaviour of these complexes has also been investigated and using TG data, thermodynamic parameters have been calculated. The reaction of the parent complexes with nitrogenous bases such as 1,10-phenanthroline and 2,2'-bipyridyl results in the formation of simple addition compounds characterized by analytical and infrared spectral studies.

Keywords : Zirconium(IV), 2,4-dinitrophenol, thermal behaviour, Lewis acid character.

Sonochemical degradation of brilliant cresyl blue – an ecofriendly approach

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Abstract : Dye-stuffs which are often present in industrial waste water may have a serious impact on the environment as well as on the health of human beings. This report describes an ecofriendly method which has been developed for the degradation of brilliant cresyl blue. Ultrasonic frequency of 4 MHz was used for all experiments in order to find the best conditions for degradation. The effect of operating variables like pH, concentration of dye, solvent composition, temperature, nature and concentration of surfactant etc. on the reaction rate has been observed. The progress of the sonochemical degradation was monitored

spectrophotometrically. The value of energy of activation was also computed for this sonochemical degradation. A suitable tentative mechanism for sonochemical degradation of brilliant cresyl blue has also been proposed.

Keywords : Sonochemical degradation, brilliant cresyl blue, spectrophotometry.

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Peptide alkaloids of *Zizyphus rugosa*

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Abstract : Five cyclopeptide alkaloids, sativanine-C, mauritine-A, mauritine-D, amphibine-B and nummularine-K has been isolated from the bark of *Zizyphus rugosa* and their structures were established by spectral evidences.

This is the first report of these compounds in *Z. rugosa*.

Keywords : *Zizyphus rugosa*, cyclopeptide alkaloids.

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Synthesis and characterization of some 3-*N*-alkoxyphthalimido-5-arylidene-2- {[4-(4-substituted phenyl)-1,3-thiazol-2-yl]imino}-1,3-thiazolidin-4-ones

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Abstract : 4Chloro/methyl phenacyl bromide 1a-b reacted with thiourea to furnish 2amino thiazole 2a-b through Hantzsch's process, which were converted to their thiazolidinone derivatives 4a-b, by the reaction of corresponding thiazolyl thiourea 3a-b with chloroacetic acid in the presence of sodium acetate. Subsequent treatment of 4a-b with aromatic aldehydes 5a-c, followed by condensation with w-bromoalkoxyphthalimides 7a-b afforded titled compounds 8a-l.

Keywords : 2-Amino thiazole, thiourea, phenacyl bromide, condensation, w-bromoalkoxyphthalimide.

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Potential utilisation of aquatic weeds for the production of alcohol

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Abstract : The rhizomes of *Typha angustata*, *Cyperus exaltatus*, aquatic weeds which are rich in carbohydrates were processed to generate the fermentable sugars. The fermentable starch hydrolysates were used as fermentation substrates for the yeast *Saccaromyces cereviceae*. The optimum conditions for the survival, growth and fermentation of the yeast *Saccaromyces cereviceae* with the selected substrates was evaluated.

Alcohol was produced on a pilot scale by fermentation using these two substrates.

Keywords : Alcohol production, starch, rhizomes, *Typha angustata*, *Cyperus exaltatus*, *Saccaromyces cereviceae*.