Neutron activation analysis and its applications to the determination of elements in multiple areas and peaceful uses of atomic energy

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The availability of nuclear reactors associated with the development of nuclear energy has made possible the extension of a technique, first used by G. Havesy, into one of the most sensitive and specific radioanalytical technique available for the determination of minute quantities of a wide range of elements.

The essential basis of the method can be seen from this early application; i.e., the element to be determined is made radioactive usually, but not necessarily, by slow neutron irradiation and then this radioactivity, after suitable chemical separation (if necessary) is a measure of the mass of the element originally present. In view of the great sensitivity of the present methods of measuring activity, because of the specific characteristics of the individual radionuclides, e.g. decay period and energy of the emitted radiation and since nuclear reactors are now available providing neutron fluxes greater by factors of 10^8 or more than that used by Hevesy, this method of activation or more simply activation analysis offers a great attraction.

Activation can be carried out radiochemically (destructive) or instrumentally (nondestructive). In radiochemical neutron activation analysis radiochemical separations are essential for the separation and chemical identification of previously unknown radioactive species (isotopes) of naturally non-existent elements such as, technetium, promethium etc., for isolation of particular nuclides as tracers, for the investigation of chemical and physical properties or radiation characteristics and often to study the nuclear processes leading to the formation of a particular nuclear species.

The present work discusses the application of separation techniques such as solvent extraction, precipitation, ion exchange in RNAA and its application to the study of geology, medicine, agriculture, environment etc. The results for peaceful uses of atomic energy will be also discussed.

Anthracyclines and tyrosine kinase inhibitors in cardiotoxicity

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Prof. Hari S. Sharma is currently affiliated to Free University Medical Center (VUmc), Amsterdam, **The Netherlands.** He studied Biological Sciences at AMU, Aligarh, **India** and obtained **BSc** (Honours in 1978) and **MSc** in Biochemistry (First Division in 1980). He then joined V.P. Chest Institute, Delhi University and received **MPhil** in 1982 and **PhD** in 1984 degrees in Biochemistry. In 2005, Dr. Sharma was awarded **DSc** in Biochemistry for his single author work on *'Angiogenesis and Tissue Remodeling in the Heart and Lung Diseases'*. Dr. Sharma has served at Armed Forces Transfusion Centre, Delhi as a Clinical Biochemist (6 months) and then moved to the prestigious Max-Planck Institute, **Germany** in March, 1985 and worked as Max-Planck Fellow (3 years) and group leader (5 years). In early 1993, he moved to the Erasmus University Medical Centre, Rotterdam, The Netherlands as an Assistant Professor and in 2010, he joined VUmc, Amsterdam as a senior faculty. Dr. Sharma holds Visiting Professorship at the Leuven University, **Belgium,** KG Medical University, Lucknow and AKSH University, Satna, **India**. His area of research include: *'Mechanisms and Therapeutic Strategies for Heart, Lung and Vessel Diseases'*. Dr. Sharma has obtained a number of research **grants,** published 335 research papers/book chapters/abstracts and cloned several genes. He has 28 years of teaching experience of Molecular & Cell Biology, Pharmacology and Laboratory Techniques to **Medical/Master/PhD** students. He has **supervised** 14 MD/MSc and 10 PhD students and has many international **conferences/symposia** and delivered 208 **invited lectures** worldwide. Dr. Sharma has been bestowed with numerous **awards/medals** including **Young Investigator** Award of the International Society of Hypertension, **Distinguished Service** Award of Heart Care Foundation, **Masters** of Indo-European Intervention Council and **Excellence in Research & Innovations** Award of AMITY University. He serves as **editor,** editorial board member and **referee** for many reputed journals and funding agencies. Dr. Sharma is the **founder president** (emeritus) of the *Indian Academy of Biomedical Sciences*, executive board member of *Netherlands India Association* and member of several Indian, European and International **scientific societies.**

The term Cardiotoxicity is also referred as drug induced cardiac injury is side effects amongst variety of drugs that are used to treat several human diseases. Numbers of drugs are associated with adverse effects on cardiovascular system. Different categories of drug like anticancer drugs, Tricyclic antidepressants, antipsychotics, anticonvulsants, antimalarial, beta blockers, digoxin, dextroprppoxyphene, calcium channel blockers, anti-arrhythmic drugs are associated with cardiotoxicity. Among these categories, anticancer drugs mediated cardiotoxicity is one of the major concern of clinicians in view of treating the patient for metastasis and aggressive tumours. Albeit, cancer therapy accounts for number of drugs like anthracyclines/ anthraquinolones alkylating agents, antimetabolites, antimicrotubules monoclonal antibodies, interleukins, interferon and miscellaneous agents, anthracyclines and tyrosine kinase inhibitors are currently a major concern. Anthracyclines are one of the key components of anticancer therapy and are known to cause cardiomyopathy and congestive heart failure. Anthracyclines associated cardiotoxicity (AAC) is multifactorial and depends upon factors like cumulative dose, administration schedule, mediastinal radiotherapy, combination therapy, old age or age below 4 years, female gender, ethnicity, hypertension, previous cardiovascular disease, chromosomal abnormalities and liver disease. Interaction with mitochondrion and production of oxidative stress through semiquinone free radical formation are major mechanism of anthracycline induced cardiotoxicity.

Compared to Anthracyclines, Tyrosine kinase inhibitors are recently developed drugs that fall under the category of targeted therapy. Tyrosine kinase inhibitors show their adverse effect on cardiovascular system by inhibition of off-target and on-target kinases which plays important role in proper functioning of cardiovascular system. Tyrosine kinase inhibitors (TKI) are a class of anticancer drugs that target kinases. TKI targets the ATP binding pocket of the kinase and prevent ATP from binding to the kinase. Hence ATP cannot bind which results in non-phosphorylation of kinase and its downstream signalling is inhibited. TKI agents blocks the unintended kinases which are responsible for proper functioning in the heart then they can cause off target cardiotoxicity. Currently, there are nine small molecule ATP-competitive inhibitors exists in the market and additional are in development. Some of these agents like Trastuzumab, Sunitinib, Imatinib, Dasatinib, Nilotinib, and Sorafenib are likely to cause cardiotoxicity. While Lepatinib, Gefitinib, Erlotinib, Cetuximab are considered to be low cardiotoxic. It is essential to note that cardiotoxicity mediated by TKI have been mainly due to inhibition of those kinase that are directed towards essential kinase in the heart and vasculature and not because of the whole class of TKI. A comprehensive review will be presented on up to date about cardiotoxicity of anthracycline and tyrosine kinase inhibitor in terms of molecular mechanism and in vitro model systems for prediction etc.

Biomarkers in drug discovery and development: prospects and challenges

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Biomarker research is an area of critical importance within the pharmaceutical discovery and development process in understanding the mechanism of action of a drug, identifying efficacy or toxicity signals at an early stage of development and in identifying patients likely to respond to treatment. New drug approvals have declined and running low for novel therapeutic compounds. The USFDA encourages the integration of biomarkers in drug development and their appropriate use in clinical practice. Therefore, need of the pharmaceutical industry for biomarkers has grown in recent years and they become an essential part of clinical drug development, fostering a safer and effective alternative to the conventional drug development approach. The biomarkers are integral in drug development to evaluate safety and effectiveness, predict effectiveness, provide informative links between mechanism of action and clinical effectiveness, connect animal and human studies, and serve as surrogate endpoints. Biomarkers play a vital role in drug development as tools to monitor drug toxicity, prove a compound mechanism of action, prove the concept for which a drug will be used, and predict efficacy and toxicity. Biomarker hypothesis-driven drug development and personalized medicine seem to be the future of drug industry. Though, one of the major challenges to innovation is our ability to discover new biomarkers along with gaining a better understanding of the pathophysiology of disease, thereby uncovering potential drug targets and biomarkers in the disease pathway. The rapid developments in the discovery and validation of a range of biomarkers such as biochemical, functional, morphological, proteomic and genomic approaches and novel imaging biomarkers has improved the safety and efficacy outcomes. Several biomarker validation programs including C-Path and the FDA Biomarker Qualification Program has been developed to "provide a framework for scientific development and regulatory acceptance of biomarker for use in drug development". The biomarkers can improve drug development timelines, lower costs, facilitate better compound selection, reduce late-stage attrition, and open the door to personalized medicine.

Biochemistry of aluminium induced lipid peroxidation and brain toxicity

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Aluminum exposure is known to be associated with oxidative stress and cognitive decline in experimental animals but the precise mechanism of its neurotoxicity has not yet been delineated. The present study attempts to assess the learning and memory capacity of rats using Y-maze test for cognitive functioning. The markers of oxidative stress, e.g. lipid peroxides and endogenous antioxidants as well as metals (Al, Fe, Cu, Zn and Se) were measured in the brain frontal cortex of young and aged rats fed with AlCl(3) (100 mg/kg b.w.) for 90 days and normal saline treated controls. We observed significant changes between young and aged Al treated rats and their controls in terms of lipid peroxides and endogenous antioxidants. Lipofuscin content was significantly increased in Al treated aged rats along with higher concentration of Al, Fe and Zn with concomitantly low levels of Cu, and Se. Ultrastructural studies of the frontal cortex of exposed rats revealed that the changes were more pronounced in the aged treated rats in terms of presence of spongiform lipofuscin, vacuolization and lysosomal degradation. Changes in synaptic morphology and decreased number of synapses were detected in the frontal cortex of Al treated aged rats. On the basis of the results of the present study, we conclude that Al may be linked with neurolipofuscinogenesis and alteration in neurobehavioral activity and these changes may be responsible for the development of age related disorders, such as Alzheimer's disease.

Extracellular RNA : More than a tumer maker

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Editor of Books
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2. Arteriogenesis - Molecular Regulation, Pathophysiology and Therapeutics I, Eds. E. Deindl & W. Schaper, 2011

Reviewer for Scientific journals : Acta Physiologica, Arteriosclerosis Thrombosis and Vascular Biology, BioTechniques, Cell Biochemisty and Biophysics, Circulation, Journal of Leukocyte Biology, Journal of Vascular Research, Medical Science Monitor, Physiological Genomics, The American Journal of Physiology, The Journal of Clinical Investigations, The Journal of Pathology

Biochemistry of heart development

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Professor Brand is a Professor and Chair of Developmental Dynamics Heart Science Centre Harefield Hospital, Imperial College, London, UK (since 2009). Earlier, he was head of Cardiac Developmental Biology group and Professor at the University of Würzburg, Germany. He was a Group Leader at the Institute of Biochemistry and Biotechnology, University of Braunschweig, Germany (1994-2004). He did his postdoctoral training at Baylor College of Medicine Houston, U.S.A (1991-94). He obtained his PhD at the Max-Planck Institute for Physiological and Clinical Research in Bad Nauheim, Germany (1988-1990) and earlier studied Biology at the University of Bielefeld, Germany (1980-1987). Professor Brand's research focuses on cardiac coronary vessel development and ageing specially on a novel class of membrane proteins, the Popeye proteins, which are involved in stress adaptation of cardiac pacemaker activity. Professor Brand is a referee for numerous journals and funding several European/American agencies. He is a member of the Working group on Developmental Anatomy and Pathology of the European Society of Cardiology. He has published more than 100 Research papers/book chapters and has guided numerous PhD/MD students.

Electrochemical determination and binding studies of 4-aminoantipyrine, an analgesic and anti-inflammatory drug

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Cyclic voltammetry (CV) is the most versatile electroanalytical technique for the study of electroactive species. It is used in all fields of Chemistry as a means of studying redox states. CV methods have found to have extensive applications for evaluation of thermodynamics and mass transport phenomenon of a number of redox reactions and associated chemical reactions. The primary objective of developing these CV techniques was analytical, both qualitative as well as quantitative. CV studies in rat brain, in vivo studies in animals, bacteria and even plants are picking up. With the introduction of newer electrode materials of small size, these methods of chemical analysis in living systems might grow even faster.

A highly sensitive electrochemical detection method for 4-aminoantipyrine (AAP) has been developed by using multi-walled carbon nanotube (MWCNT)-cetyltrimethylammonium bromide (CTAB) surfactant composite modified glassy carbon electrode (GCE). The MWCNT”CTAB / GCE electrode exhibited excellent electrocatalytic activity towards AAP than the bare GCE. Diffusion controlled oxidation observed at acidic pH 3.0 resulted in the maximum peak current response in cyclic voltammograms. MWCNT”CTAB / GCE electrode gave a linear response for AAP from 0.5×10^{-8} M to 4.0×10^{-8} M with a detection limit of 1.63×10^{-10} M. The modified electrode showed good selectivity against interfering species and also exhibited good reproducibility. The present electrochemical sensor based on the MWCNT”CTAB / GCE electrode was applied to the determination of AAP in real samples.

The interactions of 4-aminoantipyrine (AAP) with human serum albumin (HSA) have been studied by UV-visible spectroscopy, fluorescence spectroscopy and cyclic voltammetry. The binding of 4-aminoantipyrine quenches the HSA fluorescence, revealing a 1:1 interaction with a binding constant of about 10^5 M^{-1}. The experimental results showed that AAP effectively quenched the intrinsic fluorescence of HSA via dynamic type of quenching. In addition, according to the synchronous fluorescence spectra of HSA in presence of 4-aminoantipyrine, the tryptophan residue of the proteins are most perturbed by the binding process. The number of binding sites, the binding constant, site probe study, some common metal ions effect and the thermodynamic parameters were calculated.

Novel electrochromic conducting polymers : Synthesis, characterisation and applications

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Electrochromism is potentially the most commercially useful form of chromism. Electrochromic materials are highly desirable, as they are the potential candidates for applications in display devices. Electrochromism is the reversible change in optical properties that can occur when a material is electrochemically oxidized or reduced. Conducting polymers are more promising electrochromic materials. Utilization of materials of biological interest for the preparation of newer nano polymeric compounds assumes importance in the present environment. Dapson, an anti-leprotic drug, Diclofenac, a non-steroidal anti-inflammatory drug and Benzocaine, a local anesthetic topical pain reliever were copolymerised with aniline monomers electrochemically. The synthesized copolymer films showed good adherence and electroactivity. Copolymers were characterized by spectral and morphological studies. The copolymers exhibited good multicolour electrochromic effect. These copolymers can be employed as potential candidates in the development of dynamic electrochromic devices.

Voltammetric sensors for sensing of pharmaceuticals

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Novel graphene / silicon dioxide nano-composite modified glassy carbon electrode (GR / SiO_2 / GCE) sensors have been developed for the sensitive determination of various pharmaceuticals. For example Novel graphene / silicon dioxide nano-composite modified glassy carbon electrode (GR / SiO_2 / GCE) sensor has been used for sensing of an adrenergic agonist muscle relaxant drug tizanidine (TZ) in a solubilised system of cetyltrimethyl ammonium bromide (CTAB). The morphological characteristics of the developed GR / SiO_2 / GCE sensor were studied by scanning electron microscopy (SEM). The influence of optimization parameters such as pH, effect of different solvents, critical micelle concentration, and effect of loading of composite mixture of GR and SiO_2 at GCE on analytical performance of the developed sensor was investigated. Various kinetic parameters such as surface area (A), diffusion coefficient (D) and electron transfer no. (n) were also calculated. GR / SiO_2 / GCE sensor exhibits excellent electrocatalytic performance towards reduction of tizanidine in Britton Robinson buffer at pH 6.5 in 0.1% CTAB as compared to bare GCE, GR modified GCE (GR / GCE), and SiO_2 modified GCE (SiO_2 / GCE). Under optimal experimental conditions, square wave cathodic peak current shows a linear response for tizanidine over a concentration range of 5 (ng mL^{-1}) to 10 (μg mL^{-1}) with a correlation coefficient (r^2) of 0.9928. The detection limit (LOD) and quantification limit (LOQ) were found to be 40.050 ng mL^{-1} and 133.503 ng mL^{-1} respectively. The sensor exhibits a significant catalytic effect on tizanidine reduction with an acceptable reproducibility of 1.70 % relative standard deviation (RSD). The fabricated sensor shows great promise for simple, sensitive, quantitative screening and detection of tizanidine using voltammetric techniques. The voltammetric study of tizanidine in cationic surfactant CTAB results in an enhanced cathodic peak current .

Effect of chemical composition of $Sr_xCa_{1-x}Fe_2O_4$ ($0.0 \leq x \leq 1.0$) catalyst and alkali towards efficient and selective epoxidation of styrene

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Spinel type strontium substituted calcium (SSC) ferrite $Sr_xCa_{1-x}Fe_2O_4$ ($0.0 \leq x \leq 1.0$) catalyst synthesized by citrate-gel combustion method are well characterized by various techniques such as TG-DTG, FT-IR, X-ray diffraction, SEM, EDS and BET. The crystallization temperature of the spinel particle prepared by citrate gel is 600 °C, which is lower in comparison to ferrite prepared by other methods. Among this series of catalysts, $Sr_{0.2}Ca_{0.8}Fe_2O_4$ which has highest surface area shows the best catalytic efficiency. GCMS analysis revealed that, during the course of reaction the insertion of oxygen takes place selectively than the oxidative cleavage of C=C bonds; to give epoxide as major product. Addition of NaOH suppress further isomerization of the styrene epoxide, it prevent the ring opening in styrene epoxidation, thereby increasing the selectivity remarkably to give epoxide as major product. The catalyst containing both Sr^{2+} and Ca^{2+} ions are more active than pure $SrFe_2O_4$ and $CaFe_2O_4$. The synergistic effect of Sr^{2+}, Ca^{2+} ions and greater site preference energy of Sr^{2+} than Fe^{3+} favour towards the selective epoxidation of styrene in presence of 30% H_2O_2 as oxidant. The optimization and the effect of various reaction conditions on the conversion of styrene and product distribution were also studied.

Spectroscopic investigations of oxidation of antiarrhythmic drug - procainamide hydrochloride by hexacyanoferrate(III) in aqueous alkaline medium : A kinetic and mechanistic approach

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The kinetics of oxidation of procainamide by alkaline hexacyanoferrate(III) at a constant ionic strength of 1.10 mol dm^{-3} has been studied spectrophotometrically at 25°C. The stoichiometric analysis indicates that, one mole of procainamide requires two moles of hexacyanoferrate(III).

The reaction products are identified and confirmed by IR, NMR and GC-MS spectral studies. The reaction is first order with respect to oxidant, $Fe(CN)_6^{3-}$ and less than unit order with respect to procainamide and alkali concentrations. Increasing ionic strength and decreasing dielectric constant of the medium increases the rate of reaction. The added products did not have any significant effect on the rate of reaction. Based on the experimental results a suitable mechanism is proposed and the following rate law is derived and verified.

Activation parameters are evaluated with respect to the slow step of the mechanism and thermodynamic quantities are also calculated.

Ionic liquid mediated synthesis of pyrano-pyrimidindiones

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Fused pyrimidinones are integral parts of a good number of natural products and drugs[1].Pyrano-pyrimidinonesexhibit a wide range of diverse biological properties[2] such as antitumor, antibacterial, antihypertensive,hepato-protective and anti-allergic activities. Most of these pharmacological activities are due to the presence of uracil species[3].Moreover pharmacological activities of poly cyclic derivatives of pyrimidinones have been less explored. To make the synthesis environmentally benign The Ionic liquids[4] were used, replacing hazardous chemicals, as the reaction media. It has been observed that the Ionic liquid $(Bmim)BF_4$) is very effective for the synthesis of methyl-5-phenylpyrano(3,4,5,6)pyrano(2,3-d)pyrimidine-4,6(3H,5H)-diones.The starting reactants are2-amino-7-methyl-5-oxo-4-aryl-4,5-dihydropyrano (4,3-b) pyran-3-carbonitriles and aromatic acids.$(Bmim)BF_4$ act as a catalyst as well as reaction medium. The ionic liquid can be reused for 5-6 times. The reactions times are relatively low and the yields are high.

Fatty acids present in semecarpus anacardium L. f. flowers, leaves, stembark, rootbark, nuts

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Computer Assisted Drug Designing of Fatty acids from different extracts of semecarpus anacardium L.f. flowers, leaves, stem bark, root bark, nuts yield, 21 fatty acids (saturated, ω–3 unsaturated, ω–6 unsaturated,

ω–7 unsaturated, ω–9 unsaturated fatty acids). The isolated compounds are the first time report from this plant. The structural elucidation of the isolated compounds was finalized based on spectral data (IR, ^{1}H NMR, ^{13}C NMR, MASS, GC-MS / GC Analysis)

LC–MS/MS studies of Lopinavir and its forced degradation products

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Forced degradation of Lopinavir [LV], under the conditions (acidic, basic and neutral), oxidation, thermal stress as prescribed by ICH was studied using HPLC as well LC-MS / MS, degradation products were formed and their separation was accomplished on Hypersil BDS, C18 column (100 x 4.6 mm, 5m) using Potassium dihydrogen Orthophosphate pH 3.20 and Acetonitrile at a flow rate of 1.0 ml / min under isocratic flow elution mode. The method was extended to LC-MS / MS for characterization of the degradation products and the pathways of decomposition were proposed.

Microwave assisted synthesis, spectroscopic characterization and biological studies of some 3d metal complexes of a potentially tridentate Schiff base

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2-Amino-3-carboxyethyl-4,5,6,7-tetrahydrobenzo*[b]*thiophene on condensation with antipyrine-4-carboxaldehyde yielded a novel potentially tridentate Schiff base ligand. The complexes of cobalt(II), nickel(II), copper(II), and zinc(II) were prepared in good yield by the reaction of the ligand with the corresponding metal salts under microwave assisted solvent free condition. The ligand and metal complexes were characterized through elemental analysis, molar conductance, magnetic moment measurements and various spectroscopic techniques such as IR, UV-Vis, ^{1}H NMR, FAB mass and ESR. The spectral data revealed that the ligand acted as neutral tridentate coordinating to the metal ion through azomethine nitrogen, oxygen of ester carbonyl group and carbonyl oxygen of antipyrine moiety. XRD patterns of the ligand and the copper(II) complex indicated their crystalline nature. The antibacterial and antifungal activities of the ligand and the metal complexes were assessed by *in-vitro* testing of their effect on the growth of various strains of gram-positive and gram-negative bacteria (*S.aureus, E.coli, K.pneumoniae and P.aeruginosa*) and fungi (*A.niger, C.albicans and P.notatum*) by disc diffusion method. The results showed that the metal complexes possess increased activity than the free ligand. The DNA cleavage studies were carried out using agarose gel electrophoresis technique. The *in-vitro* alpha amylase inhibitory activity of the ligand and the metal complexes was also examined.

Synthesis, characterization, antimicrobial and catalytic studies of complexes of valsartan with d^{10} metal ions

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Considering the importance of valsartan, its complex with Zn^{ZX} and Cd^{ZX} were prepared by conventional method. After checking the purity, they were subjected to chemical characterization and then after standard instrumental analyses for structure elucidation. On assigning structures, these complexes were subjected to antimicrobial analyses with pathogenic and/or opportunistic micro organism and interesting results were obtained. Furthermore, looking to the catalytic activities of coordination compounds, these complexes were mixed into selected redox reaction systems and around 15% to 20% increase in reaction yields, increase in reaction rates and there by decrese in reaction times were observed.

Divalent metal complexes derived from succinyldihydrazide and dimedone

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A new series of macrocyclic complexes of the type [M $(C_{12}H_{18}N_4O_2)$ X_2]; where M=Co (II), Ni (II), Cu (II) & Zn (II) and X= Cl^-, NO_3^-, OAc^- has been synthesized by template condensation reaction of succinyldihydrazide and dimedone in 1:1:1 molar ratio. The stereochemistry and coordination behaviour of transition metal complexes of a 14-membered tetraazamacrocyclic ligand (12, 12-dimethyl-2, 3, 8, 9-tetraazatetradeca-1, 9-diene-4, 7-Dione) have been investigated with the help of various physico-chemical techniques *viz.* elemental analyses, magnetic susceptibility, conductivity measurements and spectral (IR, electronic, mass, NMR & EPR) techniques. The elemental analyses and spectral studies are in agreement with the proposed framework of the new macrocyclic complexes and indicate towards distorted octahedral geometry around the central metal ion. The low value of molar conductivity in DMSO points towards the non-electrolytic nature of the complexes. The complexes were also screened *in vitro* against a number of pathogenic fungi and bacteria to assess their growth-inhibiting potential. Some of the complexes were showing remarkable activities against pathogenic microbes.

Biosensor for online monitoring of ultra-trace level mercury in continuous stream

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Whole cell based biosensor using algae *Chlorella* sp. is reported for ultra trace level detection of mercury in aqueous medium. The proposed sensor is highly selective for mercury ions in presence of potential interfering ions like silver, zinc, calcium and sodium ions. The biosensor is optimized for substrate concentration, pH,

response time, and durability. The electrode shows linear response in concentration range of 10^{-14}M to 10^{-6}M for mercury ions and has a lifetime of 14 days. The biosensor has been used for online selective determination of mercury ions in a continuous flow system. A new assembly for online voltammetric determination was designed and used for the measurement of mercury ions in a detection range of 10^{-14} M to 10^{-6} M. The biosensor performed with an excellent selectivity, sensitivity and reproducibility in an aqueous stream with a flow rate varying in the range of 0.5 mL / min to 1.5 mL / min. Real sample analysis was carried out using proposed biosensor and was validated with the chronoamperometric mesurements taken in batch mode and with atomic absorption spectrometry. Results are also compared with the existing measurement methods and are found better in terms of selectivity and detection limit.

Biodegradation of organophosphate pesticide quinalphos by *orchrobactrum* sp. AS12

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Organophosphate pesticide quinalphos is extensively used in controlling the pests of variety of crops including fruits and vegetables. The large scale use of quinalphos poses a health hazard to animals and humans because of its persistence in the soil and crops. Organophosphate pesticides are neurotoxic, genotoxic and carcinogenic to mammals. Microorganisms plays a significance role in detoxifying pesticides in the environment. We have isolated a soil bacterium capable of degrading quinalphos and identified as *Ochrobacterium* sp. AS 12. The organism was versatile in degrading various organophosphate pesticides quinalphos, profenofos, methyl-parathion and chlorpyrifos. Response surface methodology (RMS) showed optimum conditions for quinalphos degradation at pH 7 and 27°C. 2-Hydroxyquinoxaline and diethyl phosphate were identified as metabolites of quinalphos degradation by HPLC and GC-MS analysis. Cell-free extract of *Ochrobacterium* sp grown on quinalphos contained activities of quinalphos hydrolase. Thus the organism degraded quinalphos by hydrolysis to yield 2-hydroxyquinoxaline and diethylphosphate which were further utilized as carbon sources. This Strain could potentially be useful in the bioremediation of soils contaminated with toxic organophosphate pesticides.

Effect of chitosan molecular weight of chitosan-citrate film on site specific *in vitro* release of ofloxacin

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Chitosan, a biodegradable and biocompatible polysaccharide, is a potentially useful material in various fields. Chitosan films with different molecular weights (MW) of chitosan were developed followed by incorporation of Ofloxacin as a model drug by a casting / solvent evaporation technique. And citrate cross-linked films were prepared simply by dipping film into sodium citrate solution. The swelling ratio of citrate / chitosan film was sensitive to pH and ionic strength studied here. These films were characterized by release and swelling studies, DSC, Opical microscope coupled with Raman spectroscopy, SEM, Drug release based on cross linking time. Concentration of cross linking agent significantly influenced the *in vitro* release of drug as well of swelling of the films. The higher the MW of chitosan lower release rate was observed. The present study showed that MW and cross linking time of films regulatd the varying swelling and drug release at pH 3.5 and pH 6.2. In addition, it indicated that the citrate/chitosan films were useful in drug delivery i.e., site-specific controlled drug release in stomach.

Thermoanalytical studies of Hg (II) complex derived from Schiff base of salicylaldehyde and 5-amino-1, 2, 3, 4-thiatriazole

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Thermoanalytical methods have become an established method in the study of thermal behavior of materials and finds wide applications. Kinetic study of complex compound is one of them. 5-amino-1, 2, 3, 4-thiatriazole was prepared by diazotization of thiosemicarbazide. Schiff base is prepared by condensing 1:1 molar solution of salicylaldehyde and 5-amino-1, 2, 3, 4-thiatriazole in acidic medium. Complex compound was obtained by refluxing warm solution of Mercuric (II) acetate in N-methyl pyrilidone and Schiff base dissolved in NMP. The blackish complex so obtained was filtered, washed with doubled distilled water and dried in oven at 100^0C. The reaction of mercuric (II) salt with Schiff base ligand(L) resulted in formation of a solid complex $[Hg(II)L_2]$.

The recorded thermo gram shows two stages of decomposition. First stage of decomposition was selected for the study of kinetic parameters using different methods like Freeman-Carroll, and Doyles method as modified by J. Zsako. The order of reaction, activation energy, apparent activation entropy and apparent frequency factor were found 1, 24kcal/mol, -19.96623e.u. and 2.88819×10^4 sec^{-1} respectively which are in good agreement with each other and may be utilized in study of solid state kinetics.

Defluoridation of water using natural and chitosan nano material

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The study assesses the suitability of inexpensive leaf, root and shoot adsorbents to effectively remediate fluoride contaminated water. The study of sorption of fluoride comprises of pH, contact time, adsorbent dose, type and size of adsorbents and initial fluoride ion concentration data of fluoride and is well corrected by Longmuir models.Treated various parts of Plant was studied at various PHs (2, 4, 6 and 8) with a series of aqueous solution containing 2, 3, 5, 6, 8, 10, 12 and 15 mg F At the highest F- ion concentration (5 mg) the F ion level is the efflunt gradually decreased to 0mg/l within 180min at 29 + 0.5oC .when the dose of adsorbent is l0 g/l in a sample of 50 ml volume with lower F ion concentration (2 mg/l)in the feed solution The flouride ion concentration steadily decreased reaching 0 mg/l after 150 min. Langmuir isotherm fits well for defluoridation of water using leaf, root and shoot powder. Chitosan nano particle biosorbents have been prepared and their various properties like FTIR and scanning electrons micrograph. Graph of some adsorbent have been recovered to ascertain fluoride adsorbent capacity of prepared material.

The process and the mechanism of adsorption of fluoride content of the sample have studied. The attempts have been made to evaluate the rate constant and time maxima. The fluoride absorption capability of chitosan nano particle adsorbed have studied. The adsorption studies has been made by using Langmuir adsorption isotherm. The kinetics and mechanism of removal process has been discussed by Langmuir adsorption isotherm and with the use of Freundlich equation q_e=K $c^{1/n}$. the order of removal by freundlich adsorption so them has been discussed. It has been shown kinetically and mechanistically that nano particle is good adsorbent materials known so far for reducing fluoride content from the water sample.

Adaptability of green solvents in chemical analysis by thin layer chromatography for sustainable development of analytical processes

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Because of the increasing day-to-day environmental problems, search for environmentally benign green-solvents has been the prime priority of chemists working in the area of organic synthesis, drug analysis and analytical separation processes. The term "Green Chemistry" introduced by P. T. Anastas in 1990's has become a guiding source for chemists to address environmental issues through environmentally conscious designing of chemical technologies and analytical processes. Before 1990, the aim of scientists was to develop new methodologies without taking into consideration the effect of solvents and auxiliaries being used by them on the environment. The disposal of several volatile organic solvents (VOCs) used in laboratories and industries has adverse effect on the environment. To protect environment from the negative impact of solvents, the search for greener and alternative solvents have grown enormously during last twenty years. As regards to chromatography, emphasis has been to develop green analytical techniques either by modifying existing methods or by introducing new methodologies in order to reduce/ eliminate the use of hazardous VOCs.

In this direction, certain green thin layer chromatographic systems using environmental friendly solvents have been developed in our laboratory for achieving efficient resolution of multi-component mixtures of chemical species. The interesting worked-out green thin layer chromatographic procedures using water (greenest solvent)- based solvents and mixed green organic systems will be presented as guiding routes for further development of environmentally acceptable analytical techniques.

An overview of various strategies developed on the modification of titania for visible light response with enhanced interfacial charge transfer process

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Doping of transition metal ions in TiO_2 lattice within certain limits prolongs the charge carrier life time and also extends the band gap absorption to the visible region either through d-d transition or interband transition from dopant level to band gap states. Metal ion doped titania prepared by applying ion-engineering techniques such as ion-implantation and RF magnetron sputtering deposition method showed high efficiency for water splitting reaction under visible light. Although, reports on enhanced activity of metal ion doped TiO_2 compared to the benchmark photocatalyst Degussa P25 is widely reported, the thermal instability as well as increased recombination due to metal ion inclusions limits its scope. In case of non metal ion doping, the p orbital of dopant atom hybridizes with O 2p orbital resulting in visible light response. It is argued that this response mainly originates from color centers. Nitrogen doped rutile TiO_2 has shown to increase the oxidation power of holes due to the downward shift of valence band maximum. This indicates the phase structure dependence of titania in tuning the redox properties of the charge carriers. The dense localized surface states with favorable surface structure in the non metal ion doped titania promotes the separation of photoexcited charge carriers. Surface sensitization of tiania by coupling with narrow band gap semiconductor, organic dyes, inorganic metal complexes or conjugated polymers enables the utilization of the large fraction of solar spectrum. In the above cases, interfacial electron transfer takes place from the excited state of the sensitizer to conduction band of titania with charge separation followed by dioxygen reduction. The self degradation and lower adsorption of the sensitizers on titania surface and their relative physical / chemical instability hinders its practical application. In most of the cases, sacrificial electron donor should be continuously added to regenerate the sensitizers. Another novel version of coupled semiconductor is $FeTiO_3/TiO_2$, wherein transfer of holes from sensitizer to titania takes place. Chelating compounds like H_2O_2 or chlorophenol with surface Ti-OH groups can result in visible light response for titania *via* ligand to metal charge transfer transition which is critically dependent on the nature of the groups anchored on the titania surface and their electron density. Surface fluorination of TiO_2 has drawn significant attention in recent years since it facilitates the generation of free hydroxyl radicals which are highly oxidative as compared to the surface bound hydroxyl radicals. The replacement of isovalent hydroxyl groups by fluoride ions forces the holes to oxidize solvent water molecules and adsorbed fluoride ions desorbs the surface bound hydroxyl radicals in the Helmholtz layers generating free hydroxyl radicals. In addition, surface ≡Ti-F serves as reactive electron trapping site with enhancement in the formation of singlet oxygen. Noble metal deposition on titania serves as passive sink for electrons *via* Schottky barrier and also shifts the band gap absorption to visible region due to the surface Plasmon resonance effect and the efficiency depends on the work function of the deposited metal. Synthesis of titania by co-doping with two or more foreign ions has drawn significant attention for its multifunctional electronic properties, favorable surface structure, stability, reusability and for enhanced efficiency. However, it is suggested that the defects and imperfections within the lattice caused by co-doping have little adverse effects on the activity of titania. Towards the end of this century, exploring the photocatalytic application of anatase {001} facet was another recent venture in TiO_2 photocatalysis since they have higher surface energy compared to widely reported {101} facet.

Synthesis, structure and biochemical properties of some bridged copper(II) complexes

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Current interest in Copper complexes is stemming from their potential use as antimicrobial, antiviral, anti-inflammatory, antitumor agents, enzyme inhibitors, or chemical nucleases. It is evident that such compounds could be very important in medicinal procedures, and their role has probably been underestimated. Some new bridged copper(II) complexes, viz., $[(Bipy)_2Cu\text{-}Im\text{-}Cu(Bipy)_2](ClO_4)_3$ **1,** $[(dien)Cu\text{-}im\text{-}Cu(dien)](ClO_4)_3$ **2,** $[(PMDT)Cu\text{-}Ox\text{-}Ni(PMDT]^{2+}$ **3,** $(L^1)Cu(\mu\text{-}CH_3COO)_2Cu(L^1)].4,4\text{-}bipy$ **4**, $[(L^2)Cu(\mu\text{-}NO_3)_2Cu(L^2)]$ **5**, $[(L^3)Cu(\mu\text{-}CH_3COO)_2Cu(L^3)]$ **6**, $[(L^3)Cu(\mu\text{-}NO_3)_2Cu(L^3)]$ **7,** $[Cu_2(\mu\text{-}benzoato)(L^4)2]NO_3{\cdot}2H_2O$ **8,** $[Cu_2(\mu$-

succinato)$(L^5)_2(H_2O)]$ ClO_4 **9,** $[Cu_4$(2-Pca)4- $(NH)_2(bipy)_2](ClO_4)_2H_2O$ **10,** and [(dien)Cu(μ-Cl_2)-Cu(dien)]$(ClO_4)_3$ **11** where (bipy = 2,2-bipyridine, Im^- = Imdazolate ion, Ox^{--} = Oxalate ion, dien = diethylenetriamine, PMDT = Pentamethyle diethylenetriamine L^1 = N'-[phenyl(pyridin-2-yl)methylidene]furan-2-carbohydrazide, L^2 = (2E,4Z)-N,2-dimethylhepta-2,4,6-trienamide-1-phenyl-1-pyridin-2-ylmethanimine and L^3 = N'-[phenyl(pyridin-2-yl)methylidene] benzohydrazone) μ-CH_3COO^- = μ-acetato / μ-NO_3^- = μ-nitrato, L^4 = N2 -[(E)-phenyl(pyridin-2-yl)methylidene]benzoylhydrazone and L^5 = N2 -[(E)-pyridin-2-ylmethylidene]benzoylhydrazone, 2-Pca = the pyridine-2-carboxylate ion, NH = nicotinic acid hydrazide) have been prepared and physiochemically characterized. These complexes are structurally characterized by X-ray crystallography. In complexes (**4-7**), the two copper centers are linked by two acetate or two nitrate groups in *end-on* bonding fashion. The copper–copper separation is 5.0-5.35 Å for **1** & **2,** 5.35 Å for **3**, 3.28 Å for **4**, 3.46 Å for **5**, 3.34 Å for **6**, 3.40 Å for **7,** 3.10-3.17 Å for **8** & **9**, 5.32 Å for **10** and 5.20 Å for **11**. The cyclic voltammograms (CV) of these complexes have been investigated. The cathodic CV of these complexes (**1-11**) displays two reduction waves. Two one electron reductive responses are observed due to metal coupling for these complexes. The purpose of the present talk is to give insight to the multiple physiological activities of copper, with particular focusing on the biochemical action of copper complexes and their applications in medicine.

Synthesis of mononuclear complexes with azlactones and their DNA binding studies

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Exploring new class of homonuclear complexes may allow the discovery of agents that possesses enhanced biological properties. The program of present study is the preparation and characterization of metal complexes based on mixing different transition metal salts with azlactones in the ratio of 1:1 and 1:2. To mimic the chemical structural and electrochemical properties of vitamin B_{12} and its derivatives, zinc and nickel complexes we have proposed to study the Co(II), Zn(II) & Ni(II) complexes of substituted azlactones.

Azlactones(anhydrides of α-acylamino acids) are formed by the condensation of aromatic aldehydes with acyl derivatives of glycine in the presence of acetic anhydride and anhydrous sodium acetate (Erlenmayer azlactone synthesis). Thus aromatic and hetero aromatic aldehydesand 2-(2-hydroxybenzamido)acetic acid (I)yields the azlactone of α-acetamino or α-benzylamino cinnamic acid. The resulting 4(-Arylidine)-2-(hydroxyl phenyl)oxazol-5(4H)-one(II) is treated with Metal salts.The hot methanolic solution of ligand and hot methanolic solution of metal salt (MX2, where M = Cu(II), Ni(II), Co(II), Zn(II) and VO(IV) ; X = Cl / acetates / SO4) were mixed together with constant stirring. The metal to ligand ratio was maintained at 1:2 molar ratio. The mixture was refluxed for 2-3 hrs at 70-80°C on water bath. On cooling, coloured solid product was precipitated out. The product was filtered, washed with cold methanol and dried under vaccum.The DNA Binding interaction studies are carried on the obtained Metal complexes.

M= Cu(II), Ni(II), Co(II), Zn(II) and VO(IV)

X = Cl,Acetates,SO_4-2)

Synthesis of 5-aryloxypyrazole derivatives bearing substituted thiazoles as potential antimicrobial agents

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Pyrazole ring is a ubiquitous motif in biologically active compounds and therefore represents an interesting template for combinatorial as well as medicinal chemistry. Pyrazoles represent a key structural motif in heterocyclic chemistry and occupy a significant position in medicinal and pesticide chemistry because of their capability to exhibit a wide range of biological activities including antimicrobial, anti-inflammatory, analgesic, antioxidant, angiotensin antagonists and cytotoxic agents. Also in the literature the use of 5-aryloxy pyrazoles are reported to be potent antimicrobials, androgen receptor antagonist and herbicidals. Compounds containing thiazole ring play a prominent role in numerous biologically active natural and synthetic compounds. Hence, biheterocylic compounds with thiazole and pyrazole hybrids are found to be highly versatile systems displaying wide variety of pharmacological activities. Based on the above observations and our interest on the development of new bioactive molecules, we report the synthesis and biological activity of novel series of aryloxy pyrazolo - thiazoles carrying bioactive 3-aryl sydnone, coumarin, nitrofuran and 4-nitro phenyl groups with excellent anti-microbial moiety.

Synthesis and characterization of magnetite colloids and their role for sorption of various radionuclide’s

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Magnetite colloid has been synthesized by solution route for use as a sorbent for various radionuclides. It was characterized by X-Ray Diffraction, zeta potential, BET surface area, FTIR spectroscopy and site density measurement. Sorption of ^{137}Cs, ^{90}Sr, ^{154}Eu and ^{141}Ce bymagnetite colloid has been studied at varying pH (4 to 11) in the presence and absence of humic acid. The sorption studies have also been carried out with varying the ionic strength (0.01M to 0.2M $NaClO_4$) and humic acid concentration (2mg/L to 20 mg/L). Percentage sorption of ^{137}Cs and ^{90}Sr was found to be pH dependent, with increase in sorption with increasing pH of the suspension. At all pH, the percentage sorption of ^{90}Sr was higher than that of ^{137}Cs. The results have been explained in terms of the electrostatic interaction between the positively charged metal ions and the surface charge of magnetite which becomes increasingly negative with increasing pH. On the other hand, ^{154}Eu and ^{144}Ce were found to be strongly sorbed by magnetite at all pH values, with sorption being independent of pH. The strong sorption of trivalent and tetravalent metal ions suggests the role of complexation reactions during sorption, apart from the electrostatic interactions. Presence of humic acid (2mg/L) was found to have negligible effect on sorption of all metal ions.

Densities, ultrasonic velocities and viscosities of substituted pyrazole in dioxane-water mixture at 298.15K

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Density, ultrasonic velocity and viscosity of ligands, 1-phenyl-3-(2-hydroxyphenyl)-5-methyl pyrazole (L_1) and 3-(2-hydroxy-4-methylphenyl)-5-methyl pyrazole (L_2) in 70% dioxane-water mixture have been measured at 298.15 K. Studies were carried out in the concentration range of 0.02 to 0.1M of ligands in 70% Dx-water mixture. The experimental data is used to computed various thermodynamical and acoustical parameters; adiabatic compressibility(β), inter- molecular free length(L_f), acoustical impedance(Z), relative association(R_A), apparent molar compressibility (Φ_β), apparent molar volume (Φ_V) relaxation time(Γ), absorption coefficient(Abs_{coeff}) , internal pressure (π_i), Gibbs free energy (ΔG), free volume (V_f) and Wada's constant (W) etc have been used to identify the existence of intermolecular interaction. The density, ultrasonic velocity and viscosity increases with increase in concentration of ligands L_1 and L_2. The results have been discussed in terms of solute-solvent, solvent-solvent interaction.

Mixed sulfur donor ligand complexes of antimony(III)

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By the reactions of antimony(III) precursors with 1,1-dithiolato, 1,2-dithiolato and other thiolato ligands in suitable molar ratios in suitable anhydrous organic solvents with varying temperature and time, a large number of antimony(III) complexes with mixed sulfur donor ligands have been synthesized. These compounds are of various shades of yellow (cream yellow, pale yellow, light yellow, yellow, dark yellow, and orange) coloured solids or semi-solids and are more or less soluble in common organic solvents. These have been characterized by physicochemical (elemental analysis, melting point and molecular weight determination), spectral [UV-Vis, IR, NMR (^{1}H and ^{13}C)] and thermal (TG / DTA) analysis, mass spectral and X-ray diffraction studies. Upon thermal decomposition highly pure antimony sulfide (Sb_2S_3) is obtained and powder X–ray diffraction studies show that the complexes are crystalline in nature, lower symmetry and nano ranged particle size. These complexes have also been screened against Gram$^+$ and Gram$^-$ bacterial and fungal species. These are found to be comparable and more active than the free ligands and standard drugs.

The single crystal X-ray study of *tris*(*N,N*-dimethyldithiocarbamato-*S,S'*)- antimony(III) found it to be a dimer with Sb···S and C–H···S interactions as well as chloro*bis*(*N,N*-dimethyldithiocarbamato-*S,S'*)antimony(III) also found it to be a dimer with C–H···Cl interaction as in supramolecular structure.

Metal complexes of neutral tridentate ligands derived from thiazole and coumarin moieties : synthesis, analytical and anti-TB activity study

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Series of first row bivalent cationic transition metal complexes were synthesized with the newly synthesized Schiff bases derived from thiazole and coumarin moieties. Structural elucidation of Schiff bases and their metal complexes was done on the basis of spectral (IR, NMR, GCMS, ESIMS, ESR, Fluorescence etc.), magnetic and thermo analytical data. Red-ox behavior investigation was carried out by the cyclic voltammetry. Molar conductance values confirmed the electrolytic nature of the metal complexes. The synthesized Schiff bases and their metal complexes have been evaluated for their in-vitro anti-TB activity by MIC method.

Investigation of the antimicrobial activity of thiazolidinedione based antidiabetic scaffolds

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Wide spread resistance too many commercially available antibiotics is emerging and it is predicted that resistance to these agents will only increase. There are now examples of both Gram-positive and Gram-negative infections which are resistant to all known commercial agents. The discovery of novel antibacterial agents working through an unexploited mechanism of action are less likely to be compromised by pre-existing resistance mechanisms to currently used antibiotics. As part of our eûort to identify such new antibiotic agents, here, we present results of antimicrobial activity of our pyridine based TZD compound collection for whole cell activity against different biological species.

Corrosion protection of stainless steel in vegetables by aloe vera juice

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Vegetables are very important food for human beings. People make varieties of items with vegetables. They can generally use stainless steel related container for competition of these purpose. Most of the vegetables are acidic in nature. Farmers are used bulk amount of insecticides and pesticides for protection insects and these chemicals increase acidic character of vegetables. When these vegetables keep in stainless steel utensil, after certain time it is noticed that colour of the vegetables change. It happens due to formation of corrosion cell on the surface of metal. The electrochemical reaction starts and metals ions go into vegetables. In this way vegetables are contaminated. The contaminated vegetables create several types diseases and decrease their nutrition values. Metal ions reduce efficiency of vitamins in vegetables. The acidic vegetables produce

several types of corrosion like galvanic corrosion, pitting corrosion, uniform corrosion, crevice corrosion and stress corrosion.

The corrosion rate of metal studied with gravimetric and potentiostaic polarization methods. Inhibitor used for this work was alovera. Aloevera inhibition efficiency and surface coverage area studied at different concentrations and temperatures. The concentration of aloevera selected 2ml, 4ml and 6ml and temperature maintain on these concentrations were 20^0C, 25^0C, 30^0C and 35^0C. The corrosion rate determined with and without inhibitors at different intervals of times like 24hrs, 48hrs, 72hrs and 96hrs. The surface adsorption phenomenon studied with help of Langmuir and Temkin isotherm. Activation energy increased after addition of inhibitor. It means that adsorption takes place on the surface of metal. Heat adsorption, free energy, enthalpy and entropy found to be negative so it is a sign of adsorption. Thermodynamical results indicated that aloevera bonded with metal by physical adsorption.

Synthesis, characterization and biological screening of thioether derivative of 2,5-dichloro-3,4-diformyl (N-substituted phenyl) pyrrole

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The heterocyclic compounds are very much importance due to their biological activities. The formyl group attached to pyrrole molecules make them promising precursors for further synthesis transformation. Thioether compounds possess broad spectrum biological activities such as fungicidal, insecticidal, herbicidal & plant growth regulating activities some heterocyclic thioether derivatives have been also reported to exhibit good antiviral activities. Due to these many workers are interested in the synthesis of thioether compounds with heterocycles.

To achieve our aim we diformylated succinimides using Vilsmeier Haack reagent to get 2,5-dicloro-3,4-diformyl (N- substituted phenyl) pyrroles. The succinimides in turn were obtained from succinic acid & aniline. The diformylated compounds were then converted into thioether derivatives by treating with sodium sulphide, ethyl bromide in dry DMF as solvent. All the compounds were characterized and screened for antimicrobial activities.

Estimation of total polyphenolic contents and antioxidant activity of some plants of cucurbitaceae

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Medicinal plants rich in various chemical compounds such as polyphenols, flavonoids, tannins, alkaloids, amines, terpenoids, carotenoids, vitamins, act as antioxidants and scavenge free radicals thus minimizing their deleterious effects. In the present study we tested fruits of five plants of family cucurbetaceae i.e.

Lauki(*L. siceraria*), Karela(*M. charantia*), Tarbuz(*C. lantus*), Kaddu(*C.maxima*) and Taroi (*L.actungula*) for their total polyphenolic contents and free radical scavenging activity. In this study we observed significant IC_{50} values of methanolic extracts of chosen fruits.

Effect of PEDOT : PSS films and their applications in polymer photovoltaic devices

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The introduction of donor–acceptor heterojunctions made small molecules and conjugated polymers attractive candidates for the fabrication of cost-efûcient and ûexible power sources. Polymer conductivity is key factor to improve the performance of the electronic and photonic devices. Poly(3,4-ethylenedioxythiophene): poly(styrenesulfonate) (PEDOT:PSS) is promising to be the next-generation transparent electrode of optoelectronic devices. In this research, we investigated the high efficiency of an OPV for which PEDOT:PSS and active layers were fabricated by spray deposition using the air brush coating method. In order to improve the conductivity of spray-deposited PEDOT:PSS, we modified the PEDOT:PSS films *via* simple UV irradiation and UV irradiated solvent modified PEDOT:PSS using various solvents like methanol, ethanol, acetone, acetonitrile, hydrochloric acid and sulphuric acid to form a hole transport layer (HTL). The active layer of PTB7:$PC_{70}BM$ is spray coated on the top of PEDOT:PSS layer. The films were investigated using optical spectroscopy, mirco-Raman spectroscopy and conductivity measurments. The surface morphology of the films deposited was examined using Atomic Force Microscopy (AFM). The current density(*J*)-voltage(*V*) characteristics were measured under the illumination of simulated solar light with 100 mW / cm^2 (AM 1.5 G) by an oriel 1000 W soalr simulator. The obtained results show a considerable impact and bright future for organic polymer solar cells.

Environmental effects of chemicals used on the food and nutritional potentials of agricultural products

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With the growth of population for the bigger country like India, it becomes essential to achieve the targeted level of food grain production. “To meet the increasing food grain demand, the use of chemicals, such as inorganic fertilizers, pesticides, insecticides, organic wastes, sewage, sludges in modern agriculture are also increasing, which have serious adverse effects on the environment creating serious threats to human as well as animal beings. Therefore, agriculture technologies, like crop rotation, green manuring, crop and animal residues, conservation of natural resources, nutrient management, application of organic manure together with need based use of Inorganic fertilizers and pesticides should be encouraged to preserve the environmental quality. Such encouraging efforts will be of much importance for facilitating the production of pure foods having high nutritional potentials.

Comparative anticancer potential of an Indian spices-overview

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Indian spices not only add aroma and taste to the food, but also possess certain medicinal values as well. Spices or their active compounds could be used as possible ameliorative or preventive agents for the health disorders. Many Indian spices like turmeric, red chili, coriander, cumin, and mint have been proved to cure the diseases ranging from common cold and cough to cancerous tumors. Besides India, spices are also produced in several other parts of the world, but those produced on the Indian land are totally incomparable in attribute. Nowadays, these spices are getting much fame in the west as well. The role of some spices used in the Indian kitchen for its flavour and taste which are potential to maintain a healthy heart will be discussed in detail in presentation.

Body mass index studies of inhabitants of some fluorosis and arsenic affected villages of Bihar (India)

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The WHO regards a BMI of less than 18.5 as underweight and may indicate malnutrition, eating disorders or other health problems while BMI greater than 25 is considered over weight and above 30 is obese.

However, in some regions of the world including our country earth crust is rich in fluoride bearing minerals due to which the ground is naturally fluoridated. Intake of excess fluoridated water for a prolong period causes fluorosis which is a proven cause of physical deformities of one kind the other. Nearly 66.6 million people including 6 million children below the age of 14 years in 20 states of our country including Bihar are affected with dental, skeletal and non-skeletal fluorosis due to intake of fluoride contaminated drinking water. In Bihar 4157 habitants spread over 98 blocks in 11 districts including NAWADAH district have been found to have visible cases of fluorosis in large number of population due to high fluoride concentrations in ground water, the main source of their drinking and cooking water.BMI Studies have been done in many countries of the world to find correlations between BMI and various types of health problems of the people. But BMI Study of the inhabitants of fluorosis endemic areas has not yet been done. A preliminary study done by our team in FLUOROSIS affected villages KACHHERIADIH, MUSLIMTOLA, CHAUTHA and HALDIA of RAJAULI Subdivision of NAWADAH district have shown that a large number of inhabitants of these villages have low BMI value. Similar BMI studies on inhabitants of few others nearby villages which do not have the cases of fluorosis have, on an average, a higher trend of BMI values. The study indicates a probable connection between fluorosis in people and their BMI value. This research work plans to carry out extensive BMI studies of inhabitants of the above stated fluorosis affected villages of NAWADAH district with a view to establish the relations, if any, between Body Mass Index of the people and the level of fluoride in their drinking water sources. our team has also initiated research work in the direction of developing a defluoridator using burnt brick pieces as filter material . These defluoridatros are low cost,easy to fabricate and operate , easy to change the filter material by the beneficiary families themselves and which is associated with the least health hazards . A team of researchers headed by the authors visited Institute of Fundamental Studies, Kandy, Sri Lanka. Similar results also found for the people who have been consuming arsenic contaminated drinking water in Patna Diara area in gangetic belt.

Correlation analysis among physico-chemical and biological parameters of river ken water quality in Distt. Banda (U.P.)

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The present study was carried out to analyse water of river Ken for various physico-chemical and biological characteristics in summer, Year 2012. Water samples were collected from seven villages situated at the bank of river Ken in distt. Banda (U.P.). Parameters investigated were pH, electrical conductivity, turbidity, T.D.S., total solids, D.O., B.O.D., C.O.D., chloride, sulphate, phosphate, nitrate, total alkalinity, total hardness, calcium hardness and total coliforms. Analysis of water quality with respect to above parameters was carried out using standard methods for examination of water and wastewater. The results were compared with drinking water quality standards prescribed by WHO. Correlation analysis was conducted to know the relationship among the said parameters. A significant correlation was found among the aforesaid parameters. Strong correlation was found between EC and turbidity, EC and total hardness, EC and chloride, chloride and calcium hardness, and chloride and total hardness. Moderate correlation was found between EC and total alkalinity, EC and total solid, EC and nitrate, TDS and phosphate, total coliform and chloride, TDS and turbidity, and total alkalinity and turbidity. Correlation recorded between EC and COD, TDS and COD, TS and COD, phosphate and COD was of weak category.

Studies on inclusion complexes of N-(4-oxo-3-phenyl thiazolidin-2-ylidene)-nicotinohydrazide derivatives with β-cyclodextrin

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Thiazolidinones and their derivatives are well known for their versatile physiological activities. Nicotinic acid and its amides have also proved to be powerful antimicrobial agent. All these facts were driving force to synthesize N-(4-oxo-3-phenyl thiazolidin -2-ylidene)-nicotinohydrazide and its derivatives starting from nicotinic acid hydrazide. Since these therapeutic agents possess low intrinsic aqueous solubility, their corresponding inclusion complexes have been prepared with β-cyclodextrin so as to increase their solubility in polar medium. The formation of the compounds and their inclusion complexes have been ascertained from their elemental and spectral analysis. The antimicrobial and antioxidant activities of the compounds and their inclusion complexes have been evaluated. It is found that the inclusion complex formation increases the antimicrobial and antioxidant activities significantly.

CoFe-ZET : A green catalyst for MCRs

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Herein in the present scenario when there is a growing interest where both academia and industry are sharing common platform to face the challenges with respect to the modern societies to the environment, we are screening the easy synthetic method to synthesize new zeolite frame work (XRD Analysis) having FFC topology bearing Iron (Fe) and Cobalt (Co) as important core ingredients (EDAX Analysis). The synthesis of the (CoFe ZET) zeolite is achieved by hydrothermal treatment under vacuum which possesses advantages of energy efficiency over conventional methods. The core ingredient units are responsible for increase in reactivity on micro structured (FE-SEM analysis) surface of CoFe-ZET zeolite. This is an important feature which makes it a better & sustainable catalyst in case of well familiar heterocyclic multi-component reactions by facilitating accessibility for reactants to react on solid support. It is environmentally benign and thermally stable (TGA Analysis) heterogeneous catalyst which not only reduces reaction temperature but also reduces reaction time in case of multi-component reactions (MCRs). Herein this preceding, we attempt to explore novel and better experimental techniques towards eco-friendly synthetic strategies. The key synthetic protocols we have executed are co-ordination, cyclization, condensation etc. It ultimately results in increase in percent of yield, time reduction in reaction execution, use of less hazardous solvents, safety, atom economy etc.

Removal of dyes by the synthesize adsorptive catalyst from fly ash and clay

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In the present era of industrialization, dyeing and finishing are most important process in the many industries. The waste coming from these industries can affect our atmosphere. Hence contaminations due to dyes pose not only a severe public concern but also many serious environmental problems because of their persistence in nature and non biodegradable characteristics. In the present study the removal of dye over synthesized catalyst by adsorption technique has been studies. New catalysts were synthesized by mechanical, thermal and chemical activation of fly ash and clay by loading other adsorbent on its surface. Methods are developed to keep the catalyst suspended for longer period for fast and effective removal of dye particles. The batch technique was adopted and removal data were fitted into Langumuir, Freundlich adsorption isotherms and thermodynamic parameters were also estimated in order to study the nature of system.

Some high coordination compounds of lanthanides (III) derived from Schiff bases

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Initially coordination chemistry of lanthanides was limited to strongly chelating ligands with oxygen as donor atom. With the development of new complexing compounds, a significant number of lanthanide

complexes with various types of ligands were synthesized and characterized. The chemistry of metal complexes with heterocyclic compounds containing nitrogen, sulfur and oxygen as complexing ligands has attracted increasing attention. These compounds are worth attention for many reasons due to their biological activities while many drugs involve heterocycles, sulfur, oxygen, nitrogen, amino-nitrogen, azomethine-nitrogen and alcoholic or phenolic-oxygen are some of the donor atoms of interest. Pyrazolones (N-heterocyclic compounds) is an active moiety as a pharmaceutical ingredient, especially in non-steroidal anti-inflammatory agents used in the treatment of arthiritis and other musculoskeletal and joint disorders. Earlier work reported that some drugs showed increased activity when administered as metal-chelates rather than as simple organic compounds.

Lanthanides constitute an interesting group of 15 elements with similar physico-chemical properties which change periodically with the atomic number. Lanthanide compounds frequently have magnetic, catalytic and optic properties and therefore they are widely used in industries. In recent years new experimental methods have been developed due to which new data on the role of lanthanides in the biochemical processes operating in cellular membranes organelles and cytoplasm have been obtained. The coordination compounds formed by lathanides (III) generally display the coordination number varies from six to twelve with different geometries. In present lecture, the author reports the summary of the work mostly carried out in our laboratory on lanthanide (III) complexes of Schiff bases derived from 4-aminoantipyrine and their properties.

Role of five membered heterocycles as inhibitors in polymerization of vinyl monomers

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Heterocycles continue to be a major contributing nucleus in many of the polymer formation reactions, the five memberedheterocycles are a class of naturally occurring compounds that displays a wide range of inhibiting property. In recent years, the development of various five membered heterocycles as inhibitants to polymeric materials has been undertaken. A number of improved procedures have been reported in recent years for various polymers and their retarders.

Polymerisable vinyl monomers undesirably polymerise during various stages of manufacturing, processing, handling, storage and use thereof. It is a known fact that when temperature increases, the polymerization of vinyl polymers also increases. These polymers may polymerase when left in storage tanks and during transportation at temperatures as low as room temperatures. To prevent this, vinyl monomers are frequently treated with polymerization inhibitors.

A variety of compositions and methods have been proposed for inhibiting uncontrolled polymerization of vinyl monomers. New targets are identified for different inhibitors of five membered heterocycles.

In the current lecture, the chemistry of five membered heterocycles namely, thiophene, 2-acetyl thiophene, furan and 2-acetyl furan used for inhibiting the polymerization of vinyl monomers important findings from authors' lab will be presented.

Indoor environmental air quality : Case studies

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Indoor air pollution consists of toxic gases or particles that can harm your health. The effects of indoor air pollutants range from short term effects-eye and throat irritation to long term effects-respiratory diseases and cancer. The health impacts of many chemical components in building are not well understood. Many chemicals present in indoor air environments have not been thoroughly tested and little is known about their long-term health effects. Even less understood are the health effects from constants exposures to mixtures of these chemicals. This presentation reviews few studies done in North Central part of India (Agra) region in homes and buildings located in different microenvironments i.e., rural, urban and roadside during last ten years. Sampling was performed to monitor time series concentration of PM concentration as well as gaseous pollutants. Diurnal, monthly, seasonal variations and annual trends were identified. Indoor-outdoor ratio, inter pollutant correlations, indoor-outdoor correlation, factor analysis were used for the interpretation of data. Questionnaire survey was carried to relate illness with indoor air quality for small group of individuals targeted for a specific purpose and to know about sociodemography, house characteristics. The study showed that indoor activities and disparity in lifestyle between poorer residents and privileged residents affect indoor fine particle concentration level with the degree of effect depending upon the type of the source and on house characteristics. Bioavailability of trace elements in total and water soluble fraction of particulate matter was also analyzed from three different microenvironments. All the case studies undertaken highlights that there is utmost requirement to collect better and systematic information about actual exposure levels experienced by household in different districts and climate zones and develop a model for predicting the exposure levels based on fuel use and other households data therein (exposure atlas) to protect the health of children, women and elderly persons.

Assessment of pollution load discharged though various drains entering river mandakini at chitrakoot stretch (M.P. and U.P. part)

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The study deals with estimation of point pollution load contributed by various drains joining to the river Mandakini at Chitrakoot stretch. Mandakini is one of the major holy rivers of Madhya Pradesh especially of Chitrakoot area, the eastern part of Bundelkhand region- shared between the states of M.P. and U.P. River Mandakini is known as Paisuni in government records. Total 22 major drains entering the river were selected for the study. Monitoring of water of the above drains had been carried out in Oct.- Nov., 2013 and pollution load contributed by each drain was determined. The parameters investigated were temperature, pH, TDS, DO, BOD, COD, velocity and flow rate along with pollution load. Results were compared with their standards prescribed by WHO and BIS. Findings of the study indicated that values of all selected parameters were higher than their permissible limits. Pollution load was found in range of 7.40 to 180.22 kg / day. Affective measures to minimize the pollution load reaching to the river were also investigated.

Trends in preservation coatings for fresh fruits & vegetables

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India rank first in the world for production of many fruits and vegetables. Fruits and vegetables are highly perishable commodities that require to be handled with much care to minimize losses. Postharvest losses of these fresh produce can be reduced by using surface coatings, low temperature techniques, various packaging, irradiation, modified atmosphere etc. In this paper I will give emphasis on natural coatings available for extension of shelf life fruits.

Total quality management for hospital chemist store

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TQM is a useful tool synchronized to deliver ever higher standards of performance in everything a organisation does.

Purpose : The study explores health care adoption of quality parameters from industry using quality management system, covers application TQM factors especially for chemist store function and its impact, on some performance indicators.

Methodology : Extensive literature survey on the issue is used to develop conceptual understanding of the subject, analysed based on focused area of research.

Findings : Therapeutics Committee need to review the following activities in the hospital: Irrational use of antibiotics, Non-adherence to drug listed in drug formulary, Use of irrational drugs combination, Non ethical prescribing practices. A series of quality initiatives were implemented according to total quality management

(TQM) "best practice." Measurements subsequently lead to improvement of quality of care and to QMS. The programs were viewed upon as part of a "management" rather than "professional" agenda, despite the underlying philosophy of TQM.

Research limitations : A role model of drug store of need to be cover under the study. Every city is unique in itself and because of social and cultural differences prevailing.

Development and validation of a reversed-phase ultra-performance liquid chromatographic method for the simultaneous determination of six drugs used for combined hypertension therapy

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A simple, rapid, and reliable ultra-performance LC assay method has been developed for the simultaneous estimation of orally administered hypertension drugs (atenolol, hydrochlorothiazide, amlodipine besylate, indapamide, nifedipine, and lercanidipine hydrochloride), any of which may be administered with atenolol in combined hypertension therapy. Chromatography was carried out at 25°C on a 2.1 × 50 mm id, 1.7 µm particle size Acquity BEH C18 column with the isocratic mobile phase 0.01 M, 4.0 pH aqueous phosphate buffer–acetonitrile (50 + 50, v / v) at a flow rate of 0.35 mL / min. All drugs were separated in less than 4 min with good resolution and minimal tailing, without interference by excipients. The method was validated according to International Conference on Harmonization guidelines, and the acceptance criteria for accuracy, precision, linearity, specificity, and system suitability were met in all cases. The column effluent was monitored at 230 nm. The detector response was linear in the range of 1–20 µg / mLof these drugs. LOD obtained was 0.04 µg / mLfor atenolol, 0.02 µg / mL for hydrochlorothiazide,0.03 µg / mL for amlodipine besylate, 0.03 µg / mL for indapamide, 0.02 µg / mL for nifedipine, and 0.01 µg / mL for lercanidipine hydrochloride.The suggested method has the advantage that all the drugs can be quantified alone or in combination with atenolol using a single mobile phase

Assessment of heavy metals concentration in ground water and public health aspects at granite mining areas of laxman pura, Jhansi , U.P (India)

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A study was carried out in granite mining area in Jhansi (laxman pura) to evaluate the current status of heavy metals concentration and their sources in groundwater. Groundwater samples collected from mining and residential area in 6 different locations were analyzed. There are almost 30 crushers running in the study area. The location (laxman pura) is situated at 10 km north-east of Jhansi city. In each location of mining and residential areas, three samples were collected at various distances. The heavy metals

concentration in ground water such as Cu, Pb, Zn, Ni, Mn and Cd, have been analyzed. The results showed that among the mining and the residential locations, many of the estimated ions concentration in ground water of mining and residential areas are more or less with the permissible limits of WHO.

Synthesis of novel prochiral organophosphorus compounds

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Phosphinidenes are phosphorus analogue of carbenes. Phosphinidene tungsten pentacarbonyl complexes are extremely unstable, highly reactive and could be *in-situ* generated only. These intermediates could be trapped easily in presence of various reagents containing π-systems to afford a number of P-heterocycles[1]. A number of compounds are known to give phosphinidene intermediates but *2H*-azaphosphirene tungsten pentacarbonyl complex (**1**) is the most stable precursor for the *in-situ* generation of terminal phosphinidene complexes (**2**). Recently, we found that terminal phosphinidene tungsten pentacarbonyl complexes (**2**) reacted efficiently with the reagents containing no ð-systems. For example, a reaction of terminal phosphinidene complex (**2**) with CCl_4 resulted in halogen atom transfer[2] from carbon to phosphorus. Following these results we run a few reactions of (**2**) with substrates containing a single **carbon-halogen** bond like RX ($C_6H_5CH_2$ or Me; X= Cl, Br or I) and in all cases only a **single prochiral product** was formed **selectively** as a result of the insertion-reaction of phosphinidene complexes (**2**) into a carbon-halogen bond[3-5]. This is the first example where terminal phosphinidene complexes (**2**) have shown insertion reactions into **carbon-halogen** bonds giving interesting novel route for one step selective synthesis of prochiral organophosphorus compounds.

Study on behaviour of strip and rectangular footings on dune sand reinforced with mat of waste G.I strips

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The soil is considered as the oldest and complex among the construction materials, used by engineers. In the mostly part of Rajasthan, non plastic uniformly graded wind deposited fine sand is available having geotechnical engineering problem like poor bearing capacity due to its chemical structure. The construction of any structure on such type of sand is difficult job for engineers. One of the latest technique is to increase the bearing capacity of dune sand by using various reinforcing material in different form such as strips, grids, etc. The test were conducted on dune sand of Pushkar (Rajasthan) in laboratory and studies were carried out on strip and rectangular Footings on dry dune sand deposited at density of 1.45 gram / cm^3 which is reinforced with mat of waste G.I. strips. Mat of various sizes (1.0B, 1.5B, 2.0B, 2.5 B) were placed at different depth (1.0B, 1.5B, 2.0B, 2.5B) where B is width of footing. The maximum value of bearing capacity is obtained for a D / B ratio equal to 1.0 and minimum value of bearing capacity is obtained for D / B ratio equal to 2.5. The improvement in bearing capacity is attributed to generation of frictional forces between surface of G.I strips and chemical particles of dune sand.

A rapid and sensitive extractive spectrophotometric determination of platinum (iv) in hydrogenation catalyst using bis(2,4,4-trimethyl pentyl) monothiophosphonic acid

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A rapid and sensitive extractive spectrophotometric method has been developed for the determination of platinum (IV) in hydrogenation catalyst using bis(2,4,4-trimethyl pentyl) monothiophosphonic acid (Cyanex 302) as an analytical extractant. The Cyanex 302 in carbon tetra chloride forms yellow colored complex with the metal in presence of 0.2 M stannous chloride in hydrochloric acid medium which is extracted in carbon tetra chloride. The absorbance is measured at 295 nm. The method adheres to Beer's law up to a concentration 0.2 to 10 µg cm^{-3}. The molar absorptivity and Sandell's sensitivity are 2.998×10^4 $dm^3mol^{-1}cm^{-1}$ and 6.578×10^{-3} µg cm^{-2} respectively. A plot of log D vs. log C with respect to Cyanex 302 concentration gave a slope of 1.905 indicating the stoichiometric ratio between Pt and Cyanex 302 as 1:2 in its complex. The concurrent repetition of the method is checked and the relative standard deviation (RSD) (n=6) was derived as 0.24%. The present method was applied to the determination of Pt (IV) in hydrogenation catalysts. The results obtained were in close agreement with the reported values.

Synthesis, characterization, DNA cleavage study and corrosion inhibitory activities of transition metal(ii) complexes with a potentially bioactive azo dye

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Coordination chemistry of transition metal complexes with azo ligands is an important and fascinating area of research and plays pivotal roles in industry, technology and life processes. In this investigation an azo dye has been prepared by coupling diazotized 2-amino-3-caroxyethyl-4,5,6,7-tetrahydrobenzo*[b]*thiophene with resorcinol and this ligand is versatile in forming a series of 3d metal complexes. The ligand and the metal complexes have been fully characterized through elemental analysis, molar conductance, magnetic susceptibility, IR, NMR, FAB mass and ESR spectral studies. The analytical data indicates that manganese(II) and cobalt(II) complexes exhibit 1:2 metal to ligand stoichiometry while nickel(II), copper(II) and zinc (II) complexes exhibit 1:1 metal to ligand ratio. Spectral data reveals that the azo dye acts as a monobasic tridentate ligand using ONO donor sequence towards the metal ions. The EPR spectral data of the copper(II) complex show that the metal–ligand bond has considerable covalent character. The ligand and copper(II) complex have been subjected to powder X-ray diffraction studies. Powder X-ray diffraction pattern shows that the ligand possesses crystallinity and the crystallinity is retained within complex also. The DNA cleavage activity of the ligand and the metal complexes has been monitored by gel electrophoresis method. All the metal complexes cleave the pUC19 DNA in presence of H_2O_2. The corrosion inhibition activity of the ligand and its copper(II) complex has been also examined.

Sorption of heavy metal ions from water using ion-exchange resin with amine, hydroxyl and carboxylic acid functional groups

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Terpolymer resin 4-ASAOF was synthesized by the condensation of 4-Aminosalicylic acid (4-ASA) and Oxamide (O) with Formaldehyde (F) in the presence of 2 N hydrochloric acid. The structure of the resin was characterized by various spectral techniques like infra-red (FTIR) and nuclear magnetic resonance (^{1}H and ^{13}C-NMR) spectroscopy. The empirical formula and empirical weight of the resin were determined by elemental analysis. The physiochemical properties of terpolymer resin were determined. The morphological feature of the 4-ASAOF terpolymer resin was studied by Scanning electron microscopy (SEM). The chelating ion-exchange property of this terpolymer was studied for eight metal ions viz. Fe^{3+}, Cu^{2+}, Ni^{2+}, Co^{2+}, Hg^{2+}, Zn^{2+}, Cd^{2+} and Pb^{2+} ions by using batch equilibrium method. The chelating ion-exchange study was carried out over a wide pH range at different time intervals using different electrolyte of various ionic strengths.

Clean up determination of paraquat residue in oil matrix method

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The experiment was to evaluate the feasibility of the method in determination of paraquat residue in palm oil and palm oil product. The method involved three steps : extraction of residue from the oil, clean up procedure using one type of resin, amberlite and spectrophotometric determination of the purified material. Using amberlite with glucose, the percentage recoveries were greater than 90% for 0.01 $\mu g\ ml^{-1}$ level of concentration. The method with the use of Amberlite resin in the clean up step can give better recoveries of the analyze. Beer's law is obeyed over the concentration range of 0.5 - 15 µg of paraquat per 25 ml of the final solution (0.02 - 0.6 ppm) at 600 nm. The molar absorptivity and Sandell's sensitivity were found to be $2.2X10^4 \pm 100\ l\ mol^{-1}\ cm^{-1}$ and $0.004\ \mu g\ cm^{-2}$ respectively. The method is highly reproducible and has been applied to determination of paraquat in environmental samples

Oxidation of some hydroxy acids by quinolinium chlorochromate : A kinetic and mechanistic study

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Oxidation of hydroxy acids by quinolinium chlorochromate (QCC) in dimethyl sulphoxide (DMSO) leads to the formation of carbondioxide. The reaction is first order with respect to both QCC and hydroxy acid. The reaction is protonated by hydrogen ions, the hydrogen ion dependence has the form $k_{obs} = a + b[H^+]$. The oxidation of hydroxy acids exhibited a substantial primary isotope effect. The reaction was studied in nineteen different solvents and effect of solvents was analyzed using Taft’s and Swain’s multi parametric equation. A suitable mechanism has been proposed.

Kinetics and mechanism of thermal decomposition of binary mixture of barium oxalate and copper oxalate in the mole ratio (2:3) mixture

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The non-isothermal TGA, DTA and EGA decomposition study of individual $BaC_2O_4.0.62H_2O$, CuC_2O_4 and their binary mixture in the mole ratio (2:3) respectively was studied by using Coats-Redfern, Freeman-Carroll and Horowitz-Metzger Equation. The $BaC_2O_4.0.62H_2O$ shows three step decomposition with $BaCO_3$ and BaO as the end product when heated up to 1000 °C by two dimensional phase boundary reaction and Ginling Braunshtein equation. The non-isothermal decomposition of individual CuC_2O_4 shows single step decomposition with CuO as the end product when heated up to 310 °C by Avrami equation. The non-isothermal study of the binary mechanical mixture of $BaC_2O_4.0.62H_2O$ and CuC_2O_4 in mole ratio (2:3) by TGA when heated up to 1000 °C shows mixture of BaO, $BaCO_3$ and CuO as end product. The α Vs time plots of isothermal study by TGA and EGA of this binary mixture shows applicability of one and two dimensional diffusion up to $\alpha = 0.60$ and Ginling Braunshtein equation (three dimensional diffusion) up to $\alpha = 0.99$ respectively. The end products were characterized by using X-ray diffraction. The kinetic parameters like energy of activation (Ea), pre-exponential factor (A) and correlation factor (r) were obtained from isothermal TGA and EGA.

A study of ground water of Bhojpur, Bihar

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Water is an important constituent of environment and necessary for both animal and plant kingdom. It is a universal solvent can dissolve toxic and hazardous substances and produce water pollution problems. Ground water is used for domestic and industrial water supply and irrigation all over the world. The ground water chemistry is controlled by the composition of its recharge components as well as by geological and hydrological variations within the aquifer. The over exploitation of ground water due to geogenic and anthropogenic activities such as unplanned disposal of industrial effluents, sewage and sewerage has resulted in the lowering of water level and deterioration in ground water quality . About 80% of all the diseases in human beings are caused by water. Once the ground water is contaminated , its quality can not be restored by stopping the pollutants from the sources. It becomes imperative to regularly monitor the quality of ground water and to device ways and means to protect it. Aesthetic, physical, chemical, trace elements and bacteriological water quality parameters are the major groups of examination. This communication presents result of survey on ground water quality of three blocks of Bhojpur district of Bihar total 60 numbers of ground water samples were collected from different locations and analysed for the parameters PH, electrical conductivity (EC) , total dissolved solid (TDS), total hardness (TH), Ca^{+2}, Mg^{+2}, iron, arsenic fluoride (F-) and sulphate (SO_4^{-2}). Water samples were collected from hand pumps and public water supply. All the parameters except arsenic has been found within the permissible range for drinking water (higher than permissible limit)

Electrochemical characterization and transport studies of duck egg (*Anas Platyrhynchos Domesticus*) shell biological membrane

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The present work describes the electrochemical characterization of duck egg (*Anas Platyrhynchos domesticus*) shell biomembrane. The physicochemical nature was determined by using Scanning Electron Microscopy (SEM), Fourier Transform InfraRed Spectroscopy (FTIR), X-Ray Diffraction (XRD) and Thermogravimatric analysis (TGA). The experimental observed membrane potential of biological membrane were measured with univalent electrolytes (KCl, NaCl, LiCl, NH_4Cl) solution using saturated calomel electrodes. The TMS method was used to determine the transport number, mobility distribution coefficient and charge density of the membrane. The order of surface charge density of a 1:1 electrolyte solution was found to be KCl>NaCl>LiCl>NH_4Cl. The membrane was found to be anion selective.

Gravimetric estimation of yttrium (III) using hydroxy lawsone

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Lawsone (2-hydroxy-1,4-naphthalenedione), a naturally occurring pigment has been used as a analytical reagent. Its oxime derivatives are shown analytical applications as a gravimetric reagent for Nickel (II) and Palladium (II). Aizenberg has reported the gravimetric determination of nickel (II) using Juglone (5-hydroxy-1,4-naphthalenedione). The syntheses, characterization and analytical studies on metal complexes of monohydroxy-1,4-naphthalenediones, dihydroxy-1,4-naphthlenediones has been reported. Isonaphthazarin (2-hydroxy Lawsone i.e. 2,3-dihydroxy-1,4-naphthalenedione) is well known spectrophotometric reagent used for thorium determination. Yttrium is found to be an important element in analytical, biological Chemistry as well as in industrial purposes. Because of its novel coordination geometry, it is used for the kinetic studies. It is also used in industrial glass devices, electronic devices, graded index lenses and semiconductors. Here we are reporting 2,3-dihydroxy-1,4-naphthalenedione is gravimetric reagent for estimation of Yttrium.

Sorption investigation of metal ions by copolymers with respect to pH, time and in media of various ionic strengths of different electrolytes

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A series of novel copolymer resins (4,4'-BP-4,4'-ODA-F-I, II, III) have been synthesized by the condensation polymerization reaction of 4,4'-biphenol and 4,4'-oxydianiline using the linkage of formaldehyde in presence of acid catalyst by varying the molar concentrations of reacting monomers. The resins compositions were

determined on the basis of elemental analysis. The copolymer resins were further characterized by UV-Visible, Infra-red and Nuclear magnetic resonance spectroscopy to confine the most probable structure of synthesized copolymers. Thermal analysis was carried out for studying the thermal degradation behavior and kinetic parameters. Thermal degradation curve has been discussed with minute details by applying Freeman-Carroll, Sharp-Wentworth and Coat Redfern equations to evaluate the kinetic parameters i.e. activation energy (Ea), order of reaction (n) and frequency factor (z). The data from Freeman-Carroll method has been used to determine various thermodynamic parameters i.e. entropy change (ΔS), free energy change (ΔF) and apparent entropy (S^*). These copolymers are proved to be a selective chelating ion exchangers for certain metal ions such as Fe^{3+}, Cu^{2+}, Hg^{+2}, Ni^{2+}, Co^{2+}, Zn^{2+}, Cd^{2+} and Pb^{2+}. A batch equilibrium method was employed in the study of selectivity of metal ion uptake involving the measurements of distribution of a given metal ion between the copolymer sample and a solution containing the metal ion. The study was carried out over a wide pH range, shaking time and in media of various ionic strengths.

Sustainable polymers : Todays need

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The use and development of materials from renewable sources is not a new concept, and there are many examples in history of the use of renewable materials to prepare primitive tools, clothes and shelter. As the complexity of human requirements increased, so did the materials and by the 19th century durable materials were being prepared from renewable resources such as vulcanized rubber and adhesives from starches and other natural resins. However, the widespread use of these materials was diminished in the 20th century with the development of fossil fuel derived leading to the polymer renaissance. In the following decades, coal and petrol-based polymers could be found in nearly every item we touched, e.g., clothing, packaging, paints, adhesives and plastics.Today, the use of polymers is widespread but the sources which are used to prepare them are coming under scrutiny. The traditional sources to prepare the vast majority of conventional polymers are finite and will begin to dwindle in the future. This will put a significant cost pressure on the polymers prepared from these finite resources. Lastly, as the world begins to become much more aware of the needs for a sustainable future, there will be increasing pressure to incorporate sustainable materials. With these concerns, there is now a growing shift back to polymeric materials from renewable sources. Significant research is ongoing to develop new or improved products and processes based on sustainability.

Development of novel pervaporation membranes using chitosan and titanium glycine-N,N-dimethylphosphonate for dehydration of isopropanol

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Titanium glycine-N,N-dimethylphosphonate, $Ti[(O_3PCH_2)_2NCH_2COOH]$ (TGDMP), was synthesized and incorporated into chitosan in different weight ratios to obtain nanocomposite membranes. TGDMP acts as electronegative nanofiller owing to its high content of –COOH groups and thereby established an electrostatic interaction between nanofillers and chitosan. The structure, morphology, thermal properties of the resulting membranes were studied using different techniques such as FTIR, WAXD, DSC, TGA and SEM. The effect of

TGDMP on the pervaporation performance was investigated systematically. The separation selectivity and permeation flux of the resulting nanocomposite membranes are much higher than that of pure chitosan membrane. The membrane containing 1.2 mass% of TGDMP demonstrated the highest separation selectivity of 1,050 with a permeation flux of 7.37 x 10^{-2} kg / m^2h at 30 °C for 10 mass% of water in the feed. The total flux and flux of water are found to be overlapping particularly for TGDMP incorporated membranes, manifesting that the developed nanocomposite membranes could be used effectively to break the azeotropic point of water-isopropanol mixtures. From the temperature dependent diffusion and permeation values, the Arrhenius activation parameters were estimated. The activation energy values obtained for water permeation (E_{pw}) are significantly lower than those of isopropanol permeation (E_{pIPA}), suggesting that the developed membranes have higher separation ability for water-isopropanol system. The positive heat of sorption (ΔH_S) values was obtained for all the membranes, suggesting that Henry's mode of sorption was predominant.

Green synthesis and characterization of zinc oxide (ZnO) and silver nanoparticles (NP) and determination of their antibacterial assay

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Development of reliable and eco-friendly processes for synthesis of metallic nanoparticles is an important step in the field of application of nanotechnology. The synthesis of nanoparticles has become the matter of great interest in recent times due to its advantageous properties and applications in different fields. Though physical and chemical methods are more popular for nanoparticle synthesis, the biogenic production is a better option due to eco-friendliness. The present abstract reports the investigation, synthesis and characterization of Zinc Oxide (ZnO) and Silver nanoparticles (NP), and their application on pathogenic bacteria. ZnO NP were synthesized by chemical reduction method using starch as capping agent and silver NP was prepared by green synthesis process from AgNO3 solution through the extract of *Citrus sinensis* (Santra). The detail characterization of the nanoparticles was carried out using UV-Vis Spectroscopy, FT - IR Spectrophotometer, Dynamic Light Scattering (DLS), Scanning Electron Microscopy (SEM), X-Ray Diffraction (XRD) analysis and Thermogravimatric (TGA) analysis. From Dynamic Light Scattering (DLS) particle size and SEM image analysis, the average particle size was found to be 90 nm and 50 nm, for ZnO and silver nanoparticles, respectively. From the analysis of XRD pattern, UV-VIS spectroscopy FT-IR and TGA, the formation of nanoparticles was confirmed. Antibacterial assay of synthesized ZnO and silver NP was carried out both in liquid and solid growth medium against different pathogens.

Synthesis and antitubercular activity screening of some novel pyrrole derivatives

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With an objective of synthesizing some potent anti-tubercular agents, here we have synthesized some novel series of pyrrole derivatives. In this ethyl-4-pyrrole-1yl-benzoate **(I)** was synthesized by the reaction between benzocaine and 2, 5-dimethoxy tetrahydrofuran in presence of glacial acetic acid. Compound **(I)**

on treatment with hydrazine hydrate in presence of ethanol yielded 4-pyrrole-1-yl benzoic acid hydrazide **(II).** Compound **(II)** on treatment with chloroacetyl chloride and methylene chloride yielded N^1-(2-chloroacetyl)-4-(cyclopenta-2,4-dienyl)-benzohydrazide **(III)**, compound **(III)** on reaction with different aromatic amines and triethylamine in presence of acetonitrile yielded N^1-(2-(substituted phenylamino acetyl)-4-(cyclopenta-2,4-dienyl)-benzohydrazide **(IV)**.Structure of the synthesized compounds were confirmed on the basis of physico-chemical and spectral data (IR, ^{1}H-NMR and Mass). All the synthesized compounds were screened for their anti-tubercular activity using Microplate Alamar Blue Assay (MABA) method using isoniazid as the standard drug. Among the synthesized compounds **IV b, IV d, IV f, IV j** have showed good anti-tubercular activity.

UV radiation - New energy source for curing polymers

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Ultra-violet (UV) curing technology was explored in the early 1940s as an alternative to thermal curing of polymeric materials. UV curing uses electromagnetic radiation energy in the form of photons to induce chemical change in monomers and form polymer networks. These methods were explored to eliminate non-reactive solvents and reduce drying process for coatings and inks. UV light generates reactive species, free radicals or ions, with small amounts of a photoinitiator. Exposing polymeric precursor materials to high energy radiation sources in order to initiate polymerization or cross-linking of resin has been developed in the last 50 years. The growing interest in radiation curable resins is due to the broad range of advantages these materials have over traditional thermally cured polymers. Radiation curing requires shorter times, reduces emissions of toxic volatile components, and cures at low temperatures thus reducing energy consumption and costs. There are different types of radiation that are applicable to different situations. The forms of radiation that have been investigated in the past as a viable initiation source for ionic and / or free radical polymerizations. This paper provides an overview on this radiation curing technology in surface coating industry.

Applications of calixarenes in medical sciences

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The application of calixarene derivatives were assessed and reviewed in six main divisions of medical sciences and technologies including hematology, pathology, pharmacy and pharmacology, infectious diseases, nuclear medicine, and chemotherapy. Although it is difficult or not possible to distinct a boundary between the medical and the biological studies, the aim was to distinguish and focusing on the medical researches rather than the biological ones using the objectives of more than fifty references. Although the recent reports have focused on the synthesis, optimization and application of one kind or a unique group of calixarenes, this review deals with the synthesis and behavior of a variety of calixarene-based medical platforms to illustrate their potentials in the medical sciences.

Synthesis, characterization and direct current electrical conductivity study of cadmium succinate and cadmium tartarate

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The solid state reactions involved in the preparation of Cadmium oxide from Cadmium (II) Sucinate &Tararate of monohydrated and dehydrate have been analyzed using direct current electrical conductivity measurement under the atmospheres of static air. The product at each decomposition stage has been characterized by Infrared spectroscopy, X-ray diffraction U.V. spectroscopy and elemental analysis etc. For Cadmium(II) Succinate & Tararate the final decomposition product in was found to be CdO and intermediate step product was formation of Cd_2O.Which is characterized by x-ray diffraction .The conductivity measurement were supplemented with data obtained by thermogravimetric analysis (TGA), IR spectroscopy, U.V. spectroscopy and x-ray diffraction. The magnetic susceptibility of Cd-Tartarate & Cd (II) Succinate was measured by Gouy method.

Enhancement of pervaporation performance of composite membranes through in-situ generation of silver nanoparticles in poly(vinyl alcohol) matrix

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Composite membranes were prepared from an aqueous solution of poly(vinyl alcohol) (PVA) and silver sulphate. The silver nanoparticles were generated in-situ before crosslinking PVA matrix by reduction of silver ions using sodium borohydride. The resulting composite membranes were characterized by FTIR, UV-vis, TGA, WAXD and SEM. The UV-vis spectrum shows a single peak at 410 nm arising from the surface plasmon absorption of silver nanoparticles. This indicates that silver nanoparticles were generated in PVA matrix. The membranes were subjected to pervaporation (PV) for separation of water-isopropanol mixtures at different temperatures. PV results reveal that increase of silver nanoparticles content in the crosslinked PVA matrix leads to an increase of both flux and selectivity. Among the composite membranes, membrane containing 2.5 mass% silver exhibited the best PV performance, whose permeation flux and separation factor were 7.16×10^2 kg / m^2h and 634 for 10 mass% of isopropanol at 30 ^oC, respectively. The values of total flux and flux of water are almost closed to each other, indicating that the developed membranes could be effectively used to break the azeotropic point of water-isopropanol mixtures. From the temperature dependency of diffusion and permeation values, the Arrhenius activation parameters were estimated and discussed in terms of membrane efficiency.

Studies on synthesis and biological activities of 1-(3-((4-phenylthiazol-2-yl)amino)phenyl)ethanone

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Small ring heterocycles containing nitrogen and sulphur atoms have been under investigation for a long time because of their important medicinal properties. Among the wide range of heterocycles explored to develop pharmaceutically important molecules, thiazoles have played an important role in medicinal chemistrysuch as cardiotonic, fungicidal, sedative, anesthetic, bactericidal and anti-inflammatory. The synthesis of thiazole derivatives is important because of their wide range of pharmaceutical and biological properties. Therefore some novel Thiazole ring containing compounds were synthesized from 1-(3-acetylphenyl)thiourea**(3)** and 2-bromo-1-phenylethanone **(4)** to produce 1-(3-((4-phenylthiazol-2-yl)amino)phenyl)ethanone**(5)** by conventional method. The newly synthesized compounds were characterized using IR,^{1}H-NMR, HRMS, and Mass Spectrometry. These compounds were screened for their antibacterial activity against **Gram-positive bacteria***viz. Staphylococcus aureus* and *basillus* and **Gram negative bacteria***viz. Escherichia coli, klebsiella.*Fewcompounds were found to show strong activity against **Gram-positive bacteria***viz. Staphylococcus aureus* and *basillus* and some compounds were found to show moderate activity against **Gram negative bacteria***viz. Escherichia coli.*

Synthesis, characterization and thermal studies of transition metal complexes supported by ONN / ONO tridentate Schiff base ligand

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The chelating ability of the Schiff bases combined with the ease of preparation and flexibility in varying the chemical environment about the C=N group makes it an interesting ligand in coordination chemistry. Studies on the metal chelates with Schiff base of dehydroacetic acid have received attention due to their excellent chelating capacity in modern Coordination Chemistry. The compound dehydroacetic acid is widely used as fungicide, herbicide and as a preservative that has powerful antimicrobial effect against bacteria yeast and particularly molds. Furthermore, this compound has several reactive functional groups and can serve as a reagent in organic synthesis. The complexes of Ni(II),Cu(II) and Zn(II) with Schiff base ligand derived from dehydroacetic acid (3-acetyl-4-hydroxy-6-methyl-2H-pyran-2-one) and 3-Hydrazino-1,4-benzoxazine-2-one have been synthesized. The ligand acts as tridentate ONN / ONO donor. The ligand was characterized by Mass, IR, ^{1}H NMR and electronic spectral studies. Characterization of the complexes has been done on the basis of elemental analysis, molar conductance measurements, magnetic susceptibility measurements, IR, electronic spectral techniques , esr, thermal studies etc., The geometrical structures have been found to be octahedral / square planar. Thermal studies show the degradation pattern of compounds.

Facile one-pot clean synthesis of 2-substituted benzimidazoles and 1, 2-disubstituted benzimidazoles using bismuth nitrate

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An efficient, clean and one pot syntheses of 2-substituted benzimidazole and 1, 2-disubstituted benzimidazole derivatives have been developed by reacting *o*-phenylenediamine with aromatic aldehydes using bismuth nitrate [$Bi(NO_3)_3.5H_2O$] as a catalyst in ethanol at ambient temperature. The important advantages of this greener methodology are faster reaction with excellent yield, mild reaction condition, and use of inexpensive and non-toxic catalyst.

Synthesis, characterization and antimicrobial studies of isatin schiff base ligand with cobalt (II) complexes

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In this study, two Schiff base ligands *viz*., 1*H*-indole-2-one-3-(2-methyl-4-nitro)-anilinimine and 1*H*-5-bromo indole-2-one-3-(2-methyl-4-nitro)-anilinimine was synthesised. Co (II) complexes of these ligands were synthesised by treating with $CoCl_2.6H_2O$, $Co(NO_3)_2.6H_2O$, $CoSO_4.7H_2O$ and $Cu(OAc)_2.4H_2O$. All the synthesised compounds were characterised by various physicochemical techniques such as elemental analysis, FT IR, ^1H NMR, conductivity and magnetic susceptibility measurements. The ligands act as a bidentate in which the carbonyl oxygen and the azomethine nitrogen of Isatin are involved in co-ordination. Octahedral geometry was proposed for all the Co (II) complexes. The ligand and its metal complexes have been screened for their antibacterial activity against bacteria's Viz. *Staphylococcus aureus* and *Escherichia coli* etc. and antifungal activity against fungi *Aspergillus niger* and *Aspergillus flavous* etc. The activities of both the samples have shown significant and noticeable changes on complexation.

Ceramic processing of silicon carbide : Preliminary results

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Recent advances in ceramics processing indicate that a significant materials improvements can be attained by characteristics physical properties. New results are presented, for various commercial powders (viz.Schering-Kalbaum (A1), Aldrich Chem. (B1) and Himedia Lab. (C1). of SiC have been used, which are characterized by X-ray powder diffraction, scanning electron micrograph (SEM), particle size distribution, BET surface area measurement. Their properties depended to a great extent on the nature of the manufacturer. The cubic nature, 2.16 m^2/gm surface area and the bimodal type of particle size distribution is observed in SiC obtained from Aldrich chem. (B1) .The particle packing is based on the concept of filling the voids in a bed of large spheres with smaller size spheres .The remaining pores between the smaller spheres are filled with still smaller spheres,etc. to give good particle packing. Thus SiC obtained from Aldrich chem. is considered to be good for slip casting.

Ambient air quality status of Nizam Deccan Sugar Factory at Bodhan, Andhra Pradesh

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The air pollution causes serious problem all over the world. It deteriorates the quality of environment due to the presence of impurities or pollutants. Air pollution not only affects the mankind, but also affects the natural habits and environments of the plants and animals. The present study was taken up to measure, SPM / RPM and to estimate the concentration of $NO_{X,}$ and SO_2 in ambient air at Nizam Deccan Sugar Factory, Bodhan, Andhra Pradesh. It was observed that the concentration of SPM / RPM above the standards (I.S. 5182) during crushing season of the factory and the concentration of NO_x and SO_2 was found below the maximum limits of the standards.

Synthesis, characterization and photocatalysis of rare earth doped ZnO nanoparticles

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ZnO doped with rare earth (such as Pr^{3+} and Eu^{3+}) at different concentration (viz. 2, 4 and 6 wt %) were synthesized by tartarate coprecipitation method. The products were characterized by infrared spectra (Far IR), thermal analysis (TGA / DTA), X-ray powder diffraction (XRD), scanning electron microscopy (SEM), diffuse reflectance spectrum (DRS) and BET surface area measurements. The XRD studies of rare earth doped ZnO exhibit the presence of hexagonal wurtzite type crystal structure similar to parent compound ZnO and suggesting that the rare earth doped ions sit at the regular Zn^{2+} site The small variation in the lattice parameter occurs as the rare earth ion concentration increases . The average crystalline size are determined by Debye Scherrer formula and found to be in the range of 65 to 75 nm for pure and rare earth doped ZnO. The nanocrystalline nature of the sample and their crystallinity has been confirmed by SEM measurement. UV-DRS of rare earth doped ZnO nanoparticles shows a strong absorption peak at 388 nm due to ZnO band to band transitions. The UV-DRS absorption analysis reveals the decrease in energy band gap of rare earth doped ZnO nanoparticles and creating defective sites on the ZnO surface. The photodegradation of Methylene Blue solution demonstrated that the photocatalytic activity of ZnO was significantly improved with rare earth doping.

Acoustic behavior of sertraline hydrochloride drug in methanol-water at different temperatures

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The measurements of density, viscosity and speed of sound of Sertraline hydrochloride drug have been determined by experimental procedures using bicapillary pyknometer, Ostwald viscometer and ultrasonic interferometer respectively. From the experimental data various acoustical parameters such as apparent

molar compressibility (ϕ_κ), apparent molar volume (ϕ_v), adiabatic compressibility (β_s), specific acoustic impendence (Z), intermolecular free length (L_f) have been evaluated. The concentration range is 0.02 to 0.1 mol dm^{-3}.

The measurements are conducted at different temperatures in methanol- water solvent. The results are interpreted in terms of molecular interactions occurring in these solutions.

Synthesis, characterization and thermal behavior of dicarboxylato complexes leading to superconducting Bi–Sr–Ca–Cu-O

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Bismuth – strontium – calcium – copper malonate decahydrate, $BiSrCaCu_2(C_3H_2O_4)_{5.5}.10H_2O$ and fumarate hexahydrate, $BiSrCaCu_2(C_4H_2O_4)_{5.5}.6H_2O$ are synthesized by coprecipitation method. The composition of the formed dicarboxylato complexes such as malonate and fumarate is practically insensitive to pH value in a relatively wide range (pH = 3.0 to 6.0). The thermal analysis data (TGA, DTG and DTA) of these precursors indicated three steps decomposition viz. dehydration, decomposition to carbonate followed by the formation of $BiSrCaCu_2O_{8+d}$ compound. The characterization of this superconducting $BiSrCaCu_2O_{8+d}$ is done by using infrared spectra, X-ray powder diffraction, low temperature dependence resistivity, scanning electron microscopy techniques. The X-ray diffraction pattern of $BiSrCaCu_2O_{8+d}$ shows a single phasic material with tetragonal structure. The low temperature dependence of resistivity of $BiSrCaCu_2O_{8+d}$ sample via malonate precursor have higher Tc and appeared to be more metallic than other corresponding sample via fumarate precursor.

Adsorption of Pb (II), Fe (III) &Co (II) metal ions from wastewater using agricultural wastes as adsorbents

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Agricultural-based inexpensive adsorbents should be explored and their feasibility for the removal of heavy metals should be studied in detail. The objective of this research is to study the efficiency of removing Pb^{2+}, Fe^{3+}& Co^{2+} ions from their salt solutions, using Agricultural-based adsorbents like banana skin and lemon rind. Liquid-phase adsorption removal of Pb^{2+}, Fe^{3+} and Co^{2+} and $^{??}$in the concentration range of 10–30 mg / L using low-cost banana and lemon rind wastes was examined at room temperature. Under comparable conditions, the amount of adsorption Pb^{2+} was found to be maximum at 5.5 pH.The amount of adsorption decreases in the order of Pb^{2+}, Co^{2+}&Fe^{3+} with increasing pH and reached a plateau at pH 7 for both adsorbents. The adsorption isotherms could be better described by the Freundlich equation. Removal efficiency of adsorbents increased with an increased in contact time .Results showed that low cost adsorbents can be effectively used for the removal of heavy metals.

Synthesis, characterisation, thermal studies and spectral studies of Nb (V) complexes derived from ONO donor Hydrazones

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The complexes of Nb (V) with 2- imidazolyl mercapto hydrazone (LH_2) are prepared in dry Chloroform with stirring under Nitrogen atmosphere for 4 hours. The complexes are characterised by elemental analysis, molar conductance, electronic spectra, IR, ^{1}H NMR and thermal studies . The analytical data suggest 1:2 metal to ligand stoichiometry and are non electrolytes. The IR and ^{1}H NMR spectral studies suggest that ligands act as dibasic tridentate in nature and suggest the nature of ligand in enol form.

Thermal studies reveal that the complexes undergo two stages of decompositions. Kinetic parameter value suggest that the rate of second decomposition of the complexes slower than the rate of first decomposition of the complexes. From the above data coordination no. Seven for Niobium ion in the complexes of the type $[Nb(L_2)Cl]$ is proposed.

Synthesis of aryl {4-[({5-[3-(methylsulfonyl) phenyl] pyrazin-2-yl} oxy) methyl] piperidin-1-yl} methanones

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Pyrazine nucleus possesses remarkable pharmaceutical importance and biological activities, some of their derivatives occur as natural products. In view of these findings, it appeared of interest to synthesize 2-(piperidin-4-ylmethoxy) pyrazines derivatives by the condensation of 2-[3-(methylsulfonyl) phenyl]-5-(piperidin-4-ylmethoxy) pyrazine with various aromatic acid chlorides in the presence of DIPA. The biological activities of the synthesized compounds are related to antifungal and antibacterial activities.

Synthesis, structural characterization, biological activity studies of Ni(II) and Zn(II) complexes

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Metal complexes of Schiff base ligands perceived applications in many areas such as catalysis, analytical chemistry and medicine. Chromone contains gama pyrone nucleus fused to benzene ring at the 5th and 6th position. The benzopyron ring system is central in important classes of bioactive natural products as coumarines, chromones and flavonoides. Molecules containing the chromone skelton have extensive biological applications including antimycobacterial, antifungul, anticancer, antihypertensive, antiinflemmatory, tyrosone and protein kinase C inhibitors. Moreover, chromone compounds showed non-linear optical (NLO) property. Keeping the importance of the ligands and their metal complexes we have reported here the synthesis and characterization of Ni(II) and Zn(II) complexes using tridentate formyl chromone Schiff bases such as 3-((2-hydroxyphenylimino)methyl)-4H-chromen-4-one (HL_1), 2-((4-oxo-4H-chromen-3-yl)methylneamino)benzoicacid (HL_2), 3-((3-hydroxypyridin-2-ylimino)methyl)-4H-chromen-4-one (HL_3) and 3-((2-mercaptophenylimino)methyl)-4H-chromen-4-one (HL_4). All the complexes were characterised in the light of microanalysis, molar conductance, FTIR, UV-VIS, magnetic, thermal, Powder XRD and SEM studies. The conductance and spectroscopic data suggested, the ligands acts as neutral and mono basic tridentate ligands and forms octahedral complexes with general formula $[M(L_{1-4})_2].nH_2O$ (M=Ni(II) and Zn(II)). Metal complexes exhibited pronounced activity against tested bacteria and fungi strains compared to the ligands. In addition metal complexes displayed good antioxidant and moderate nematicidal activities. The cytotoxicity of ligands and their metal complexes have been evaluated by MTT assay, all metal complexes exhibited considerable cytotoxic activity against Raw, MCF-7 and COLO 205 cell lines. The DNA cleavage activity of the metal complexes was performed using agarose gel electrophoresis in the presence and absence of oxidant H_2O_2. All metal complexes showed significant nuclease activity in the presence of H_2O_2.

Impurity profiling of lisinopril

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There is an ever increasing interest in impurities present in Active Pharmaceutical Ingredients. Recently, not only purity profile but also impurity profile has become essential as per various regulatory authorities requirements. Impurities in pharmaceutical compounds can originate during the synthetic process from raw material, intermediates and byproducts. Lisinopril is a drug of the angiotensin-converting enzyme (ACE) inhibitor class primarily used in treatment of hypertension, congestive heart failure, and heart attacks, and also in preventing renal and retinal complications of diabetes. Two unknown impurities are formed during process development because of Alpha ketoester (ethyl 2-oxo-4-phenylbutanoate), one of the raw material in synthesis of Lisinopril, as a Dimer-1 and Dimer-2 with mass numbers m/z = 366.41, 338.36 respectively. In this study the structure confirmation and possible mechanism for the formation of the impurities are discussed. The structures of impurities are confirmed by the study of IR, 1D NMR (1H, 13C, DEPT), 2D NMR (HCOSY, HSQC, HMBC) and Mass spectra. The Dimer-1 impurity structure is confirmed by Single crystal X-ray diffraction. The molecule crystallizes in monoclinic crystal system with $P2(1)/_C$ space group. The cell parameters are a= 8.6139(5)Å, b=16.7236(10)Å, c=13.5044(8) Å, $\alpha = \gamma$ (°)=90°, (°)= 99.1220(10)°, V = 1920.8(2) Å^3 and Z=4.

Build green : Stay green and stay healthy

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The buildings in which we live, work and play protect us from nature's extremes, yet they also affect our health and environment in countless ways. The built environment has a vast impact on the natural environment, human health, and the economy. As the environmental impact of buildings becomes more apparent, a new field called “green building” is gaining momentum. By adopting green building strategies, we can maximize both economic and environmental performance. Green construction methods can be integrated into buildings at any stage, from design and construction, to renovation and deconstruction. However, the most significant benefits can be obtained if the design and construction team takes an integrated approach from the earliest stages of a building project. Green, or sustainable, building is the practice of creating and using healthier and more resource-efficient models of construction, renovation, operation, maintenance and demolition. The Indian building industry is highly decentralized, involving diverse stakeholders engaged in design, construction, equipment provision, installation, and renovation of buildings. Each group may be organized to some extent, but there is limited interaction among the groups, thus disabling the integrated green design and application process. Hence, it is very important to define and quantify sustainable building practices and their benefits. It is also imperative to delineate the role of each actor in ensuring that the building consumes minimal resources in its entire life cycle and leaves behind minimal environmental footprint.

Buildings have major environmental impacts over their entire life cycle. Resources such as ground cover, forests, water, and energy are depleted to give way to buildings. Resource-intensive materials provide the skin to the building and landscaping adds beauty to it – in turn using up water and pesticides to maintain it. Energy-consuming systems for lighting, space conditioning, and water heating provide comfort to its occupants. Hi-tech controls add intelligence to ‘inanimate’ buildings so that they can respond to varying conditions, and intelligently monitor and control resource use, security, and usage of fire systems, etc. in the building. Water is another vital resource for the occupants, which gets consumed continuously during building construction and operation. Several building processes and occupant functions generate large amounts of waste, which can be recycled for use or can be reused directly. Buildings are thus one of the major pollutants that affect urban air quality and contribute to climate change. Hence, the need to design a green building, the essence of which would be to address all these issues in an integrated and scientific manner. It is a known fact that it costs more to design and construct a green building. However, it is also a proven fact that it costs less to operate a green building that has tremendous environmental benefits and provides a better place for the occupants to live and work in. Thus, the challenge of a green building is to achieve all its benefits at an affordable cost.

Effect of hazardous air toxics on the life of living beings

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The clean air which is a natural mixing of many useful gases, moisture and particular matters is essential for safe and carefree life on this earth. But now-a-days some foreign matters are found mixed with the clean air in significant quantities and make it polluted. The polluted air becomes harmful to mankind, animals and plants directly or through food chain. Hazardous air pollutants (HAPs) are the chemicals in the atmosphere that in sufficient concentration may have adverse effects on the health of human and other animal species and may cause damage to ecological and social systems such as forests, agricultural crops and building materials. It is estimated that about three million deaths occur globally each year due to air pollution, mainly by particular matter (organic and inorganic). People exposed to toxic air pollutants at sufficient concentrations and durations may have an increased chance of getting cancer or experiencing other serious health effects. These health effects can include damage to the immune system, as well as neurological, reproductive (eg. reduced fertility), developmental, acute and chronic respiratory illness, lung cancer, cardiovascular disease, mental health and stress-related disorders.

Development and validation of related substance method of active pharmaceutical ingredient entacapone by high performance liquid chromatographic technique

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Reverse phase High performance liquid chromatography is worldwide accepted technique, which is used in analysis of drugs. This technique is used for separation and quantification of disteriomers, positional isomers and related impurities of drug substance. Apart from this, normal phase chromatography technique is specially used for separation of enantiomers. Regulatory authority also required method validation of this technique for approval of drug. By looking importance of this technique, a simple, linear and accurate related substance method was developed for the quantification of Z-isomer impurity and 3,4-dihydroxy-5-nitrobenzaldehyde intermediate impurity in entacapone active pharmaceutical ingredient by using high performance liquid chromatography technique. Separation between 3, 4-dihydroxy-5-nitrobenzaldehyde, Z-isomer and Entacapone was achieved on Phenomenox Kinetex C18, (100 x 4.6) mm, 2.6 micron column. For standard preparation mobile phase consisted of 0.1% Orthrophosphoric acid in water: Methanol in ratio 58:42:0.1 in isocratic mode. Gradient method was used for sample preparation with flow rate of 0.8 ml/min at 300 nm and column oven temperature at 50°C. RSD for standard preparation under system precision was observed 3.56%. RSD for retention time was observed 0.05% which shows reproducibility during replicate injections. Limit of detection (LOD) and limit of quantification (LOQ) was achieved at 0.1 ppm and 0.2 ppm level respectively which indicates the lowest level of detection and quantification. The linearity range was achieved from 0.2 ppm to 0.75 ppm level for entacapone, Z-isomer and intermediate. Recovery study was performed and it was found that % recovery is within acceptance criteria for Z-isomer and intermediate. The method was applied for quantification of Z-isomer, intermediate and any unknown impurity of entacapone API.

Evaluation of parameters of sodium-2-hydroxy benzoate in 50% ethanol using ultrasonic waves

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Ultrasonic waves are established as effective means for analyzing certain physical properties of the materials. Ultrasonic's is an area of intense scientific and technological research. Science and technology of ultrasonic is widely used in the recent years for industrial and medical applications. The propagation behaviour of sound waves is studied for the liquid systems as well as solids. In the present work, we selected ternary system that is sodium-2-hydroxy benzoate dissolved in 50% ethanol and water mixture with 0.1M, 0.01M and 0.001M concentration for the evaluation of density, viscosity and ultrasonic velocity. All the measurements were taken at three different temperatures 298 K, 303 K and 308 K. From the measured values of density, viscosity and ultrasonic velocity, different acoustical parameters like adiabatic compressibility, apparent molar compressibility, free volume, relaxation time etc are calculated. A standard frequency of 4MHz of ultrasonic waves has been used as a source for the selected system. The results obtained are interpreted on the basis of molecular interactions. The deviations in the ultrasonic velocity from the experimental values in the systems studied are showing molecular interaction between the solute and solvent molecules in the

solution. The values of adiabatic compressibility and apparent molar compressibility show incompressible part in solutions with the variation in solute concentration. The variation of the change and relative change in compressibility values with temperature shows thermal rupture of water structure.

Microwave-assisted synthesis of conducting gellan gum-graft-polyaniline

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Grafting of Polyaniline (PANI) on to Gellan Gum (GG) was carried out in the presence of catalytic amount of ammonium peroxydisulfate (APS) as oxidant / initiator under mild acidic conditions using microwave irradiation technique. The grafting condition was optimized by varying the microwave power, exposure time and the composition of the reaction mixture. The graft copolymer GG-g-PANI was characterized using UV / vis, FTIR, TGA and SEM techniques. The findings have been discussed and a plausible mechanism for graft copolymerization has been proposed. The electrical conductivity of the GG-graft-PANI has been measured using the four-point probe method. The dielectric properties have been discussed.

LC-MS/MS method for determination of nitrosoamines in raw bovine milk and testing persistence on boiling

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A LC-MS / MS method for simultaneous determination of eight N-Nitrosoamines (N-Nitroso-N-Methylamine, N-Nitrosodi-N-Butylamine, N-Nitrosodi-N-Propylamine, N-Nitroso diethyl aminine, N-Nitrosodiphenylmine, N-Nitrosomorpholine, N-Nitrosopiperidine and N-Nitrosopyrrolidine) in raw bovine milk was developed. The analytical range was 70 to 490 ng / mL of each nitrosoamine in milk and the method detection limit was as low as 70 ng / mL. The developed method involved extraction of nitrosamines from milk by liquid-liquid extraction and analysis by LC-MS / MS. For raw bovine milk, assay accuracy, precision (repeatability and reproducibility), specificity, stability and Limit of quantitation (LOQ) were established for the proposed method. The LOQ was considered, based on the lowest spiked concentration that gave acceptable validation results at 70 ng / mL for all the tested 8 nitrosoamines. The inter-day recoveries for Nitrosoamines in bovine milk ranged from 88.5 to 110.3% over the three concentrations tested (70, 280 and 420 ng / mL). The intra-day %CV (repeatability) ranged between 1.5 to 11.9 % for 8 Nitrosoamines. The inter-day %CV (reproducibility) ranged between 1.5 to 10.8% for Nitrosoamine mix.The processed sample stability was performed for 24 hours at room temperature and for 48 hours in refrigerated conditions. Nitrosoamines were found to be stable in the processed samples for 24 hours at room temperature and for 48 hours in refrigerated conditions at 70, 280 and 420 ng / mL fortification levels. To determine the persistence of nitrosoamines on boiling, nitrosoamines were spiked into raw bovine milk at two known concentrations (280 and 420 ng / mL) and the milk was boiled, till froth. The boiled milk samples were then allowed to cool to room temperature and then processed and analysed using the validated method. The nitrosoamines persist in milk even on boiling.

Mechanism of Ir(iii) catalysis in oxidation of some digols by patassium bromate

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The kinetics of oxidation of some digols such as methyl digol and ethyl digol by potassium bromate in presence of acidic solution of iridium (III) chloride as homogeneous catalyst using mercuric acetate as bromide ions scavenger has been investigated. The results indicate zero order kinetics with respect to oxidant potassium bromate and second order kinetics with respect to both methyl digol and ethyl digol. The oxidation of methyl digol and ethyl digol exhibited first order kinetics with respect to iridium (III) chloride. Successive addition of mercuric acetate did not influence the reaction velocity. Insignificant effect of variation of ionic strength of medium on reaction velocity was observed. Zero order dependence on perchloric acid, i.e., H^+ ions was observed. The thermodynamic parameters have been computed from the rate constants observed in 30°- 45°C temperature range. Mechanistic steps in conformity with observed kinetic data have been discussed. The products thus obtained in the reaction were separated by different techniques and were identified by spectral techniques.

Synthesis and antimicrobial activity of chloro, nitro and methyl substituted Schiff's bases

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Schiff's bases were prepared by condensation of H / nitro aniline with chloro, nitro and methyl substituted benzaldehyde in ethanol in presence of 2, 3 drops of concentrated H_2SO_4. Characterization, and structural elucidation were done on the basis of chemical, analytical and spectral analysis. The antimicrobial activity of these schiff's bases were assayed against the test organism E.coli, S.typhi, S.paratyphi, P.vulgaris, S.aureus. All bacterial species used in present investigation are human pathogens. The Schiff's bases were tested against Pathogenic bacteria for their antimicrobial activity by using cup plate diffusion method and for determination of minimum Inhibitory concentration (MIC) values by serial dilution method.

A versatile synthesis and antimicrobial activity of 2-aryl-3-*m*-chloro-phenyl-5-tetra-*o*-acetyl-β-d-glucopyranosylimino-3-oxo-1, 2, 4-thidiazolidines

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The 1, 2, 4,-thidiazolidine have drawn considerable attention due to their varied biological and physiological activities e. g. local anaesthetic. Glucosyl 1, 2, 4, thidiazolidine are known to be selective and efficient catalytic inhibitors of human liver glycogen phosphorylase, a target for the design type 2 diabetes therapeutics.

Several 2-aryl-3-*m*-chloro-phenyl-5-Tetra-*o*-acetyl-β-D-glucopyranosyl-imino-3-oxo-1, 2, 4-thidiazolidines have been prepared by the interaction of 1 -aryl-3-*m*-chloro carbamide and, Tetra-*O*-acetyl-β-D-glucopyranosyl-

isothiocarbamoyl chloride. This converted high isolated yields which can find application in the area of medicinal chemistry. The identities of these newly synthesized compounds are established on the basis of elemental analysis IR, 1HNMR, Mass, and ^{13}CNMR spectral analysis. These compounds were assayed for their antibacterial and antifungal activity against some selected pathogenic organisms like *E. coli, S. aureus, Ps. aeruginosa, S. typhi, R. oligosporus and A. Niger* to get potent bioactive molecule.

Corrosivity of *Pongamia pinnata* biodiesel on zinc and its alloy – A comparison

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From the viewpoint of global warming prevention and reduction of fossil fuel consumption, biodiesel has been widely used all over the world. Oxidation of biodiesel is determined by the degree of unsaturation in the fatty acid alkyl ester chain, water content and environmental factors such as temperature, nature of storage container and air exposure during storage. The corrosivity of biodiesel on metals is higher than diesel due to their distinct chemical characteristics. Some metals have a catalytic effect on the biodiesel oxidation process which causes severe corrosion during long-term storage. Higher concentrations of biodiesel may begin to create problems more rapidly with zinc, tin, brass and bronze. Hence the present study is aimed to investigate the corrosivity of *pongamia pinnata* biodiesel (PBD) and its blends with commercial diesel on zinc and brass by mass loss method. Zinc was found to be highly corroded than brass in PBD. The surface morphology and the elemental composition of the corrosion products were determined by scanning electron microscope (SEM) and energy dispersive spectroscopy (EDS). Pit distribution and pit density of the metals exposed in PBD were analysed by laser profilometry. Corrosion products on the PBD exposed metals were also examined by X-ray diffraction (XRD).

Synthesis, characterization and antimicrobial activity of copper, nickel and iron complexes derived from (E)-1-(2-(pyridin-2-ylmethylene) hydraziynl) phthalazine

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Hydrazones and their transition metal complexes show hypotensive, antituberculous, antitumoral, antiviral, antibacterial and psychotropic activities. Due to their most practical use and biological activities 1-hydrazinophthalazine (hydralazine) have been widely studied and applied, in particular, as catalysts, dyes, analytical reagents and pesticides.

The thiosemicarbazones (TSC) of 2-pyridyl ketones have been reported to show various bioactivities against protozoa, insects and fungi, however, due to the toxicity associated these TSC compounds, corresponding hydrozones of 2-formyl pyridine are looked as new options. Expectation of possible bioactivities prompted us to prepare a variety of hydrazones with hetero-arylhydrazines. Hence, in present work we have prepared hydrazone (L) by condensation of 2-formyl pyridine with hyrazinophthalazine and Copper complexes of [MLX] and [ML_2] type have been prepared by reacting copper chloride, nickel chloride and ferrous sulphate with ligand in 1:1, 1:2 ratio respectively. The ligand and complexes have been characterized by sophisticated analytical techniques such as single crystal x-ray crystallography, ESI-MS, elemental analysis, IR. These complexes have been evaluated for their antimicrobial potency, where some of the compounds exhibited moderate to good potency.

Dielectric behavior and second harmonic generation efficiency studies of pure and glycine doped bisthiourea copper / zinc oxalate : A novel semiorganic nonlinear optical materials

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A novel class of semiorganic nonlinear optical materials viz. Pure and glycine doped bisthiourea copper oxalate and bisthiourea zinc oxalate have been synthesized by solvent free mechanochemical method. Chemical composition was confirmed by chemical and CHNS analysis. Incorporation of glycine was confirmed by FTIR and EDAX analysis. FTIR studies ascertained the presence of various functional groups and coordination of metal ions to thiourea through sulphur atom. TG and DTA investigations showed doped compounds are more stable. Transmittance spectra reveal that lower cut-off wavelength for pure and doped material are between 321 to 289nm. The dielectric measurements of material with varying frequencies at room temperature were studied. The dielectric constant and dielectric loss were found to decrease when the frequency increased. These lower values at higher frequency are a desirable property to enhance the second harmonic generation (SHG) efficiency. The SHG conversion efficiency measured by Kurtz-Perry powder technique using Nd: YAG laser was found to be increased for glycine doped material than pure compounds. SHG of glycine doped bisthiourea zinc oxalate is 0.528 times higher than that of glycine doped bisthiourea copper oxalate (0.367) as compared to KDP as reference defining the nonlinear optical nature and suitability for NLO applications.

Synthesis, spectral, thermal and fluorescence studies of Co(II), Ni(II), Cu(II) and Zn(II) complexes derived from 4-(4-cyanobenzylideneamino)-3-mercapto-5-oxo-1,2,4-triazine

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A new series of metal complexes have been synthesized with a imine 4-(4-cyanobenzylideneamino)-3-mercapto-5-oxo-1,2,4-triazine which has been derived by the condensation of 4-cyanobenzaldehyde and 4-amino-3-mercapto-5-oxo-1,2,4-triazine. Different techniques like IR, ^{1}H NMR, electronic spectroscopy, fluorescence, ESR, thermal, conductivity and magnetic measurements were used to investigate the structural features of the synthesized compounds. The thermal and IR data show the presence of coordinated water with the metal complexes. The electronic absorption spectra and magnetic moment measurements suggest octahedral geometry for Co(II), Ni(II) and Zn(II) complexes and square planar for Cu(II) complexes. All the newly synthesized metal complexes show enhancement in fluorescence intensity in comparison to the ligand. The newly synthesized ligand and metal complexes were also screened for their antimicrobial activities against some bacterial and fungal strains to assess their inhibiting potential *in vitro*. The activities shown by

these complexes were compared with ligand and also with standard drugs. The molar conductivity values indicate that the complexes are non- electrolytes.

Spectrophotometric method for determination of deltamethrin in environmental and food samples by using leucomalachite green

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Deltamethrin[(*S*)-Cyano-(3-phenoxyphenyl)-methyl] (1*R*,3*R*)-3-(2,2-dibromoethenyl)-2,2-dimethyl-cyclopropane-1-carboxylate] is a pyrethroid insecticide, used on various crops including cotton, corn, cereals, soybeans and vegetables for controlling pests such as mites, ants weevils and beetles. As a consequence deltamethrin can be found in natural water, soil and food materials. In this work we have developed a method, based on spectrophotometery, to determine low level of deltamethrin in water soil and vegetables. The method is based on the bromination of deltamethrin to form dibromodeltamethrin which reacts with potassium iodide-Potassium iodate mixture in presence of leucomalachite green (LMG) to form greenish blue dye. The dye shows maximum absorbance at 620 nm. Beer's law obeyed over the concentration range of 10-50 µg in a final solution volume of 10 ml. The Molar absorptivity and Sandell's sensitivity were found to be 7.72×10^{4} L $mol^{-1}cm^{-1}$ and 1.0×10^{-3} µg cm^{-2} respectively. The standard deviation and relative standard deviation were found to be 1.53×10^{-3} and 1% respectively. The proposed method is free from the interferences. The analytical parameters were optimized and the method was applied to the determination of deltamethrin in water soil and vegetable samples.

Some studies on solid dispersions of NA-AN drug system

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The study of solid-liquid phase equilibrium of binary / multi component system has been very helpful in analyzing crystallization processes to separate the organic melt mixtures. In the present study the binary drug system consisting of Nicotinamide (NA), a water soluble vitamin B3, dietary supplement and anti-pellagra agent with Anthracene (AN), used in radiation therapy was taken. The solid-liquid phase diagram of NA-AN drug system has been carried out by the Thaw-melt method. Congruent melting type phase diagram at 0.33 mole fraction of AN at 194°C melting temperature exhibits only one eutectic point at 0.387 mole fraction of AN and at melting temperature 188°C. NA and AN reacts in 2:1 stoichiometric ratio. The excess and mixing thermodynamic quantities have been determined by computing the values of heat of fusion and activity coefficient in binary mix. The Gibbs-Duhem equation gives the graphical solution of partial mixing thermodynamic function and activity coefficient for the binary dispersion. The thermodynamic stability function favours the considerable stability during the formation of the dispersions and their mixing. The surface properties: solid-liquid interfacial energy, a phenomenologically important thermodynamic quantity and other properties such as grain boundary energy (σ_{gb}), the driving force of nucleation (ΔG_v), critical free energy of nucleation (ΔG^*) and critical radius (r^*) at different undercoolings have been determined.

Design, synthesis, charecterisation and biological evaluation of novel triazine derivatives

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New substituted triazines were prepared from methylcrotanate and paratoulenemethylsulphonylisocyanide (TosMIC) as starting materials throughpyrrolediester as intermediates. These intermediates on reaction with ammonium chloride in alkaline media to give aminatedpyrrolediester, which was converted intodehydrotriazine in the presence of fomamide, finally this one converted into corresponding triazines by using dehydrating agent $POCl_3$. Reaction completion was monitored by TLC, the synthesized compounds were characterized by their physicalproperties, IR, ^1H NMR, ^{13}C NMR, elemental analysis and LC Mass spectroscopic studies. The antimicrobial activity of synthesized triazines wasassessed by agar cup method and filter paper disc method. In the most cases triazines having chloro substitution onthe styryl ring was found to be more efficient than the remaining against xanthomonascampestris and aspergillusniger species.

Synthesis of fused thiazolopyrimidines and evaluation of their antibacterial activity

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A series of fused thiazolopyrimidine derivatives have been synthesized by reaction of fused pyrimidine-thiones with 4-substituted phenacyl bromides / 3(2-bromoacetyl)coumarin in refluxing acetic acid with good yields. All the synthesized compounds were confirmed by spectral studies and screened for their *in vitro* antibacterial activity against *Staphylococcus aureus, Bacillus thuringiensis (Gram positive), Escherichia coli and Klebsiella pneumonia (Gram negative) bacterial strains.* Activity *results revealed that, all the compounds were weak to moderately active against the tested bacterial strains on comparing with the standard drug* Gentamicin. The intermediate, fused pyrimidine-thiones were prepared with high yields (88-94%) *via* a modified Biginelli reaction of cyclopentanone, aryl aldehyde and thiourea in the presence of Brønsted solid acid catalyst, poly(4-vinylpyridinium)hydrogen sulfate [P(4-VPH)HSO_4] under solvent-free conditions at 120 °C.

Characterization of manganese and nitogen codoped TiO_2 nanoparticles synthesized by modified sol gel method

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Manganese and Nitrogen codoped photocatalysts were prepared by modified Sol-Gel method. The prepared photocatalysts were characterized with X-ray diffraction (XRD), Scanning Electron Microscopy (SEM), Brunauer-Emmett-Teller (BET) Analysis and UV–Vis spectroscopy. Their photocatalytic activity was evaluated using azo dye as a model organic compound. The UV- Visible absorbance spectra of the synthesized samples of N and Mn codoped TiO_2 showed the shift of absorbance edge of Mn-N-codoped TiO_2 to a lower energy as compared to N- doped TiO_2. The SEM photograph of the Pure TiO_2, N-doped TiO_2 and Mn-N-Codoped TiO_2 ($Ti_{1-x}Mn_xO_{2-y}N_y$) showed that N and Mn codoping result in agglomeration of particles to form irregular shaped clusters. XRD patterns and corresponding characteristic 2θ values for the diffraction peaks of $Ti_{1-x}Mn_xO_{2-y}N_y$ at different calcination temperature confirms that TiO_2 was in anatase phase having tetragonal structure. The low intense peak of $MnTiO_3$ was observed in the sample calcinated at 400°C, disappeared on heating at 600°C and new crystalline phase of Mn_3O_4 appeared. The average crystallite size of samples calcinated at 400°C and 600°C was calculated to be 31.82 and 170.25 nm respectively. The Mn-N-codoped TiO_2 ($Ti_{1-x}Mn_xO_{2-y}N_y$) calcinated at 600°C exhibits photocatalytic efficiency for degradation of Acid Orange 7 under solar irradiation.

Synthesis of fine calcium titanate particles by flux method and their photocatalytic performances for hydrogen production

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Fine calcium titanate particles were synthesized by the flux method : The fine particles were obtained by heating a mixture of solutes (calcium carbonate and titanium oxide) in flux such as NaCI at high temperature (1100 *ºC)*, holding this temperature for a long time such as 10 hrs., and then cooling gradually or rapidly. Several samples were synthesized by using this method in various condition with different ratio of the solutes in the flux (5, 10, 15, 20 mol% of solutes in the NaCI flux), and characterized by DR-UV-VIS, XRD, SEM and BET measurements. As a result, some samples with fine particles were successfully obtained. These samples were loaded with Pt-co-catalyst by the photodeposition method and examined for the photocatalytic tests for hydrogen production.

Green chemistry : A hope of the future

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Population on the planet earth is increasing in geometric progression as well as necessities of human beingsare also increasing with the economic growth of the society . Now a days they need not only food ,clothes and shelter rather they are also in need of medicines ,cosmetics,transportation,entertainments and many other auxiliary amenities. Deforestation for agriculture and construction of residential as well as industrial establishment on the agricultural lands are the need of the hour, as a result area of agricultural land is shrinking whereas demand of food material is increasing day by day. In the middle of 20th century chemists envisioned chemistry as a solutionto a hostof societal needs.They discovered many things which improved the quality of life on the earth to name a few is fertilizers and insecticides to improve agricultural production, medical revolution through discovery of antibiotics and many other drugs which conquered over many fatal diseases and has increased the life expectancy and also decreased the infant mortality rate. To supply clothes synthetic fibres were discovered, a variety of cosmetics were discovered to give a beautiful look, dyes, plastics, semiconductors for electronic deviceswhich led to communication revolution along with many other materials to give a comfortable life to the people throughout the globe were discovered. A very popular slogan was given ''Better things for better living through chemistry"

Synthetic chemists are least concerned with environmental effects. In the same time chemistry has created some adverse effects leading toair, water ,soil,noise and aesthetic pollution on earth.These resulted in global warming ,ozone layer depletion,green house effect, undesirable climate change, species decline leading to loss of biodiversity these all are posing threat not only to human civilization but also to the existence of life on the earth.

The Rio declaration on environment and development states that '**'Human beings are at the centre of concern for sustainable development. They are entitled to live a healthy and productive life in harmony with nature ."** It highlights the challenges before the modern day chemists to define the objectives of sustainable development and to provide scientific ,technological and social tools to achieve these objectives.

The area of chemistry which is particularly directed to achieve such goals is termed as Green chemistry. In 21st century Green chemistry is the central issue in both academia and industry . The term green chemistry was coined by Paul Anastas and hence he is popularly known as father of green chemistry.

Sustainability of our civilization depends on whether we can supply the rapidly growingpopulation with enough food ,energy,and other chemicals simultaneously without compromising on the health ofour planet. Worldwide demand of ecofriendly chemical processes and products requirethe development of novel and cost effectiveapproaches and to reduce the adverse consequences of present pollution.

This presentation will discuss the key advancement made in the field of green chemistry, its different areas, its 12 basic principles along with their application.

Comparison of various methodologies and adsorbents to remove Cd metal ions from waste water

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Water pollution due to disposal of heavy metals is becoming a serious environmental and public health issue. Heavy metals are discharged by various industries like electroplating, mining, tanneries, fertilizers, alloy industries etc. Heavy metals are not biodegradable and have adverse effects on plants, animals and human beings. Most of these heavy metals are toxic and carcinogenic. Many methods like ion-exchange, chemical precipitation, reverse osmosis, membrane separation, adsorption etc. are being used to remove these metals from effluent water. Among all these methods adsorption is one of the most popular methods used to remove toxic metals from waste water. The present review compares the various methodologies and adsorbents used to remove Cd metal from waste water on the parameters of economy, availability of adsorbent, complexity of process, and adsorption efficiency of adsorbent, eco-friendliness. The objective of this comparison is to suggest the best adsorbent that can be used for the adsorption of Cd metal for its removal from the aqueous solution.

Kinetics and mechanism of oxidation of valacyclovir by alkaline permanganate

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Valacyclovir [VCH] L-valine-2-[(2-amino-1, 6-dihydro-6-oxo-9-hipurin-9-yl) methoxy] ethyl ester is the L-valyl ester prodrug of the antiviral drug acyclovir that exhibits activity against herpes siplex virus types,1(HSV–1) and 2(HSV–2) and vericellazoster virus. The kinetics of oxidation of VCH was studied by alkaline permanganate (MnO_4^-) spectrophotometrically at 526 nm. The order in [MnO_4^-] was found to be unity where as fractional orders were observed both in [VAL] and [OH^-] . Increase in ionic strength increases the rate of reaction. The oxidation was found to follow the intervention of free radical. A suitable mechanism was proposed and rate law was verified. Since reaction follows multistep mechanism, the reaction constants *viz.*, equilibrium constants and rate constant of the slow step are involved. In order to arrive at the values of such constants, the reaction was studied at various temperatures. From the slope of Arrhenius plot, log k_{obs} *versus* 1 / T, the activation energy, Ea was calculated. Further, the other activation parameters, $\Delta H^{\neq}$, $\Delta S^{\neq}$, $\Delta G^{\neq}$ and log A were evaluated for overall reaction. From the van't Hoff plot, the thermodynamic parameters, ΔH, ΔS and ΔG for the formation of monohydroxo permanganate, and complex between Mn(VII) and VAL were determined.

Excess volume of mixing for binary mixtures of some nitroalkanes and symmetrical aromatic hydrocarbons

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The excess volume of mixing(V^E) for the binary mixtures of the nitromethane, nitroethane and 2-nitropropane with symmetrical aromatic hydrocarbons benzene, p-xylene has been determined by density measurements at 293.15 and 298.15K. The V^E values are positive over the whole mole fraction range except those for the mixtures of niroethane and 2-nitropropane with benzene and p-xylene where they are negative at lower and positive at higher mole fractions of nitroalkanes. The results have been discussed in terms of dipole-induced dipole electrostatic molecular interactions . Moreover, the excess molar volumes were fitted using a Redlich-Kister equation.

Rheology and interaction behaviour of sodium caproate in non aqueous medium

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The different rheological parameters viz., density, viscosity and conductivity measurements on Sodium Caproate have been carried out under reduced pressure to determine the critical micellar concentration (CMC), soap-solvent interaction and various acoustic and thermodynamic parameters. The results show that Sodium Caproate behaves as a simple electrolyte. The density and visocity results confirm that the molecules of the soap do not aggregate appreciably below the CMC and a sudden change in the aggregation take place at the CMC. The ultrasonic results confirm a significant interaction between the soap and solvent molecules in dilute solutions. The results have also been explained in term of well known equations.

Design, synthesis and anti-tubercular activity of various phenanthridine analogues

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A series of twenty two new 6-(4-substitutedpiperazin-1-yl) phenanthridine derivatives were designed, synthesized, and evaluated for their anti-tubercular activity against *Mycobacterium tuberculosis (MTB)* $H_{37}Rv$ by MicroplateAlamar Blue Assay (MABA) and cytotoxic activities are determined for the most active compounds. Among the tested compounds, tencompounds exhibited significant activity profile against the growth of MTB(MIC ranging from 1.56 –6.25 µg / mL). In particular, compounds **5e**, **5j** and **5k** displayed excellent activity (MIC 1.56 µg / mL)while compounds, **7f** and **7i** exhibited good activity (MIC 3.125 µg / mL) against the growth of MTB $H_{37}Rv$. Further these compounds were tested for *in vitro* cytotoxicity against mouse macrophage cell lines (RAW264.7). The selectivity index values were found to be **>15**, indicating compounds likeliness in drug development for tuberculosis. The structure of **5k** was substantiated by X-ray crystallographic study. 9-fluorenone**(1)** upon treatment with $NH_2OH.HCl$andCH_3COONa under reflux condition afforded *N*-hydroxy-9*H*-fluoren-9-imine **(2)**. Further heating **2**with $POCl_3$ and P_2O_5 gave phenanthridin-6(5*H*)-one**(3)**. 6-chlorophenanthridine**(4)** was synthesized by refluxing **3** with $POCl_3$. **4**on treatment with substitutedpiperazines in presence of TEA under microwave irradiation conditions yielded**5a-l**.**5a** on treatment with propargyl bromide yielded **6**.**7a – j** were synthesized employing versatile 100% atom economy copper(I)-catalyzedazide-alkyne cycloaddition.

Synthesis and characterization of Mn(II), Co(II), Ni(II), Cu(II) and Zn(II) complexes of 2-amino-3-(4-hydroxyphenyl)-N'-[(2-hydroxyphenyl)methylene]propanohydrazide

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A new Schiff base, 2-amino-3-(4-hydroxyphenyl)-N'-[(2-hydroxyphenyl)methylene]propanohydrazide (**amph**) was synthesized by condensing L-tyrosine hydrazide with salicylaldehyde in ethanol and complexes of Mn^{+2}, Co^{+2}, Ni^{+2}, Cu^{+2} and Zn^{+2} ions were isolated from the ethanolic solution. The isolated ligand and the complexes were characterized based on the elemental analyses, molar conductance, TG-DTA, electronic, IR, NMR and ESR spectral data. ^{1}H and ^{13}C NMR and IR spectra suggest the bonding of the ligand with the metal ions as a neutral tridentate species. All the complexes were nonelectrolytes. Elemental and TG-DTA analysis data of the isolated complexes are compatible with 1:1 metal:ligand stoichiometry. Distorted octahedral geometry for Cu(II) complex was indicated by ESR and electronic spectra, and the trend in g-values shows that the unpaired electron is in $d_{X^2-Y^2}$ orbital. It is likely that Mn(II) complex is low spin. Octahedral stereochemistry around the Ni^{+2} ion is suggested based on magnetic and electronic spectral data. Low μ_{eff} value and half field signal in the esr spectrum of the cobalt complex suggest possibility of formation of a dimer. We are making efforts to grow single crystals of the complexes. XRD studies indicate that cobalt and copper are nanosized complexes. SEM-EDAX studies were carried out to obtain morphological information of the complexes and identification of chemical composition.

Studies on biodiesel production using waste cooking oil (WCO)

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We report herewith the studies aimed to develop a process using ionic liquid as a catalyst having multiphase conditions to achieve biodiesel production. Using waste cooking oil with high acid value as feedstock under reflux conditions and having optimized quantity of tuned ionic liquid as a catalyst, the synthesis of biodiesel as a one pot synthesis method is successfully completed. The effects of reaction time, temperature, catalyst concentration and molar ratio of alcohol to an oil on fatty acids ethyl / methyl ester yields were investigated. The fuel properties of the synthesized biodiesel from various feed stocks at different temperature, time and catalyst conditions are studied and which exhibit good correspondence with values required in ASTM Standards for Biodiesel Formation (BDF). The utility of the method is discussed.

Synthesis, characterization and biodegradation behavior of nanostructured hydroxyapatite (HAP) bioceramics

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Significance of nanosized hydroxyapatite (HAP) ceramics has been reported via sol-gel auto-combustion technique. The synthesized sample was characterized by various physico-chemical methods. Thermal stability investigated using thermo-gravimetric and differential thermal analysis (TG-DTA). Structural characterization of the sample was carried out by the X-ray diffraction technique (XRD) which confirms that it is single phase hexagonal structure. Porous surface topography was presented by scanning electron microscopic studies (SEM). The elemental analysis as obtain from energy dispersive X-ray spectroscopy (EDAX) is in close agreement with starting composition used for the synthesis. In vitro biodegradation behavior of these was evaluated using simulated body fluid (SBF). Results revealed that HAP degrade easily and can be used as scaffold for bone tissue engineering and Dentistical applications.

Synthesis of novel 3-hydrazino-3-oxo-*N*-(5 chloro 2 methoxy phenyl)-propanamide

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The full therapeutic possibilities of hydrazides were realized after the discovery of isonicotinic acid hydrazide (INH). Hydrazides and their derivatives have been described as useful synthons of various heterocyclic rings. A large number of hydrazides and their derivatives are reported to possess a broad spectrum of biological activities . Thus, these were found to be useful especially in the treatment of inflammatory and autoimmune diseases, osteoarthritis, respiratory diseases, tumors, cachexia, cardiovascular diseases, fever, hemorrhage and sepsis. These properties prompted us to synthesize Novel 3-hydrazino-3-oxo-*N*-(5 chloro 2 methoxy phenyl)propanamide from DEM and hydrazine hydrate. The synthesized hydrazide was screened for their anti-tubercular activity against H37Rv employing REMA (Resazurin microtitre assay) method and characterized on the basis of I.R, NMR spectra and elemental analysis.

Catalytic aromatization of hantzsch 1,4-dihydropyridines by SiO$_2$-HNO$_3$

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A simple method for the oxidative aromatization of Hantzsch 1,4-dihydropyridines to the corresponding pyridines is achieved by using SiO$_2$-HNO$_{3.}$ Since it is an inexpensive and readily available reagent and can efficiently oxidize varieties of 1,4-dihydropyridines to their corresponding pyridine compounds. The cheapness and availability of the oxidant and shorter reaction times are the advantages that could make this method an alternative and useful in addition to the present methodologies.

Synthesis and antimicrobial studies of maltosyl tetrazino benzothiazoles

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Benzothiazole derivatives have attracted a great deal of interest due to their biological and commercial importance. The tetrazines exhibit broad spectrum of biological activities. In our investigation maltosyl semicarbazides were prepared and used as an intermediate part for the synthesis of new set of heterocyclic compounds. The heterocyclic compounds, tetrazino benzothiazoles derived from maltosyl semicarbazides reactions have shown numerous applications. We aimed to obtain several new 3-oxo-4- hepta-*O*-benzoyl-â-D-maltosyl-(1,2,4,5)-tetrazino-(2,1b)-benzothiazoles by the oxidative cyclisation of 1-hepta-*O*-benzoyl-â-D-maltosyl-4-benzothiazolyl semicarbazides. The identities of these newly synthesized compounds have been established on the basis of usual chemical transformations and IR, ^{1}H NMR, ^{13}C NMR and Mass spectral studies and these compounds were screened for their antibacterial activity against pathogens like *E. coli*, *S. aureus*, *P. vulgaris*, *S. typhi*, *K. pneumoniae*, *Ps. aeruginosa* and for antifungal activity against *T. harzianum* and *Verticillium species* to get potent bioactive molecule.

Thermodynamic and interfacial studies on transparent organic eutectic : Phenothaizene-benzimidazole system

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Solid-liquid equilibrium (SLE) data of binary mixtures consisting of Phenothiazine (PHZ) and Benzimidazole (BZI) were measured by Thaw-melt method. Simple eutectic phase diagram was observed at 0.627 mole fraction of BZI at melting temperature 143°C. Partial and Integral thermodynamic quantities such as, excess Gibbs energy (g^E), excess enthalpy (h^E), excess entropy (s^E) of eutectic and non-eutectic mixtures were also calculated using activity coefficient data. The value of excess Gibbs free energy indicates positive deviation from ideal behaviour which refers stronger association between like molecules during formation of binary mix. However, the negative value of mixing function, Gibbs free energy of mixing (ΔG^M) suggests the mixing for eutectic and non-eutectic is spontaneous. The interfacial properties such as entropy of fusion per unit volume (ΔS_V), interfacial energy (σ), roughness parameter (α), grain boundary energy of parent components, eutectics and non-eutectics have been studied using enthalpy of fusion data. Gibbs-Thomson coefficient evaluated by numerical method is also very helpful to compute the interfacial energy. The size of critical nucleus at different undercoolings has been found in nanoscale, which may lead a big challenge in pharmaceutical world. The value of $\alpha > 2$, suggests the irregular and faceted growth proceeds in binary alloys.

LC-MS/MS method for the determination of rosiglitazone on dried blood spots a lid in urine : Application to pharmacokinetics

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A bioanalytical method for the quantification of rosiglitazone on dried blood spots (DBS) and urine using liquid chromatography, electrospray ionization coupled with tandem mass spectrometry (LC-ESI-MS / MS) was developed and validated. The chromatographic separation was achieved on a Nova-Pak C_{18} Column (150 mm x 4.6 mm i.d.. 4 µm). using 30 mM ammonium acetate (pH adjusted to 4.0 with acetic acid) and acetonitrile (75:25. v / v) as a mobile phase at ambient temperature. LC-MS detection was performed with selective ion monitoring using target ions at *m/z* 358 and *m/z* 356 for rosiglitazone and pioglitazone used as internal standard respectively. The calibration curve showed a good linearity in the concentration range of 0.5-2000 ng / mL. The effect of hematocrit, blood volume and Punch location were studied. The mean recoveries of rosiglitazone from DBS and urine were 92.30 % amd 92.49% respectively. The intra and inter-day precisions were less than 4.82 % in DBS as well as urine. The limit of detection and quantification were 0.25 and 0.85 ng / ml in DBS and 0.36 and 1.20 ng / mL in urine samples respectively. The method was validated as per FDA guidelines and successfully applied to a pharmacokinetic study of rosiglitazone in rats.

The role of carbon credit trading to curb global warming

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Today climate change and other environmental issues have been posing the greatest threat to mankind and biodiversity. Recently the researchers at the University of Cambridge and India’s Banaras Hindu University have revealed that the world’s first great civilization disappeared because of an ancient episode of climate change. Taking the serious concern about climate change or global warming in mind various international summits have been organized by various countries. Rio de Janeiro Summit (1992), Montreal Protocol (1987), Vienna Conference, Kyoto Protocol (1997) and Copenhagen Summit are important summits which addressed the issue of global warming. In December 1997 conference, the United Nations Framework Convention on Climate Change (UNFCCC) in Kyoto (Japan) recognised the need of mitigating carbon emissions in developed countries to curb global warming. Countries signed an agreement called “Kyoto Protocol”. Carbon credit trading is a unique concept which introduced in Kyoto Protocol. According to Multi Commodity Exchange of India, Carbon credits are “Entitlement Certificates” issued by the UNFCCC to the implementers of the approved Clean Development Mechanism (CDM) projects. The objective of this paper is to discuss the current scenario of carbon credit trading market in India.

Non-covalent interactions in copper(II) 2-chloro-4-fluorobenzoate and copper(II) 2,4-dichlorobenzoate complexes

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Non covalent weak interactions are major adhesive forces employed for self assemblies of molecular architectures with desired chemical properties. Four novel copper(II) complexes, [trans-Cu(2-Cl-4-F$C_7H_3O_2)_2$(β-pic)$_2$] **1** and [trans-Cu(en)$_2$(H_2O)$_2$](2-Cl-4-F-$C_7H_3O_2$)$_{2,}$ **2,** [trans-Cu(2,4-dichlorobenzoate)$_2$(b-picoline)$_2$(H_2O)$_2$], **3** and [trans-Cu(en)$_2$(H_2O)$_2$](2,4-dichlorobenzoate)$_2$.2H_2O, **4** (where β-pic = β-picoline, en = ethylenediamine) were synthesized by addition of β-picoline and ethylenediamine respectively to the hydrated copper(II) aryl carboxylate, Cu(2-Cl-4-F-$C_7H_3O_2$)$_2$ and [Cu(2,4-dichlorobenzoate)$_2$].nH_2O suspended in water-methanol (1:4) mixture. The newly synthesized complexes have been characterized by elemental analyses, TGA, spectroscopic techniques (I.R and UV/Visible), conductance, magnetic susceptibility studies and single crystal X-ray structure determination. A detailed packing analysis has been undertaken to delineate the role of noncovalent interactions.

Extractive flotation dissolution spectrophotometric determination of ethion with molybdate and methylene blue in various environmental samples

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A sensitive extractive spectrophotometric method based on flotation – dissolution is described for the determination of trace levels of the organophosphorus pesticide ethion. Ethion is converted into a molydophospho complex by reaction with ammonium molybdate in sulphuric acid medium. The complex floating on the interface of the aqueous and organic layers along with methylene blue as an ion associate complex is separated and dissolved in acetone. The absorption maxima of the greenish blue complex formed was measured at 660 nm. The color system obey Beer's law in the range 0.5 to 0.16μg ml^{-1} of ethion. The molar absorptivity is 6.0 x 10^5 mol liter-^{1} cm^{-1} and Sandel sensitivity is 0.014 μg cm^{-2}. The standard deviation and relative standard deviation were 0.022 μg ml^{-1} and 3.5% respectively. The method has been satisfactorily applied to the determination of ethion in water, soil and vegetables and grains.

Comparative study of the antimicrobial activities of the C-3 substituted lawsone monoximates of Holmium (III) Erbium (III) and Ytterbium (III)

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Oximes are proved to be superior ligands as compared to their parent ligands from which they are derived. Our research group is working on the coordination chemistry of two series of 1, 4 naphthoquinone-based ligands; C-3 substituted Lawsone series (1) and the corresponding Lw.oxime series (II). This communication is related to comparative study of the antimicrobial activities of C-3 substituted lawsone monoximates of Holmium (III); Erbium (III) and Ytterbium (III).

The lawsone monoximes selected are lawsone monoxim, pathicol monoxime (R = CH_3) and halolawsone monoximes (R = Cl, Br and I). All these ligands are synthesized in our laboratory by following the literature methods and characterized through elemental analysis, melting points and TLC. Trichlorides (hexahydrates) of Ho (III), Er (III) and Yb (III) were purchased from B. D. H. The chelates were synthesized by using standard procedure previously established in our laboratory. All these chelates were isolated in solid state, completely dried under vacuum and their chemical identities were established through elemental analyses and thermogravimetry which correspond to $ML_3.nH_2O$.

The antimicrobial activities were measured against five microorganisms *Staphylococcus aureus; Xanthomonas campestris, Psedudomonas aeruginosa, Candida albicans* and *Aspergillus niger* using well diffusion assay method. The results are utilized to compare the antimicrobial activities within each of the three series.

Effect of C-3 substitution on the antimicrobial activities of 2-Hydroxy, 1, 4-Naphthoquinone (Lawsone)

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Lawsone, which is 2.hydroxy 1, 4-naphthoquinone (I) and its C-3 substituted derivatives C-3-methyl lawsone, 3-halolawsones, 3-nitrolawsone {3-aminolawsone} constitute an important group of 1, 4 naphtoquinone-based ligands. All of these possess powerful chelating ability and significant biological activities against Gram positive, Gram negative and Fungal microorganisms.

This group of lawsone derivatives is of special interest to examine the effect of electron donating and electron attracting substituents at C-3 position on physical, chemical and biological properties of these ligands as well as large number of their metal chelates. In this communication, we would like to present our work on the antimicrobial activities of seven C-3 substituted lawsone derivatives against some selected microorganisms with special reference to the assessment of the C-3 substituents on the antimicrobial activities.

The lawsone which is the parent member, was purchased from Fluka A. G. and the other derivatives were synthesized by following the methods well established in our laboratory. The technique used for antimicrobial activity measured is disc assay method. The microorganisms selected include two Gram positive bacteria namely *Bacillus anthracis, Staphylococcus aureus*, two Gram negative bacteria namely *Salmonella paratyphi B.* and *Escherichia coli* and two Fungal strains namely *Aspergillus niger and Penicillium notum*. The results of antimicrobial activity measurements are expressed in terms of circular Inhibition zone Area calculated from π^2 (where r = radius of the zone of inhibition expressed in mm) as proposed by Kulkarni B. A. which is more useful for the comparative purpose.

Concentrations of toxic heavy metals and trace elements in raw milk of cows from organic farm

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Concentrations of toxic heavy metals (cadmium (Cd), lead (Pb)) and major nutritional and trace elements (Ca, Mg, P, Cu, Fe, Mn, Se, Zn) were analyzed in the milk of cows. Elements were determined atomic absorption spectrometry. The conducted research showed that the milk of cows was characterized by the more advantageous mineral composition and lower concentration of noxious heavy metals .In the milk of cows, significantly lower concentrations of Pb and Cd ($P<0.001$) and Cu ($P<0.05$) and significantly higher concentrations of Fe and Mg ($P<0.05$) as well as nonsignificantly higher concentrations of Ca, Mn, and Se were found. In the milk, very low Cu concentrations were recorded. The higher-than-recommended concentration of Pb in milk was also found. In the milk, the significant positive correlations between concentrations of the following elements were observed: Pb-Cd, Pb-Se, Cd-Se, Cd-Mn, Zn-Cu,Zn-P, Ca-P, Ca-Mg, and Mg-P.

Thermodynamic behavior of hen egg-white lysozyme with magnesium and calcium chloride

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High sensitivity differential scanning calorimeter and florescence spectrophotometer have been used to study the thermal denaturation of hen egg-white lysozyme in the presence of aqueous $MgCl_2$ and $CaCl_2$ solutions at pH values = 2.4, 4.5 and 6.0. Thermodynamic parameters accompanying the thermal transitions and calorimetric enthalpy have been evaluated. It is observed that thermal unfolding of lysozyme in the presence of both $MgCl_2$ and $CaCl_2$ follows a two-state denaturation mechanism as indicated by the equality of van't Hoff and calorimetric enthalpies. Further details of interactions have been determined from the partial specific volume of hen egg-white lysozyme at 288.15 K – 343.15 K determined through precise density data. The preferential interaction parameters of lysozyme with co solutes have been determined by correlating the surface tension values of aqueous $MgCl_2$ and $CaCl_2$ solutions to the surface area of the protein.

Synthesis, spectral studies and anti microbial activity of 2-pyranone derivatives

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2-Pyranones are found to possess pronounced biological activity like anti fungal ,anti bacterial etc. Many of the pyranones have been used as precursors for the synthesis of pharmacologically active compounds such as HIV protease inhibitors, antifungals, cardiotonics, anticonvulsants, antimicrobials, pheromones, natural pigments, antitumour agents and plant growth regulators. The pyranone ring when fused with other aromatic ring have also been found to possess remarkable anti fungal and anti bacterial activity. Many such derivatives containing various, heterocyclic compounds fused with 2-pyranones are known in literature. In the present paper, five new derivatives of 2-Pyranones have been synthesized by fusing them with various aromatic rings and studied for their antimicrobial activity. The Pyranone ring represents an important pharmacophore in many known drugs. This study has been supported by the proton NMR and IR spectral studies.

Synthesis and spectral characterization of some azo amine dyes

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A series of some azo amine dyes were synthesized of four aromatic amine using sodium nitrate ($NaNo_2$) and HCl and subsequent coupling of Aniline, P- Toludiene, O-Nitroaniline and m-Nitroaniline. Characterization of synthesized Compound is done by FT-IR, H’-NMR spectral data.

A metal-free post-Ugi cyclization approach towards *N*-subsituted benzo[*e*]*or*[*f*]isoindolones

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Multi-component reactions (MCR) inherently bequeath molecular diversity & complexity in a single step. A subsequent transformation of such MCR product, like an Ugi adduct, can provide a powerful way to generate a library of unprecedented molecules with potential diversity. With this core approach, we recently reported a post-Ugi gold-catalyzed regioselective tandem cyclization via Csp^3–H functionalization. Stimulated with these findings, we aimed to extend this methodology for the access *N*-subsituted benzo[*e*]isoindolones, which are known to act as potent human 17,20-Lyase inhibitors for treatment of castration-resistant prostate cancer (CRPC). Herein we have reported metal-free post-Ugi cycloaddition approach for the synthesis of such class of compounds in superior selectivity and excellent yields. Detailed mechanistic evaluation has been carried out, and all newly synthesized compounds have een well characterized by MASS, ^{1}H NMR, ^{13}C NMR and X-ray crystallographic analysis.

Determination of heavy metals and electrochemical analysis of water extracts from seeds of *Trachyspermum ammi* and *Nyctanthes arbor-tristis* in Bengal

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Seeds of *Trachyspermum ammi* and *Nyctanthes arbor-tristis* in Bengal have a great medicinal importance ip Bengal. They possess immunostimulant antiviral, antibacterial and antifungal activities in human life. Various parts of plants can absorb metals from soil as well as from deposits on the parts exposed to the air from polluted environments. Heavy metal contamination with the medicinal plants is a serious concern due to its implications on human health. Atomic Absorption Spectroscopy (AAS) is used for determination of content of heavy metals like Cu, Zn, Fe, Cd, Cr, Co, Pb, Ca, K, Mg, Na, Hg and Se from water extract of *Trachyspermum ammi* seeds and Cu, *Zn*, Fe, Cd, Cr, Pb, Ca, K, Mg, Na and Se from water extract of *Nyctanthes arbor-tristis* seeds, were detected in AAS. Cyclic voltammetry (CV) analysis shows the rapid deterioration of reducing strength of antioxidant actioxidant of water extracts. The main objective of this study was to determine nutritional status for heavy metals content and rapid detection of reducing strength as a part of antioxidant activities.

Free radical scavenging and anti oxidant activity of leaves of *Casearia tomentosa R*oxb

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The present study was sought to investigate the free radical scavenging and antioxidant activity of leaves of *Casearia tomentosa* Roxb. *(C.elliptica* Willd*)*. *Casearia tomentosa* belongs to Flacourtiaceae (Samydaceae). It is a small deciduous tree found in Himalayas from Kashmir to Nepal, and throughout tropical India. In Ayurveda it is used in the name of Chilhaka. Traditionally it is used to treat diabetes, as hepatoprotective and tonic in anaemic conditions. The ethanolic extract of the leaves was prepared and phytochemical screening was performed to identify the phytoconstituents. The antioxidant activity was evaluated by measuring Total Flavanoid content, total phenol content, reducing power of extract and total anti oxidant status. The free radical scavenging activity was determined by performing various *in vitro* methods like DPPH assay, Nitric Oxide scavenging assay and H_2O_2 scavenging activity. The preliminary phytochemical screening was performed and phytoconstituents were identified. The total flavanoid content, total phenolic content and IC50 value of the extract from DPPH assay were determined and found to be 62.86. The reducing power of the extract was found to be dose dependent. The results obtained from various scavenging assays predict that the ethanolic extract has good antioxidant activity and could be explored as a natural antioxidant.

Comparison of various methodologies and adsorbents to remove Cd metal ions from waste water

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Water pollution due to disposal of heavy metals is becoming a serious environmental and public health issue. Heavy metals are discharged by various industries like electroplating, mining, tanneries, fertilizers, alloy industries etc. Heavy metals are not biodegradable and have adverse effects on plants, animals and human beings. Most of these heavy metals are toxic and carcinogenic. Many methods like ion-exchange, chemical precipitation, reverse osmosis, membrane separation, adsorption etc. are being used to remove these metals from effluent water. Among all these methods adsorption is one of the most popular methods used to remove toxic metals from waste water. The present review compares the various methodologies and adsorbents used to remove Cd metal from waste water on the parameters of economy, availability of adsorbent, complexity of process, and adsorption efficiency of adsorbent, eco-friendliness. The objective of this comparison is to suggest the best adsorbent that can be used for the adsorption of Cd metal for its removal from the aqueous solution.

Crystal structure of 2-anilino-*N’*-[(1*E*)-1(2hydroxyphenyl) ethylidene]acetohydrazide (Hahea) and synthesis, spectral and thermal investigation of its Lanthanide (III) complexes

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A new phenyl glycine hydrazide 2-anilino-*N*’-[(1*E*)-1-(2-hydroxyphenyl) ethylidene]acetohydrazide (Hahea), was formed by the condensation of phenyl glycine hydrazide with 2-hydroxyacetophenone. The formation of Hahea is confirmed by elemental analysis, I.R ^{1}H-N.M.R. spectra and single crystal X-ray diffraction studies. Lanthanide (III) complexes of this ligand have been synthesized and characterized by elemental analyses, conductance measurements, magnetic susceptibilities, spectroscopic (I.R, N.M.R., U.V., E.P.R.,) and thermal studies. Molar conductance studies indicate 1:1 electrolytic behavior for these complexes. I.R. spectra indicate that Hahea acts as a tridentate ligand coordinating through carbonyl oxygen, azomethine nitrogen and deprotonated phenolic oxygen. TG and DTA studies indicate that the complexes are stable up to 275 ^{o}C and contain coordinated water molecules. Based on results, the complexes have been formulated as $[Ln(Hahea)_2\ 2H_2O\ ]$’” NO_3 where Ln = La(III), Pr(III), Nd(III), Sm(III), Eu(III), Gd(III), Tb(III), Dy(III) and Y(III), Antibacterial and Antifungal studies indicate an enhancement of activity of the ligand on complexation.

Synthesis of some new substituted isatin derivatives with possible antipyratic activity

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Substituted isatin derivative have been prepared by treating substituted aromatic amines with hydroxylamine hydrochloride with chloralhydrate in presence of so-dium sulphate to form 2-hydoxyimino-N-p-tolylacetamide which on reaction with conc. H_2SO_4 to give 5-substituted isatin which when condensed with 2-amino-4-aryl thiazole to yield indolin-2-one derivatives with possible antipyratic activity.

Phytochemical, multi-metal analysis, antimicrobial, anticancer investigation of *Semecarpus Anacardium* L. f. root bark

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Semecarpus anacardium L.f (Family: *Anacardiaceae*) is a deciduous tree. It is well known for its medicinal properties and is used as a highly potent Ayurvedic medicine. The fruit is reported to be astringent, antirheumatic, carminative and vesicant. The oil obtained from the nut is used for curing the rheumatic pain. The plant is having high ash content and low moisture content. Photochemical composition of various extracts of plant parts contained the presence of some minerals were recently investigated. These crude extracts were concentrated and analysed additionally by using Gas Chromatography-Mass Spectroscopy.

GC-MS analysis of phyto constituents in plants gives a clear picture of the pharmaceutical value of this plant, In the GC-MS analysis, the mass spectrum of the hexane extract of ***Semecarpus anacardium***L.f. was compared with the available library sources (NIST08 LIB, WILEY8 LIB).revealed the presence of 21varities of different individual compounds. **Further, these compounds were separated individually by using column chromatography and were identified with different spectral techniques.** Out of these, E-15-Heptadecenal (0.48%) and phenol, 2, 4-bis (1, 1- dimethyl ethyl) (0.82%) volatile compounds were identified. Root bark contains 20 components, Sterols, terpenoids and hydrocarbons were the most prominent. The major components detected were Bhilawanol(10.42%), n- Hexadecanoic acid(9.49%), β-sitosterol(9.70%), β-amyrine(8.50%), Diurethyl phthalate(8.10%),Benzene di carboxylic acid(5.63%), Oleic acid(5.57%),13-Docosenamide(3.95%), Octadecanoic acid(3.26%) etc

Characterization of some strongly acidic cation exchange resins based on poly styrene divinyl benzene copolymer

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The thermal degradation, morphology and Elemental distribution of some sulphonic catalysts namely, Thermax T-421H, Thermax T-521H, Indion 225, Indion 770 were investigated by using instrumental techniques like Fourier Transform Infrared spectroscopy (FTIR) Thermo gravimetric analysis (TGA) Differential Scanning Calorimetry (DSC) and Scanning Electron Microscopy, (SEM) with Energy disperse spectroscopy (EDS) The Thermo gravimetric analysis (TGA) was used to characterize the resin degradation.

The sulphonic cation resins undergo degradation through dehydration followed by decomposition of sulphonic acid functional group and polymer chain The Scanning Electron Microscopy with Energy Disperse spectroscopy was used to characterize the morphology and Disperse Spectroscopy allows one to identify what those particular elements and their relative proportions (Atomic%) All sulfonated polymer spheres show the loss in weight in separate temperature ranges The weight loss up to 200^0C can be attributed to moisture content. The weight loss from 200^0C to 400^0 C can be ascribed to the decomposition of SO_3H groups. FESEM images of Ion exchange resin shows the diameter of polymer sphere of different resins, It can be seen that the diameter of polymer spheres are not uniform in all FESEM image and diameter of polymer sphere of Thermax T-421H is much uniform and less in diameter as compared to other polymer sphere.

Synthesis, characterisation and anti-tubercular activity of some new thiosemicarbazide

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Tuberculosis is presently regarded as the most dangerous infective diseases world wide. And its one Of the leading causes of death due to a single infectious pathogens in the world. Approximately one-third of the world's population has been infected with the causative pathogens M.tuberculosis (M.TB). Here [l-(Substituted Anilino malonyl)-4-(4'-Substituted Phenyl)] thiosemicarbazides were prepared by the reaction of malonamic acid Hydrazides and substituted phenyl isothiocynate. Ten compounds were tested for the invitro activity against Mycobacterium Tuberculosis (M.TB) H37Rv using REMA method and three compounds (3g,3h,3j) were showing moderate activity against (M.TB) H37Rv. Details of synthesis and biological activity of active thiosemicar1y, discuss during presentation in conference.

Novel crosslinkable polymers for nonlinear optical (NLO) applications

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Nonlinear optical responsive chromophores were synthesized with imidazolidine-2,4-dione, pyrimidine-2,4,6(1*H*,3*H*,5*H*)-trione and 3-pheny-2-isoxazolin-5-one as acceptors. With these chromophores, a series of crosslinkable polymers were synthesized using phenylenediacryloyl chloride, tolylene-2,4-diisocyanate and 4,4'-methylenedi(phenyl isocynate). The molecular structural characterization of the polymers was achieved by FTIR, UV-vis, ^{1}H NMR and elemental analysis. The inherent viscosities of these polymers (ç inh) determined by Ubbelohde viscometer are in the range of 0.26 – 0.29 g / dl. Thermal behavior of these polymers was investigated using differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA). The glass transition temperatures (T_g's) of the resulting polymers are in the range of 97–175 ^{o}C. The change in the molecular alignment in the polymer films after electrical poling was ascertained by atomic force microscopy (AFM). The resulting polymers exhibited an excellent solubility in many of the common organic solvents, suggesting that these polymers offer good processability. The second harmonic generations (SHG) coefficients (d_{33}) of poled polymers determined by Maker fringe technique were in the range of 44 to 109.07 pm / V at 532 nm, suggesting that these could be acceptable for NLO applications.

Recent development in synthetic chemistry, synthesis, characterization and antimicrobial study of pyrazoles

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A great deal of work has been done on the synthesis of pyrazoles. Pyrazoles have been reported to possess a wide variety of pharmacological activities such as anti-bacterial, anti-convulsant, anti-inflammatory, anti-tubercular, intestinal antiseptic, anti-depressant, or anti-platelet activity. One of the most attractive concepts in chemistry for sustainability is Green Chemistry, which is the utilization of a set of principles that reduces or eliminates the use or generation of hazardous substances in the design, manufacture, and applications of chemical products. Microwave heating has attracted the attention of investigators in that it makes it possible to shorten the length of reactions significantly, to increase their selectivity, and to increase the product yields, which is particularly important in the case of high temperature processes that take a long time. We have obtained 1-(N-substituted aniline malonyl)-3,5-dimethyl-4-(4-fluoro-2-methyl phenyl azo) pyrazole by condensing 2,4-diketo-3-(4-fluoro-2-methyl phenyl azo) pentane with a number of N-(substituted) phenyl malonamic acid hydrazides under microwave irradiation conditions compared to the classical heating afforded. Their chemical structures of compound have been confirmed by means of their IR, NMR, mass and by elemental analysis and tried to design new and effective anti-bacterial agents.

Role of zeolite membranes : Separation of adulterants from liquid fuels

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Zeolite Membranes of Analcime, Ferrierite& ZSM-23 were successfully prepared by hydrothermal synthesis. Crystallization was carried out at a static condition under autogenous high pressure and temperature of 200^0C. X-ray Diffraction (XRD) patterns of Zeolite and their respective membranes show similar peaks. The crystal species were characterized by Scanning Electron Microscopy (SEM). Elemental detection of zeolites was carried out by Energy Dispersive Spectroscopy (EDS) and different groups present in zeolites was determined by Fourier Transform Infrared Spectroscopy (FTIR). Effect of various parameters such as separation time, temperature, molar concentration of water-isopropanol mixture, and zeolite loading on pervaporationof water–isopropanol & petrol-kerosene mixtures has been studied. Membranes were analyzed and it was observed that selectivity increased simultaneously with increase in zeolite content in the mixture. It can be explained on the basis of enhancement of hydrophilicity, selective adsorption and molecular sieving action including reduction of pore size of membrane matrix. Selective separation on the membranes was determined with the help of Gas Chromatography. Isopropanol-water mixture shows maximum separation selectivity on membranes than Kerosene – Petrol. In Kerosene – Petrol mixture, kerosene spreads more or less uniformly on the zeolite membranes, this behavior is generally described as complete wetting. Hence the zeolite membrane in kerosene is wetable and when kerosene passes into the narrow pore zeolite membrane swells more. On the other hand petrol will remain as a discrete as partial or incomplete wetting. Thus petrol will pass into the narrow pores to lesser extent and decreases the degree.

Synthesis of some noval dithiocarbamate substituted benzimidazolo-quinolin and study of some biological activies

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A series of substituted benzimidazolo- quinoline derivatives bearing a diverse dithio carbamate moiety were designed and synthesized via a three-component reaction protocol. All these compounds dithio carbamate derivatives by means of their IR, 1H NMR and mass spectroscopic data. All the synthesised dithio carbamate derivatives were screened for antimicrobial activities. Among antibacterial activity, four showed considerable activity of ciprofloxacin and other were found to be moderately active, especially compounds having methoxy and substitution at 6-position showed a moderate activity. Among fungicidal activity, compounds containing methoxy and methyl substituents at 6-position gave excellent activity and nearly equal to the standard amphotericin B.

Assessment of fertilizer requirement of starking delicious apple in 'on' and 'off' year crop condition in sub- humid condition of Himachal Pradesh

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Fertilizer recommendation on fruit trees are soil and leaf based on the soil and leaf nutrient analysis. However, these recommendations do not take in to account the expected crop load of the tree. Delicious group of varieties are prone to irregular bearing. Therefore, fertilizer recommendation on such varieties should be governed by expected crop load of the tree which varies during on and off year. As such a trial on twenty year old Starking Delicious apple tree was laid out during on and off year crop condition and it was observed that a major amount of mineral nutrients were removed by harvested fruits followed by pruning wood, whereas abscised flowers, fruitlets and senescent leaves contributed little amount to the total uptake. Trees with an yield of 16.9 t ha^{-1} removed 75.3 Kg N, 14.5 Kg P, 139 Kg K, 23.8 Kg Ca and 8.2 Kg Mg, whereas, tree with an yield of 4.1 t ha^{-1} removed 15.4 Kg N, 4.4 Kg P, 34.7 Kg K, 10.5 Kg Ca and 2.9 Kg Mg ha^{-1} . This shows that crop load largely determine the nutrient uptake of tree and should be used as a guide for fertilization of apple trees.

Role of calcium carbonate in improving the soil pH and microbial decomposition of organic matter in apple orchard of Shimla district

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Soil pH plays an important role in the growth and production of fruit crops. pH of soil in district Shimla varies from 4.5 to 7.5. Ideal pH for the growth of fruit plants especially apple varies from 6.0 to 7.0. From the survey conducted in the apple field, it was observed that soil pH is becoming low year after year. A field trial

was conducted in the apple orchard with the initial pH 5.0 for its effect on plant growth and production of quality apple fruit. To carry out the amendments in pH of the soil lime ($CaCO_3$) was added in different doses to reduce the acidity of soil. After one year of trial it was observe that soil pH was improved thereby reflecting effect on the growth of plants and production of quality apple. This was because of release of essential nutrient elements to the plants in a better way with the application of $CaCO_3$ to the soil. Moreover it could help in the stimulation of microbial decomposition of organic matter, which prompted the nitrification. The symptoms of Calcium deficiency in the fruit appearing year after year were also reduced. In addition major nutrient phosphorus was also made available to the acidic soil in the form of phosphorus pentaoxide compound to get fixed as iron and aluminium phosphates, which are otherwise unavailable, form of phosphorus to the plants.

Excess thermodynamic properties of binary liquid mixtures of bromobenzene with benzene and toluene at temperatures 293.15, 298.15 and 303.15K

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Excess thermodynamic properties are of great importance to understand the nature and strength of molecular interactions. The density *(ρ)*, viscosity *(η)* of the binary liquid mixtures of bromobenzene with benzene and toluene has been measured at 293.15, 298.15 and 303.15K temperatures. The various excess thermodynamic properties viz. viscosity deviation *($\Delta\eta$)*, excess molar volume *(V^E)*, and excess Gibbs free energy of activation of viscous flow *($\Delta G^{\#E}$)* have been calculated as a function of composition of binary liquid mixtures. These excess properties have been fitted to Redlich-Kister polynomial equation and the results have been interpreted in terms of molecular interactions existing between the components of these mixtures.

Additive effects of phyllosilicateson the properties of ethylene propylene diene monomer rubber (EPDM)nanocomposites

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The additive effects of phyllosilicates on the properties of ethylene propylene diene monomer rubber (EPDM) nanocompositeshas been investigated. Nanocomposites have been prepared by the incorporation of phyllosilicates in various concentrations through solution blending technique. Various advanced instrumental techniques such as scanning electron microscopy (SEM), differential scanning calorimeter (DSC) and thermo gravimetric analyser (TGA) have been used to characterize the thermal and morphological properties of the developed nanocomposites. TGA studies reveal that there is no appreciable change in thermal stability due to addition of phyllosilicates in rubber matrix. This can be attributed to poor dispersion of phyllosilicates in the matrix. DSC results depict a remarkable increase in Tg values at higher loading of phyllosilicates in rubber matrix SEM micrographs demonstrate a good interfacial adhesion between reinforcement and rubber matrix.

Ultrasonic study of molecular interactions and compressibility behavior of dysprosium carboxylates

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Ultrasonic measurements have been made on Dysprosium carboxylates (laurate, myristate and palmitate) in methanol with a view to determine the CMC (critical micelle concentration), carboxylate-solvent interaction and various acoustic parameters of the system. The value of CMC increases with increase chain length of fatty acids. The results of ultrasonic velocity, adiabatic compressibility, intermolecular free length, specific acoustic impedence and apparent molar volume suggested that there is a significant interaction between carboxylate and solvent molecule.

Spectral and thermal studies on carboxylates of beryllium

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Beryllium carboxylates of Carboxylic Acids (Lauric, Myristic and Palmitic) have been prepared and characterized by IR spectra, X-ray diffraction and Thermogravimetric analysis (TGA) measurements. The IR spectra result shows that the fatty acid exist in dimeric state through hydrogen bonding and carboxylates possess partial ionic character. The X-ray diffraction measurements have been used to calculate the long spacing and the results confirmed the single layer structure of Beryllium carboxylates. The decomposition reaction was found kinetically of zero order and the values of energy of activation for the decomposition process have been found in the range of 18.50-31.65 k.cal mol^{-1}.

Synthesis, characterization and capacitance measurements of poly 4, 4’-diaminodiphenyl sulphone-ZrO_2 nanocomposites

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4,4’-Diaminodiphenyl sulphone was polymerized by chemical oxidation method using potassium perdisulphate in presence of nano size zirconium oxide nanoparticle to poly 4, 4’-diaminodiphenyl sulphone - zirconium oxide nanocomposite. The solubility of the nanocomposite was ascertained and it showed good solubility in DMF and DMSO. The conductivity of the nanocomposite was determined to be 5.38 x 10^{-2} Scm^{-1}. The nanocomposite was characterized by FTIR spectral studies. A single absorption peak due to the N-H stretching vibration of the imino groups was observed around 3451 cm^{-1}. This fact suggests the participation of NH group in the polymerization. The stretching vibrations of sulphone groups showed a strong broad peak at 1403 cm^{-1}[1]. The X-ray diffraction studies revealed the formation of nano sized (20 nm) crystalline composite. FE-SEM and AFM analyses showed mixed granular nature of the nanocomposite. EDAX analysis confirms the presence of zirconium oxide in the composite. The capacitance (231.28μF) of the nanocomposite was determined by EIS and this suggests that this nanomaterial can very well be used as an energy storage material.

Metaltriflate catalyzed synthesis of pyranoorfurano quinolines

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Aza-Diels-Alder reactions provide a very important and most powerful method for rapidly constructing azaheterocyclic's with nitrogen-containing six-membered ring compounds. In recent years, increasing attention has been given to the synthesis of pyrano [3,2-c]- or furano [3,2-c] tetrahydroquinolines via three component aza-Diels-Alder reactions of aryl aldehyde, aryl amine with cyclic enol ethers. Pyrano or furano quinoline derivatives are an important class of natural products and exhibit a wide spectrum of biological activities, such as antiallergic, anti-inflammatory, antipyretic, analgesic, antiplatelet, psychotropic, estrogenic activity anti-arrhythmic, immune suppressive and anticancer properties. In addition to this they are also used in pharmaceuticals. Pyrano and furaoquinlines are prepared from aldehyde (1 mmol) and aryl amine (1 mmol), 3, 4-dihydro-*2H*-pyran or 2, 3-dihydrofuran (2 mmol) in acetonitrile and metal triflate as catalyst. The products obtained in good yields, under mild reaction conditions, with high diastereo selectivity were characterized by ^{1}H-NMR,IR and Mass Spectroscopy.

In-Situ One pot template condensation of macrocylcic metal(II) complexes: characterization, DNA interaction and anticancer activity

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Synthesis and Pharmacological evaluation of novel compounds bearing metal ions other than platinum is a field of growing interest as the anticancer agent cis-platin possesses toxic side effects. Medicinal inorganic chemistry is comparatively a new discipline, which developed after the serendipitous discovery of the anti-tumor activity of cis-platin. The clinical success of this platinum complex has stimulated considerable interest in the search for new metal complexes as modern therapeutic, diagnostic and radiopharmaceutical agents[1]. In order to develop a new type of metal -based drugs we have carried out a *In-situ* one pot template condensation of macrocylcic metal(II) complexes from Urazole based schiff base (where, M =Cu, Ni and Co). All these macrocyclic complexes have been characterized by physicochemical methods and evaluated for their Antimicrobial, DNA interaction and Anticancer activities. Antimicrobial studies reveal that the complexes restrict the growth of the organisms by disturbing the respiration process of the cell and thus block the synthesis of proteins[2]. The gel electrophoresis studies of the macrocyclic complexes clearly indicate that the copper complex effectively cleaves plasmid DNA more in the presence of H_2O_2 than the other complexes, due to the increased production of hydroxyl radical (OH.)[3]. DNA binding studies through absorption method and viscosity measurements reveal the Intercalative mode of binding. Among the metal complexes Copper(II) complex have higher cytotoxic effect against the melanoma cancer cell line (A2058) than the other complexes[4].

Total synthesis of a novel marine natural product agelanesine, A potential cytotoxic agent

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Natural products play an important role in the development of drugs, especially for the treatment of infections and cancer, as well as immunosuppressive compounds. [1, 2] Indeed, molecules derived from natural sources, including plants, marine organisms and micro-organisms, have played, and continue to play, a dominant role in the discovery of leads for the development of conventional drugs for the treatment of most human diseases. Although the present day anticancer drugs are effective, they attack all growing cells, including cancer cells and normal cells and are associated with severe side effects like nausea, hair loss, and severe fatigue. [3, 4] In addition, multidrug resistance and high systemic toxicity are the core challenges in the cancer treatment. Despite the dire requirement, anticancer natural products, extensive pharmacological studies and toxicity profile have not yet been optimized. In this pursuit, agelanesin, a novel marine alkaloid isolated from *Agelas linnaei* a marine sponge native of Indonesia which exhibited prominent cytotoxicity against lymphoma cell line is selected. [5,6] Total Synthesis of the marine natural product, agelanesin is reported, using tyraminehydrochloride and 4-bromo pyrrole-2-carboxylicacid as key starting materials. Tyramine hydrochloride is converted to N,N-di methyl tyramine and reacted with N-bromosuccinamide to get the required 2-bromo N,N-dimethyl tyramine which is further condensed with N-boc 3-bromo propylamine to give aryl ether. The aryl ether is deprotected and coupled with 4-bromo pyrrole 2-carboxylicacid to obtain the final product agelanesin. The agelanesin based library has been characterized using IR, H NMR, C NMR, mass spectral data. Screening of the Agelanesin and its derivatives for cytotoxic properties against cancer cell lines is in progress.

Electrochemical deposition of Carbon dot-ZrO_2 nanocomposite for detection of organophosphorus pesticide

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A novel and selective electrochemical sensor for detection of methyl parathion (MP) based on the preparation of carbon dot (CD) - ZrO_2 nanocomposite was developed. The electrochemical nanocomposite was electrodeposited onto a glassy carbon electrode (GCE). The carbon dot (CD)- ZrO_2 nanocomposite was fabricated using electrochemical deposition and characterized by scanning electron microscopy (SEM), transmission electron microscopy (TEM), X-ray diffraction (XRD) and cyclic voltammetry (CV). The differential pulse voltammetric analysis allowed rapid, selective deatermination of methyl parathion in rice samples. The stripping response was highly linear over the methyl parathion concentrations ranging from 0.4 ng mL^{-1} to 80 ng mL^{-1}, with a detection limit of 0.1 ng mL^{-1}. This novel nanocomposite based electrochemical sensor was successfully applied for the detection of methyl parathion in rice samples.

SCIENCE AND PHILOSOPHY

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Science is highly specialized knowledge of the physical universe. Its method is empirical, it is observational and experimental. It does not believe in anything, unless it is testified by reason and experience. It objects is to enhance knowledge for human welfare. Technology, which has grown rapidly, in its wake, has provided all sorts of gadgets for the use of mankind. Science is not concerned with extra phenomenal world which is beyond experience.

Philosophy is knowledge purse. It studies truth of the entire universe. This knowledge is higher than, and, comprehensive. It method is reflective or deep thinking. It main object is deliverance of man from misery, ignorance and parochial thinking.

The difference between Science and Philosophy is not of aim, but of method. Both try to know truth but while the method of science is sensual and rational, is empirical, the method of philosophy is reflection, i.e. transcendental.

Science and Philosophy are interrelated. Science examines the assumption of Philosophy. Philosophy reflects upon the laws of science. Both are necessary for the betterment of mankind.

Antifungal and pesticidal studies of some newly synthesized tributyltin (IV) derivatives of salicylic acid

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Organotin (IV) compounds have found wide practical applications as antifungal and antipestal in agricultural fields. In view of their applications, some tributyltin (IV) derivatives of salicylic acid were prepared from the reaction of tributyltin- isopropoxide with salicylic acid in 1:1and 2:1 molar ratios in dry benzene. The synthesized derivatives have been characterized by elemental analyses, IR spectral data, ^{1}H NMR spectral data and molar conductance measurements.

The antifungal studies of these compounds were evaluated through their Minimum Inhibitory Concentration (MIC) values on *Aspergillus niger* and *Candida albicans fungi.* The compounds were screened for pesticidal activities against the pest 'Red Flour Beetle' *(Tribolium castaneum)*. The organotin derivatives exhibited enhanced antifungal and pesticidal effects as compared to the ligand.

Jatropha curcas : A potential crop for the phytoremediation or HMX contaminated soil

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A greenhouse pot experiment was conducted to test the natural accumulation and phytoremediation potential of HMX (octahydro-1, 3, 5, 7-tetranitro-1, 3, 5, 7-tetraocine), as contaminant under simulated condition. The amount of explosives present in the soil before and during phytoremediation was determined by using HPLC. The result of the study reveals that *Jatropha curcas* removed up to 87% of HMX in 270 days of study thus indicating that the plant can be successfully utilized for the treatment of explosive contaminated sites. Most of the HMX was translocated in the parent form to the shoot and leaves.

Synthesis, characterization and physical behaviour of polyacrylonitrile initiated by BPO : Effect of 2-Acetylthiophene on polymer structure

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Polyacrylonitrile (PAN) is a synthetic, semi crystalline organic polymer resin, with the linear formula $(C_3H_3N)_n$. It has been used as a substrate for Nano Filtration (NF) and Reverse Osmosis (RO). The thermosetting characteristic offered by PAN makes it suitable as a carbon membrane precursor. It usually does not liquefy or soften during any stage of pyrolysis and preserves its morphology upon the pyrolysis. In the present study effect of 2-acetylthiophene on the polymerization of acrylonitrile initiated by benzoyl peroxide has been studied. The different techniques like NMR, IR and UV-VIS were used for characterization. The UV-VIS study showed that the rate of polymerization of acrylonitrile decreases with increase in the concentration of 2-acetylthiophene. The FT-IR study proves the successful interaction of polyacrylonitrile with 2-acetylthiophene and results also revealed that 2-acetylthioiphene act as retarder. The detailed result shall be presented.

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