Abstracts of the Research Papers in

PHYSICAL SCIENCES

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5, Lajpatrai Road, Allahabad - 211002
1. **Synthesis of 2-oxo-azetidino-2-amino thiazoles and their antimicrobial activity**

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Heterocycles are the important class of compounds in the field of medicinal chemistry. 2-amino thiazole and their derivatives have shown remarkable interest in the area for the drug development to treat various diseases. Heterocyclic compounds particularly five and six member heterocycles have attracted the attention to the pharmaceutical community for the last several years because of their pharmaceutical applications. Azetidine-2-ones are of great importance because of the use of β-lactam derivatives as antimicrobial agents. We have synthesised several compounds N-2-chloroethyl-2-aminothiazole, N-2-aminothiazolyl ethyl hydrazine and N-2-aminothiazolyl ethyl-substituted-phenyl methylidene-hydrazines and N- aminothiazolyl ethyl-substituted-phenyl-3-chloro-2-oxo-1-iminoazetidines from 2-aminothiazole using various substituted aromatic aldehydes. The structures of all the products were confirmed from chemical and spectral methods. Some of the synthesised compounds displayed remarkable antimicrobial and antifungal activities.

2. **Speciation studies on quaternary complexes of some bivalent transition metal ions with biologically important ligands**

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Equilibrium study of mixed metal-mixed ligand complexes of Cu(II), Co(II), Ni(II), Zn(II) and Cd(II) with adenine and L-glutamic acid are conducted in aqueous solution by potentiometry at 25±1°C and a fixed ionic strength I = 0.1 M NaNO₃. Formation constant of (1:1:1:1) M₁M₂L₁L₂ quaternary complexes in addition to (1:1:1) ML₁L₂ ternary, (1:1) ML₁ and ML₂ binary complexes for all the metal ions were evaluated using SCOGS computer program, which indicate that complexation occurs in simultaneous manner. Species distribution diagram as a function of pH were plotted using Origin 6.1 and discussed briefly. Relative stabilities of quaternary complexes were found higher to corresponding ternary and binary complexes in terms of log\(β_{pqrst}\) values. Stability constant of binary and ternary complexes follow the Irving-Williams order.

3. **Multiple equilibria and chemical distribution of some metals ions with ascorbic acid as primary ligand and L-histidine as secondary ligand**

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Solution Chemistry of some bivalent metal ions (viz. Co²⁺, Ni²⁺, Cu²⁺, Zn²⁺, Cd²⁺, Pb²⁺) with ascorbic acid and L-histidine ligands have been analyzed. Formation constant of quaternary metal complexes and complexation equilibria at 30±1°C and at constant ionic strength (I=0.1M NaNO₃) have been explored potentiometrically. Formation of quaternary species in addition to hydroxyl, protonated, binary and ternary species have been reported. Overall formation constant have been
evaluated using SCOGS computer program. Species distribution curves of complexes have been plotted as a function of pH to visualize the equilbria system and refined using ORIGIN program. The metal ligand formation constant of MA, MB, MAB and M1M2AB type of complexes follow Irving William order.

4. Synthesis and characterization of \([\text{SnX}_2]_2\cdot L_1\); \([\text{SnX}_2](\text{MCl}_2)\cdot L_1\); \([\text{SnX}_3]_2\cdot L^2\) and \([\text{SnX}_3]\cdot L^3\) compounds with macrocyclic ligands

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\([\text{SnX}_2]_2\cdot L_1\), \([\text{SnX}_2](\text{MCl}_2)\cdot L_1\), \([\text{SnX}_3]_2\cdot L^2\) and \([\text{SnX}_3]\cdot L^3\) (where X= Cl or Br; \(L_1= 3, 6, 9, 12, 20, 23, 26, 29, 35, 36\)- decaazatricyclo [29.3.1.1] hexatriaconta-1(34), 14, 16, 18(36) 31(35), 32-hexaene-2,13,19, 30-tetraone; \(L^2= 3,6,9,17,20,23,29,30\)-octaazatricyclo [23;3.1.1]11,15 triaconta-1(28),11,13,15(30), 25(29), 26-hexaene-2,10,16,24-tetraone and \(L^3= 3,7,15,19,25,26\)-hexaazatricyclo [19;3.1.1]9,13 hexacosa 1(24),9,11,13(26),21(25),22-hexaene-2,8,14,20-tetraone) have been synthesized and characterized by elemental analysis, molar conductance, IR and X-ray photoelectron spectra(XPS) data and an octahedral geometry were established.


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Amino acid coordination to metals confer unusual structural lability and amino acid complexes are also of relevance in enzyme inhibition. The interesting property of these complexes is ions may coordinate to the metal ions in the usual bidentate way through the amino acid group and through the carboxylate group. Thus a new series of complexes of copper(II) with some biologically important ligands of amino acids viz., L-threonine (thr), L-cysteine (cys), L-methionine (met) and have been synthesized. The structure of the synthesized compounds has been discussed in the light of elemental analysis, IR, electronic spectral studies and CV. The IR spectra indicated the presence of amino acid coordinated through nitrogen atom and the oxygen from the carboxylic group. The experimental data suggest that the ligands act as bidentate and adopt an octahedral stereochemistry. The ligand and their metal chelates have been screened for their \(\alpha\)-glucosidase inhibition effect and antioxidant activities.

6. Synthesis, characterization of silica nanoparticles and adsorption removal of \(\text{Cu}^{2+}\) ions in aqueous solution

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A successive method has been used, to synthesize monodisperse and uniform-size silica nanoparticles using ultrasonication assisted sol–gel method. The amorphous nature of silicon oxide
nanoparticles was analyzed by X-ray diffraction technique. The silica particles were obtained by hydrolysis of tetraethyl orthosilicate (TEOS) using ethanol as medium and the reagent ammonia in concentration of (2.8–28 mol L\(^{-1}\)), ethanol (1–8 mol L\(^{-1}\)), water (3–14 mol L\(^{-1}\)) and TEOS (0.012–0.12 mol L\(^{-1}\)) were used. The composition and particle size were prepared by silica nanoparticles and were analyzed by SEM and EDX. SEM image confirm average particle size was found to be 24 nm. EDX study also confirmed the preparation of nanosorbent and the adsorption of Cu\(^{2+}\) ions on its surface. Adsorption isotherms were well described by Langmuir equations with maximum adsorption capacity (qm) of 0.99 mole/gm. The effect of contact time, pH and adsorbent dose were studied. Finally, it was found that 92-96% copper was adsorbed under optimized conditions. The amount of metal ions adsorbed was calculated by plotting calibration graph using UV-VIS spectrophotometer. The adsorbent stability in acidic and basic medium, desorption study as well as its reusability and recyclability were tested satisfactorily. The study indicates that retain original metal removal capacity till five cycles are completed.

7. Degradation and mobility of certain triazinone herbicides in different pH waters

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Degradation of triazinone herbicides was conducted under laboratory condition in the water having different pH’s. All the triazinone herbicides were found to have long persistence in neutral and basic condition, but dissipation was rapidly in acidic water. The half life values for hexazinone in acidic, neutral and basic water were 16.7 to 16.9 days, 34.2 to 37.1 days and 40.5 to 40.8 days respectively. The half life values for metribuzin were 17.6 to 18.2 days in acidic, 31.4 to 31.9 days in neutral and 35.9 to 36.5 days in basic water. The pyrazon has the half life of 15.5 to 16.8 days in acidic water, 28.2 to 28.6 days in neutral water and 32.6 to 32.93 days in basic water at the tested dosages T\(_1\) and T\(_2\) respectively. The persistence of these triazinone herbicides in water showed that they are stable for a longer period of 100 days and more. In acidic condition the herbicide degradation was rapid compared to basic and neutral buffers. The water samples were tested for breakdown products and identified metabolites in traces. These were confirmed by LC-MS/MS.

8. Fabrication of aluminium oxide/poly(acrylamide-co-acrylic acid) hybrid composite

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The progress in the synthesis and technology of hydrogels makes these materials attractive structures with possible applications. In the present work, In-situ polymerization technique synthesized alumina hydrogel composite with water as a green solvent. The inclusion/incorporation of metal oxide particles in three-dimensional polymeric structures is an innovative means for obtaining multicomponent systems with diverse functionality within a hybrid hydrogel network. The filler-hydrogel combinations add synergistic benefits to the 3D structures. Polymer compositions with aluminium oxide, can improve their thermal properties and self-sustaining ability under working environmental conditions. The composite of poly(acrylamide-co-acrylic acid) [P(AM-co-AA)] with aluminium oxide as a composite was created as a result of their intermolecular interactions. The creation of a composite was confirmed by FTIR spectroscopy, DSC, TGA, and FE-SEM analysis. The aluminium oxide particles were homogeneously distributed in the P(AM-co-AA). The incorporation of aluminium oxide particles gives rise to the enhancement of thermal stability due to the strong interactions between aluminium oxide and poly(acrylamide-co-acrylic acid) polymer. Hence, the
synthesized materials were biodegradable, environment friendly and biocompatible which touches the green chemistry route.


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Fabric surface enrichment refers to superficial embellishment on the fabric or structural and applied design on any textiles material. Various techniques that enhance the consumer acceptance by beautifying the textile material are dyeing, printing and finishing. Discharge printing is a technique in which discharging materials are used to bleach out a white or light pattern on darker coloured ground. The study was taken to optimize the discharge printing recipe on cotton fabric dyed with eco-friendly reactive dye by using gum tragacanth as a thickener and Rongalite C as a discharging agent and to assess the physical and colour fastness properties of printed samples. Various variables of discharge printing such as the concentration of gum tragacanth, reactive dye and discharging agent (Rongalite C) were optimized. The various concentrations taken for gum tragacanth were 15g, 20g, 25g, 30g and 35g, and of dye were 1, 2, 3 and 4 percent. Rongalite C was taken in 5g, 10g, 15g and 20g. On the basis of visual evaluation, physical properties and colourfastness properties, it was found that 25g of gum tragacanth with 3 percent reactive dye and 20g Rongalite C produced clear design. Statistical analysis of gum tragacanth and optimized Rongalite C concentration showed mostly significant difference at 5% of probability level of significance in 3% reactive dye. Various utility articles such as top, skirt, table cloth and cushion cover were printed using standardised printing recipe.

10. Immobilization of α-amylase on chitosan coated silver nanoparticles

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The present study discerns the utilization of green synthesized silver nanoparticles as a new matrix for α-amylase immobilization. The surface functionalization of silver nanoparticles was carried out using chitosan coating providing biocompatibility. Further, glutaraldehyde was used as a crosslinking agent, exhibiting about 147.44% immobilization efficiency. Fourier transform infrared (FT-IR) spectroscopy and Transmission electron microscopy (TEM) studies showed successful immobilization of α-amylase onto chitosan coated silver nanoparticles. Thermal stability, pH stability, and storage stability of this immobilized preparation were interestingly superior with respect to their free counterparts. Immobilized enzyme exhibited shift in optimum pH from 6.5 to 7.0 and temperature 60 °C to 70 °C with respect to soluble enzyme. Immobilized enzyme remained thermostable for 5 hrs at 70 °C and had around 51% residual activity upon storage over a period of 30 days. Moreover, it retained almost 38% residual activity, even after 10 cycles of reuses. Changes in Michaelis-Menten constant upon immobilization, suggests that some of the active sites of enzyme were not accessible to the substrate. This might be due to change in enzyme structure upon immobilization. The results obtained here suggest that the α-amylase-AgCs nanoconjugate system could be an ideal preparation to be efficiently used in various industrial processes.

11. Synthesis of strontium selected crown ether 4,4’(5’)-[di t-butylidicyclohexano]-18-crown-6

Snehasis Dutta, Sulekha Mukhopadhay and K.T. Shenoy
The recovery of strontium from high level nuclear waste is crucial both in terms of radioactive waste mitigation as well as for the promising utility of strontium-90 as a heat source and in medical applications. For this purpose, 4,4'(5')-[di t-butylcyclohexano]-18-crown-6 have been synthesized, as highly selective ligand for Strontium-90. This process involves the synthesis of 4,4'(5')-[di t-butylbenzo]-18-crown-6 from the reaction between tert-butyl catacol and bis-chloroethyl ether in an alkaline medium (yield after column purification:10-12%); followed by heterogeneous catalytic hydrogenation of 4,4'(5')-[di t-butylcyclohexano]-18-crown-6. Catalytic hydrogenation has resulted in a yield of 85-88% of product. The purity of 4,4'(5')-[di t-butylcyclohexano]-18-crown-6 produced was about 71.8%, with a small quantity of half hydrogenated crown ether. The catalyst used for hydrogenation reaction was supported Rhodium catalyst. 5% Rhodium, supported on alumina was synthesised in house and was characterised using EDXRF and H2 Chemisorptions. The composition of the reaction mixture was found to have a profound effect on the hydrogenation reaction. The product was characterised using GCMS, H-NMR and FTIR. The synthesised ligand has been investigated to be extremely effective for the recovery of Strontium in terms of selectivity as well as a high percentage extraction of about 95.78%.

12. Pressure derivative of effective second order elastic constants of La_{2-x}Sr_xCuO_4 high temperature superconductor

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Pressure derivatives of the effective elastic constants of superconductor La_{2-x}Sr_xCuO_4 with different doping (x=0.13-0.20) have been studied theoretically. The expressions for the second-order and third order elastic constants of La_{2-x}Sr_xCuO_4 (LSCO) previously delivered are employed to obtain the pressure derivatives of the effective second-order elastic constants of La_{2-x}Sr_xCuO_4(x=0.13-0.20). The results show that the larger pressure derivative (dC_{33}/dp) along c-axis direction than that along ab-plane, i.e. (dC_{11}/dp) corroborates the observation that the layers close-up substantially under hydrostatic pressure while, change in inter atomic distance in a layer is smaller in La_{2-x}Sr_xCuO_4.

13. In silico molecular modeling of salicyl hydrazone analogues as tropomyosin kinase (TrkA) inhibitors

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The quantitative structure activity relationship between molecular structure and biological activity of salicyl - hydrazone analogues has been studied to explore the inherent factors affecting their biological activity. In the present analysis, quantum chemical parameters based on density functional theory, Topological descriptors were calculated at GGA-PW91 level of theory. In this Quantitative structure-activity relationships (QSAR) study, stepwise linear regression (MLR) analysis was used to select significant molecular descriptors. Based on selected descriptors, the significant QSAR models were constructed. The calculated regression models suggest that the presence of hydroxyl group OH at R_1 position enhances the activity and showed better cytotoxicity. Model equations were cross-validated by leave one out (LOO) technique. Based on statistically significant model obtained in the present QSAR analysis, pIC_{50} value was calculated for new tropomyosin kinase (TrkA) inhibitors.
14. Nanocomposite g-C$_3$N$_4$/CdSe as an anti quorum-sensing molecule in candida albicans biofilm

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Nosocomial infections due to Candida albicans have increased significantly during the past three decades. C. albicans is an important opportunistic human fungal pathogen. C. albicans has the ability for the morphogenetic conversions between yeast and hyphal morphologies which contribute to biofilm development, and represent an essential virulence factor. The biofilm enhances the resistance of the C. albicans against various antibiotics, making clinical care more challenging. The emergence of bio-nanomaterials gave a new prospect to solve the problems. Therefore, in the present study we used CdSe quantum dots (QDs)-graphitic carbon nitride (g-C$_3$N$_4$) nanocomposite system. The composites were characterized by XRD, UV-Vis-DRS, FTIR, HRTEM and PL. The Nanocomposite act as an anti-quorum-sensing molecule to inhibit the morphological transition of Candida from yeast to hyphae and ultimately the inhibition of biofilm. The molecular mechanism underline this inhibition was studied at molecular level by using Real time PCR approach. Gene expression analysis showed differential expression of the genes involved in the yeast to hyphae transition. The present study explores the fundamentals of yeast to hyphae transition as a model to understand the inhibitory effect of g-C$_3$N$_4$/CdSe nanocomposite and mechanism thereof.

15. Geochemical heterogeneity along the Vema Fracture Zone, southern Indian Ocean: implications for the Reunion Plume – Central Indian Ridge interaction

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Magmatism and tectonic processes associated with interaction between Reunion plume and mantle beneath Central Indian Ridge (CIR) and their manifestations have been central topics of interest. The Vema Fracture Zone (VMFZ; 8°45’S) in the southern Indian Ocean provides a window to understand melt generation and oceanic crust emplacement influenced by Reunion plume-CIR interaction. This work includes petrological and geochemical studies of serpentinized peridotites and basalts from VMFZ and nearby ridge segment. Mineralogically basalts composed of plagioclase and clinopyroxene while serpentine, olivine, pyroxene and Cr-spinel is the mineralogical association of serpentinized peridotite. Geochemical characteristics of the volcanic rocks from VMFZ reflect tholeiitic to calc-alkaline composition suggesting evolved character with respect to primitive mantle. Serpentinized peridotites represent the mantle residue, while the basalts are derived by variable degrees of partial melting of depleted to enriched spinel lherzolite mantle having contributions from EM-1 ocean island basalt (OIB) type mantle component. Petrological and geochemical signatures collectively suggest that the melt that gave rise to these basalts has been influenced by the Reunion plume melts during the movement of Indian and African plates over it prior the formation of CIR. This study infers that oceanic crust exposed at VMFZ preserves signature of plume-ridge mantle interaction.

16. Commercial solder alloy: an electrocatalyst for reduction of CO$_2$ to formate

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Compared to other methods of CO₂ reduction reaction, electroreduction of CO₂ is considered important due to its higher efficiency, selectivity of product and storage of intermittent renewable energy sources. The products obtained after electrocatalytic reduction of CO₂ such as CO, CH₄, HCOOH can be used as precursors for synthesis of chemical reactions or converted into hydrocarbon fuels. Thus, both goals can be achieved, storage of intermittent renewable energy sources and reducing the amount of carbon dioxide. Herein, we have investigated the efficiency of solder alloy electrocatalyst obtained from commercially available solder wire in market for the electrocatalytic CO₂ reduction reaction. The prepared electrocatalyst was characterized by XRD and FESEM. The liquid product formate formed after electrocatalytic CO₂ reduction reaction was analysed qualitatively by using ¹H NMR.

17. Synthesis, spectral studies and DFT calculation of copper(II) complexes with mixed ligands

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Reaction of copper(II)chloride with Schiff base and alkanolamine in 1:1:1 molar ratio(s) afforded a series of mixed ligand copper(II) complexes of general formula [Cu(sb)(aa)] 1-6, [where sb = Schiff base; salicylidine-1-aminobenzene(sabH) 1, 4, salicylidene-4-chloro-1-aminobenzene(scabH) 2, 5, salicylidene-4-methyl-1-aminobenzene(smabH) 3, 6 and aa = various amines]. These complexes were found to be colored solid and soluble in DMF and DMSO. All complexes were characterized by elemental analysis (C, H, N & Cu), IR, ESI-MS, ESR, PXRD, TG-DTG and SEM-EDAX spectroscopic studies. In order to provides substantial theoretical support to experimental observation, energy calculation of synthesized complexes has been done through the DFT calculations by using Gaussian 09 program with basis set B3LYP. On the basis of these observations distorted square planar geometry around the copper(II) is proposed.

18. Kinetic and mechanistic studies of oxidation of Serine by N-bromosuccinimide using chloro-complex of Rh(III) as homogeneous catalyst

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Kinetics of oxidation of Serine by N-bromosuccinimide (NBS) using chloro complex of Rh(III) as homogeneous catalyst have been investigated at 35°C. The reaction shows first order kinetics with respect to NBS and Rh(III) in the oxidation of the amino acid (Serine). The first order kinetics with respect to amino acid obtained at its lower concentration changes to zero order at its higher concentration. Inverse fractional order with respect to [H⁺] was obtained in Rh(III)-catalysed oxidation of Serine. Variation in [Hg(II)], [NHS], [Cl⁻], ionic strength and dielectric constant of the medium has no effect on the rate of oxidation of Serine. NBS itself and [RhCl₆(H₂O)]²⁻ have been postulated as the reactive species of NBS and Rh(III) chloride in acidic medium, respectively. Various activation parameters have been calculated with the pseudo-first-order rate constant values observed at four different temperatures. The proposed reaction mechanism is well supported by kinetic data, spectrophotometric evidence and positive entropy of activation.

19. QSAR exploration towards the activities and structural requirements of Pyridinone derivatives as novel and potent HIV-1 NNRT inhibitors

Neetu Sharma, Ranjana, Ajeet Singh and A. K. Srivastava
Quantitative relationship between structural and molecular properties with biological activity of novel Pyridinone derivatives as non-nucleoside reverse transcriptase inhibitors (NNRTIs) was studied to ascertain the factors that affect their biological activity. In the present analysis, quantum chemical parameters based on density functional theory, Topological and physicochemical parameters were calculated. In the present quantitative structure-activity relationships (QSAR) study, we have performed stepwise linear regression (MLR) analysis and have selected the statistically significant molecular descriptors. Based on selected descriptors, the significant QSAR models were constructed. The calculated regression models suggest that the presence of -NH-Ph at R₂ and Isopropyl at R₁ position enhances the activity. Model equations were cross-validated by leave one out (LOO) technique. Based on statically significant model obtained in the present QSAR analysis, pIC₅₀ values were calculated for new HIV-1 NNRT inhibitors.

20. Ultrastructure alteration of metal(loid)s stressed rice cultivars under proposed agronomic practice in bengal delta basin

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Agronomic practices for rice cultivation in Bengal delta basin mostly relies on the groundwater irrigation in winter and rain water in monsoonal production. In this study, implementation of a periodical dry-wet water cycle during rice cultivation is proved to be potential in reducing considerable bio-available amount of arsenic (As) from soil system. We are also proposing two parametric equations, determining arsenic release from seasonal field conditions. Soil As concentrations were 30.79±0.47 and 33.30±0.94 mg Kg⁻¹ As respectively in two selected fields with rice cultivars gosai and satabdi, in comparison to 88.64±0.38 and 87.42±0.28 mg Kg⁻¹ in continuously flooded field soil. This practice also strengthens plant’s shoot, nodes and leaf xylem-phloem integrity compared to conventional continuously flooded rice cultivation approach, as observed under Field emission-scanning electron microscopy (FE-SEM). Arsenic concentration in rice grains were analysed using ICP-MS and found to be 0.56±0.0016 and 0.71±0.008 mg Kg⁻¹ in periodically saturated field compared to 1.54±0.021 and 1.73±0.029 mg Kg⁻¹ in continuously water saturated field, respectively in gosai and satabdi cultivar with subsequent grain sample analysis for both internal and external surface topography using atomic force microscope (AFM) showing greater amplitude of roughness in As stressed grains from conventional cultivation compared to proposed practiced cultivation. Fresh plants were analysed for biomass with pigmentation and stress regulator enzymes viz. malondialdehyde (MDA), catalase (CAT), superoxide dismutase (SOD), guaiacol peroxidase (GPX) and total protein from both conditions and found to be better in proposed cultivation method over conventional practice, clearly indicating alleviation from arsenic contamination in rice grain with certain sustainability.


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New stability indicating reverse phase-high performance liquid chromatographic (RP-HPLC) method was developed and validated for the estimation of metformin hydrochloride in bulk and
dosages forms by using C18 column Phenomenix (250 mm x 4.6 mm, 5 μm), with a mobile phase consisting of acetonitrile and potassium dihydrogen orthophosphate buffer (25:75 v/v) at a flow rate of 0.5 mL/min. The detection was carried out at 233 nm and retention time (Rt) of metformin hydrochloride was found to be 2.87 min. The response of detector was linear in the concentration range of 10-50 μg/mL (n=5), with the regression coefficient of determination r² was found to be 0.994. Metformin hydrochloride was subjected to different stress conditions as per ICH guidelines like acidic alkaline, oxidative, thermal and the results showed that it was more sensitive towards basic degradation.

22. Magnetic properties of BaFe₁₂O₁₉ nanoparticles

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Nanoparticles of BaFe₁₂O₁₉ are synthesized through auto ignition method. Structural, microstructural and magnetic properties are characterized. Synthesized samples having different morphologies from elongated nanorods to spherical shape. The role of size and shape in magnetic properties are investigated. Magnetization studies shows superparamagnetic behavior for elongated nanorods and other magnetic orders are seen in depending on the size and shape. Very small coercive field of around 200 Oe is observed for one system of particle distribution with nanorod structure. Electron Spin Resonance study shows the g value is around 2.55. Magnetic properties of BaFe₁₂O₁₉ nanoparticles strongly depends on size and shape. Shape anisotropy has significant value compared to other anisotropies present in the nanoparticle systems. Therefore size of nanoparticles influences the magnetic order in nanoparticles.

23. Comparative study of two cultivars of rice with respect to arsenic accumulation and its mitigation by thio urea

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Arsenic transfer from rice straw to grain represents the additional arsenic uptake route in human nutrition which is even dominating route through drinking water. Arsenic behavior in soil may change with irrigation practices, which directly affect the accumulation of As in plant system. Here, two genotypes of rice were selected for the study of As accumulation on the basis of their usage for diet. Arsenic concentration in the plant is higher in roots in comparison to other parts. But, the aim of this study is to find which genotypes have a higher elevation of As in rice grain. Gosai genotypes exhibit the higher concentration of As in rice grain in comparison to Shatabdi variety. It accounts range from 1.38 – 2.17 mg/kg As in Gosai and 1.13 – 1.58 mg/kg As in Shatabdi rice. Both rice varieties showed the high elevation of As concentration in rice grain which is above the permissible limit (1mg/kg) but, Gosai possesses a high amount of As in rice grain. The mean concentration of As in rice grain is 1.4 mg/kg, 1.6 mg/kg and 2.17 mg/kg in 2013, 2014 and 2015 year respectively. For mitigation of As in rice grain, thio urea was used in the agricultural field. Thio urea (TU) is non-physiological organosulfur compound. Sulfur is an essential element for plant growth. The study implicates the importance of redox homeostasis for ameliorating As stress in rice through use of thio urea. Thio urea reconciles the redox balance and leads to down-regulation of transporters for As translocation, which decreases the As concentration in upper parts of the plant.
24. The national initiative on undergraduate science: a unique effort to seed high quality research among the youth

Vijay A. Singh

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The National Initiative on Undergraduate Science (NIUS) is an extended nurture program for undergraduate students (UG). It was launched in the summer of 2004 and I was its National Coordinator during the formative years [2004-2012]. The program includes initiating and guiding students for proto-research, preparing and editing lecture notes, and promoting undergraduate research. A typical student attends three to four camps each of two to four weeks duration typically over a 2 year period. The liberal, leisurely and extended nature of the programme provides an atmosphere to the student to carry out and complete a challenging project. The first camp is an exposure and enrichment camp for students in which experts lecture on topics of front line research. Some of the more pedagogical lectures have been written up and edited, and constitute valuable resource material. Another aspect has been to assist college teachers from non-metropolitan areas in setting up modest research programs who in turn would then locally mentor students. The programme includes physics, chemistry and biology. Over 1000 undergraduate students have been exposed to this programme. A happy outcome has been that several of the students have raised the level of their project work and published in international journals. The number of such publications and presentations in international conferences is over 100[see http://nius.hbcse.tifr.res.in/publications; physics.sutra@blogspot.in]. Some have even been awarded by their home institutions for work carried out under NIUS (IIT Kanpur has given out Rs. 30,000 for three research publications based on UG research). Such research output by UG students is perhaps unprecedented in the nation. I will describe the programme, the areas in physics, chemistry and biology on which we have focused.

25. Application of nano-composite material in thin layer chromatographic analysis of organic dyes

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Polyaniline-modified silica gel nano-composite material has been used as stationary phase for the resolution of coexisting dyes. A better separation efficiency was observed by modifying silica gel with polyaniline as compared to pure silica static phase. Densitographic presentation of separations of dyes achieved on polyaniline-modified silica gel indicates the usefulness of newly synthesized nano composite material in environmental chemistry. Thin-layer chromatographic system comprising of polyaniline-modified silica gel [(Pani–SG (EB1)] as the static phase and aqueous methanol (methanol–DDW, 1:9) as the mobile phase was the most favorable for the selective separation of brilliant blue from tartrazine and carmoisine. Modified silica gel nano-composite phase has been characterized by Fourier transform infrared (FTIR) spectroscopy, X-ray diffraction (XRD), scanning electron microscopy (SEM), and transmission electron microscopy (TEM) studies. Food dyes such as brilliant blue and tartrazine (in Ambrodil* S syrup) as well as carmoisine (in Flucold™ syrup) were successfully identified using the proposed thin-layer chromatographic method.

26. Elemental assessment of the leaf and seed of Rauwolfia serpentine (sarpgandha) by dc arc optical emission spectroscopy

Abhi Sarika Bharti¹, Sweta Sharma² and K.N. Uttam³
Rauwolfia serpentina is an important medicinal plant widely used in formulating various drugs and medicines in the pharmaceutical industries. The medicinal efficacy of this plant depends upon its constituents like nutrients and trace metals that require their detection with sophisticated techniques having cost effective, fast data acquisition and multi-elemental detection capability. Direct current arc optical emission spectroscopy (DC arc OES) is one such emerging versatile technique used for the simultaneous and rapid elemental survey that has great potential for the qualitative and quantitative estimation of the nutrients having biological significance without extraction and digestion. Therefore, aim of this study is to investigate the elemental profile of the leaf and seed of the Rauwolfia serpentina plant using direct current arc optical emission spectroscopy. For this, the emission spectrum of the dry powder of the leaf and seed of the Rauwolfia serpentina has been acquired in the region of the 300-900 nm at a resolution of 0.3 nm. The spectrum shows the persistent atomic lines of the calcium, potassium, sodium, iron, magnesium, manganese, molybdenum, nickel, chromium, cadmium, aluminum, titanium, bismuth, mercury, lead, tin, barium, vanadium, silicon, and strontium which confirms the occurrence of these elements in the leaf and seed of the Rauwolfia serpentina plant. Area of spectral line profile evaluated by curve fitting has been used for comparing the content of elements in leaf and seed of Rauwolfia serpentina. The role of the detected elements has been described with reference to human health.

27. Microbial biodiversity as an innovative resource for biotechnology application

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Microbial diversity is an unseen national resource that deserves greater attention. Too small to be seen no longer means too small to be studied or valued. Microorganisms are small, they are least known, and this gap in knowledge is particularly apparent for bacteria and other prokaryotic organisms. Current evidence suggests there exists perhaps 300,000 to 1 million species of prokaryotes on earth yet only 8000-9000 bacteria are described in Bergey's Manual. Learning more about these microorganisms will be of value for the following reasons (1) Microorganisms are important sources of knowledge about the strategies and limits of life. (2) Microorganisms are of critical importance to the sustainability of life on our planet. (3) The untapped diversity of microorganisms is a resource for new genes and organisms of value to biotechnology. (4) Diversity patterns of microorganisms can be used for monitoring and predicting environmental change. The observation that microorganisms are valuable natural resources for industry is not new. Bioprospecting for new industrially important organisms and enzymes from such extreme biotopes has expanded tremendously. The untapped diversity of microorganisms is a resource for new genes and organisms of value to biotechnology. The microorganisms are providing a vast array of products for the welfare of the human kind and the success of microbial biotechnology relies on the diversity of microorganisms. An attempt was made to understand the diversity of actinomycetes/actinobacteria. The biosystematics, based on the advanced chemical and molecular approaches, discloses novelty of these isolates. The biomolecules and plant growth promoting activity were exploited in laboratory scale as well in field conditions.

Microbial diversity provides not only the basics for human life but also for the life support systems of the biosphere. However, the conservation of microbial diversity has not been given the due importance. It is appropriate now, to account the present status of microbial diversity in improving the human welfare and sustainable development.
28. Preparation of Polypyrrole thin film via conventional polymerization method and its humidity sensing

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This paper reports the successful synthesis of Polypyrrole (PPY) by oxidative polymerization of pyrrole monomer and its investigation as a humidity sensor. The average crystallite size was evaluated using Debye-Scherrer’s formula. FTIR analysis confirmed the functional group present in PPY. The UV-visible spectrum showed the presence of different rings in PPY chain which are consistent with the earlier reported data. The average particle size of PPY was found as 113 nm by particle size analyzer. The BET technique measured the surface area as 13.384 m²/g. The average PPY chain separation was calculated as 4.32 Å. Further, the thin film of PPY on a glass substrate showed sensitivity towards relative humidity as 9.20 KΩ/%RH with the reproducibility of the result as 99.13 %.

29. Entanglement properties of two-mode quantum vortex state

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Entanglement is the vital resource for quantum information processing. It has been shown that the non-Gaussian quantum states should be better suited for quantum information protocols as compared to that of Gaussian [P. T. Cochrane, T. C. Ralph, and G. J. Milburn, Phys. Rev. A 65, 062306 (2002)]. Here, we study the entanglement properties of a non-Gaussian state, two-mode vortex state, which was theoretically proposed by Agarwal [New J. Phys. 13, 073008 (2011)] where a photon is subtracted from a two-mode squeezed state produced by down-converter from idler mode via a beam splitter with low reflectivity and detection of one photon by the avalanche photo diode (APD), or even better by a single-photon detector. There are different conditions to quantify the entanglement of non-classical states. We test the entanglement conditions of this state in terms of the second-order equal-time intensity correlation function, Hillery-Zubairy criterion, Hillery-Dung-Zhong criterion, Shchukin-Vogel criterion, and Duan-Giedke-Cirac-Zoller (DGCZ) criterion. We find that this non-Gaussian state shows strong entanglement under these different conditions and thus may perform as an important resource for quantum information processing applications.

30. Synthesis of enantiopure molecules (epc synthesis) using chiral building blocks obtained from regional resources

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There is a great deal of interest to obtain enantiomerically pure molecules for using as smart substances in various domains of chirality. The major application is in the area of preparation of small molecules to explore them as drug candidates. Efficient construction of potential 3-substituted and 3,4-disubstituted chiral pyrrolidines in the optically pure form have been carried out using lessknown, abundantly available (2S,3S) and (2S,3R)-tetrahydro-3-hydroxy-5-oxo-2 3-
furandicarboxylic acids. Judicious use of these acids, as such, or in the form of anhydride or as simple diester or triester furnished a range of versatile chiral pyrrolidines, which are key intermediates for the synthesis of biologically and functionally important molecules. This has been demonstrated by developing new route towards the synthesis of pyrroloisoquinoline alkaloid analogues (R)- (+) and (S)- (-)-crispine A, indolizinoindole alkaloid analogues (R) - (+) and (S)- (-)-harmicine and furopyrrrolones. While the Garcinia acid gave (1R,10bR)-1-((R)-1,2-dihydroxyethyl)-1-hydroxy-8,9-dimethoxy-1,5,6,10b-tetrahydropyrrolo[2,1-a]isoquinolin-3(2H)-one and (1R,11bR)-1-((R)-1,2-dihydroxyethyl)-1-hydroxy-5,6,11,11b-tetrahydro-1H-indolizino[8,7-b]indol-3(2H)-one, its diastereomer hibiscus acid gave (1S,10bS)-1-((R)-1,2-dihydroxyethyl)-1-hydroxy-8,9-dimethoxy-1,5,6,10b-tetrahydropyrrolo[2,1-a]isoquinolin-3(2H)-one and (1S,11bS)-1-((R)-1,2-dihydroxyethyl)-1-hydroxy-5,6,11,11b-tetrahydro-1H-indolizino[8,7-b]indol-3(2H)-one. The absolute configuration and optical purity of the starting molecules as well as the chiral pyrrolidinediones, analogues of pyrroloisoquinoline and indolizinoindole alkaloids have been ascertained using chiroptical methods and single crystal XRD of representative molecules.

31. Investigation of drug and surfactant interaction with serum albumin using fluorescence spectroscopy

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Drug proteins interactions help to understand transport, metabolism process in the body and toxicity level. Nature and mechanism of interactions between the small molecules and proteins have a crucial relevance to the understanding of biochemical consequences of drug-protein interactions and may provide information of the structural features that determine the therapeutic effectiveness of drugs. Optical techniques are often used to monitor such interactions among drug, serum and surfactant. Amid these methods, fluorescence spectroscopy is sensitive and relatively easy to use. In this work Bovine serum albumin (BSA) is selected as our protein model because of its medical importance, low cost, ready availability. A competitive interaction of drug (Amlodipine) and anionic surfactant (SDS) with BSA was studied by using fluorescence spectroscopy. The low binding constant values obtained from BSA-SDS system suggest that SDS has comparable less affinity with albumins than drug. Conformational changes determined at Δλ = 15nm and Δλ = 60nm by synchronous fluorescence spectra of BSA in presence of various concentrations of drug was analysed and assumed that drug is in the close proximity of tyrosine residue. Amlodipine binding site on BSA determined by using site marker agents which resulted that binding site of ALDP was mainly located within site I (subdomain IIA) of BSA.
32. Development of plasmonic metal nanostructures by green pathway

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Department of Physics, Savitibai Phule Pune University, Pune

Plasmonic metal nanostructures are useful for several applications due to their tunable optical properties, biocompatibility and functionalization. They show absorbance in NIR region which overlaps with the region for biological window. Due to this overlap, these nanostructures are potential candidates for applications in several fields such as biomedicine, sensors etc. Plasmonic nanostructures synthesized by biological pathways are further preferred due to advantages such as non-toxicity, reproducibility, easy scaling up as compared to their physical and chemical counterparts. Here, we report the facile green synthesis method to synthesize noble metal anisotropic nanostructures. It involves biological reduction of gold/ silver salt using the extract of Tagetus erecta (Marigold flower). Typically, nanostructures were obtained by reducing the metal ions with plant extract in aqueous solution. The synthesized nanostructures were characterized by various techniques such as UV-Vis-NIR spectroscopy, X-ray diffraction, Raman spectroscopy, Fourier Transform Infrared spectroscopy (FTIR), Morphological study was done by transmission electronic microscopy (TEM) and field emission scanning electron microscopy (FESEM).
33. Synthesis, spectral characterization and antimicrobial activity of Schiff bases and their mixed ligand metal complexes of Co(II), Ni(II), Cu(II) and Zn(II)

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In the present study a new series of Copper(II), Nickel(II) Cobalt(II) and Zinc(II) complexes with two newly synthesized Schiff base ligands N-{(E)-(5-Methylfuran-2-yl)methylidene}-ethane-1,2-diamine (MFMEDA) and N-p-hydroxybenzalidine-2-aminopyridine (HBAPy) have been prepared. The Schiff bases MFMEDA and HBAPy ligands were synthesized by the condensation of 5-methyl furfural with ethylene-1,2-diamine and p-hydroxybenzaldehyde with 2-aminopyridine respectively. The ligands and their metal complexes have been characterized by FT-IR, Mass, ¹H NMR, UV–Vis., elemental analysis and Thermal gravimetric analysis. The Schiff base and their metal complexes were tested for antimicrobial activity against gram positive bacteria Staphylococcus aureus and gram negative bacteria Escherichia coli, Salmonella typhimurium and fungus Aspergillus nidulenc, Candida albicans and Saccharomyces cerevisiae using Broth Dilution Method.

34. Synthesis, structural characterization and DFT studies of di-μ-oxidovanadium(V) complex with N’-[Z]-phenyl(pyridin-2-yl)methylidene] pyridine-4-carboxhydrazide

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The Schiff base and its one di-μ-oxidovanadium(V) complex have been synthesized by the reaction of vanadyl sulphate pentahydrate and N’-[Z]-phenyl(pyridin-2-yl)methylidene] pyridine-4-carboxhydrazide (HL). The HL and complex [(L)VO(μ-O)₂VO(L)] have been characterized by micro analysis, UV-vis and electrochemical techniques. The ligand and complex have also been characterized by single crystal X-ray technique. The ligand crystallizes in triclinic crystal system with P₁ space group while, complex crystallizes in monoclinic crystal system with P₂₁/c space group. The electronic spectrum is as expected for vanadium(V) in an octahedral environment in each vanadium centres. The electronic structures of the ligand and the complex have been explained by density functional theory (DFT) calculations.

35. Synthesis, characterization and biological evaluation of some new aryl-oxo-thiazolidino-phenoxazinyl-1,3,4-thiadiazoles as antimicrobial and antitubercular agents.

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In our present study N-(ethyl ethanoate)-phenoxazine, compound-1 was synthesized from phenoxazine and ethyl chloroacetate. The compound-1 was treated with thiosemicarbazide to afford N-(acetyl thiosemicarbazido)-phenoxazine, compound-2. The compound-2 on reaction with concentrated H₂SO₄ yielded 5-amino-2-(phenoxazinylmethyl)-1,3,4-thiadiazole, compound-3. The compound-3 on reaction with various aromatic aldehydes viz chloro, bromo, nitro and methyl produced respective Schiff bases. These Schiff bases were then cyclised with thioglycolic acid to yield the corresponding new aryl-oxo-thiazolidino-phenoxazinyl-1,3,4-thiadiazoles. The chemical structures of the products of all the compound in all the steps were characterized by using IR, HNMR,
36. Acute toxicity of Fuchsinbasic (Magenta) and its effects on blood parameters of a fresh water catfish, *Heteropneustes fossilis* (Bloch)

N.D. Singh and Tanvi Goel

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Fuchsin basic was tested for determining its acute toxicity to *H.fossilis*. The 24, 48, 72 and 96 hr \( LC_{50} \) values were found to be 130.8, 36.50, 34.30 and 31.20 ppm respectively. The calculated harmless (safe) concentration of the fuchsin basic was 0.5 ppm. Exposure of the catfish to acute level (6.24 ppm) of fuchsin basic for 96 hrs and to sub- acute (3.12 ppm) for short (10-20 days) and sub- lethal (1.56 ppm) for 10 days, resulted in significant decreases in serum calcium and protein levels. However, long term (30-60 days) exposures to both sub-acute and sub- lethal levels did not produce significant differences in the serum calcium and protein levels from that of control. The fish elicited hypercholesterolemia during acute and both short and long term exposures to sub- acute and sub-lethal levels.

37. Role of basic research in national development - creativity and original research

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Basic research in Science is very much lacking compared to western countries. Main reason for this may be due to the following reasons.

- Lack of Creative thinking in identifying the original research problem.
- Research supervisors interested in getting their scholars degrees in a time bound manner.
- Bright young Students interested in joining the professional courses like Engineering and Medicine.
- Another reason is lack of talented science teachers.
- To address the issue Government of India, Department of Science and Technology has introduced the Innovation in Science Pursuit Inspired Research (INSPIRE) program.
- Authors experience as mentor of the INSPIRE program for the past ten years will be shared in the presentation.

38. Diethylaminoethyl cellulose immobilized pointed gourd (trichosanthes dioica) peroxidase in decolorization of synthetic dyes.

Tanvi Goel and N.D. Singh

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Diethylaminoethyl (DEAE) cellulose adsorbed Pointed Gourd Peroxidase (PGP) was employed in decolorization of synthetic dyes. The expressed activity of immobilized preparation on fifth repeated use was ~50% and decolorization achieved for synthetic dyes DR19 and dye mixture (DR19 +DB9) was 64.9% and 61.5%, respectively. Immobilized enzymes could effectively decolorize up to 88.2% and 77.4% of DR19 and dye mixture respectively in stirred batch process at 40°C whereas dye color removal monitored at 30°C and 50°C was comparatively low under similar conditions. Immobilized enzyme in the packed column used for the continuous removal of dye color could successfully
decolorize DR19 and dye mixture to 69.4% and 51.4% after 50 days of operation. Thus, DEAE immobilized PGP is a simple, economical and effective preparation to remove color of synthetic dyes.

39. Galactic cosmic rays modulation during solar minimum of SC 23/24

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Galactic cosmic ray flux at earth is modulated by the heliospheric magnetic field. Heliospheric modulation potential during grand solar minimum is observed using an open solar flux (OSF) model, with OSF source based on Sunspot number. The structure of the heliosphere controls by the solar outputs and their variability, produce changes in cosmic ray intensity. Observation based on the data taken from Omniweb data centre for solar-interplanetary data and yearly mean count rate of cosmic ray intensity (CRI) variation data from Oulu (Re= 0.80 GV) and Moscow (Re=2.42 GV) neutron monitors during 1996-2016. It is observed that slow decline of solar cycle 23 and slow rise of solar cycle 24 resulted prolonged of low solar activity which lasted about 2006 to 2009 with 2008 and 2009 being sun is remarkably quiet, therefore solar minimum between cycle 23 and 24 was very extended and deep in contrast to previous solar minima’s and the strength of the interplanetary magnetic field has been falling off to new low levels, reduces the GCR entering inner-heliosphere and it is high anti-correlation between sunspot number & GCR flux. It is also found that correlation between the count rate of cosmic ray intensity with solar indices and heliospheric parameters.

40. Study of photo electrochemical and structural characterization of spray deposited CdIn$_2$S$_4$ thin films

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Cadmium indium sulphide (CdIn$_2$S$_4$) thin films have been deposited onto amorphous glass substrates using spray pyrolysis technique. The aqueous solution containing precursors of Cd, In and S have been used to obtain good quality deposits at optimized substrate temperature. The preparative parameters such as substrate temperature, concentration etc have been optimized by photo-electrochemical (PEC) technique. The films were characterized by techniques such as photo-electrochemical characterization shows that both short-circuit current ($I_{sc}$) and open circuit voltage ($V_{oc}$) are at their optimum values at the optimized substrate temperature of 360°C and concentration (50 mM). The XRD pattern shows that the films are nanocrystalline with spinel cubic structure.

41. Lorentz transformation as a tool to know the mass and age of the evolving five-dimensional universe with mass as the fifth dimension

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Here, the Lorentz transformation is used as tool to know the evolution of mass and the age of evolving universe of five dimensions with mass as its fifth dimension. It is found that the values of evolving mass and time are consistent with available data and that if one knows the age of the Universe at an epoch, one knows the mass of the Universe at that epoch and vice-versa.
42. Kinematic analysis of bunch start

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The purpose of the study was to investigate the relationship of selected kinematic variable with the performance on sitting start of bunch start. The start and acceleration from the blocks directly affect results in the sprint events. In this study, the major kinematic parameters of these phases of the race were analyzed in the terms of kinematic variable like Angle at various joints, Centre of gravity, Height of centre of gravity from ground, location of centre of gravity within the base of support, Base of support. The subject of the study was the five national level male sprinters, who was participated in All India university Championships. The study showed the following to be the key factors for performance in the two phases: on your mark and set position, the participants for the study were five male national level player athletics, amity university, Noida the age of the subject was 19-24 years. Still photography was used to take the different phase of both the start “ON YOUR MARK” and “SET” these two phases were taken on both the start bunch start and elongated start. A cannon D50 was used (DSLR) were used in still photography on sagittal plane of the participant each participant were given two trails of bunch start (phase “on your mark and “set”) and elongated start (phase “on your mark and “set”) were taken and the best trail was used for the analysis. From the photographic sequence, the stickfigure were prepared by using joint point method, and the various angular kinematic variables were obtained at the moment stance and take off. Segmentation method was employed in order to assess the center of gravity of the body during “on your mark” and “set” position the data was analyzed by using Pearson’s product moment correlation to ascertain the relationship of the selected kinematic variables with the performance of standing long jump of the subjects.

43. Lithium hydroxide an efficient catalyst for synthesis of arylethylidene

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In this paper, we study the effect of group 1st and 2nd Metal hydroxide, Metal carbonate on Knoevenagel condensation reaction between malononitrile and acetophenone. We found that lithium hydroxide was an efficient catalyst for this reaction. Lithium hydroxide catalyzed the Knoevenagel condensation reaction between malononitrile and substituted acetophenone to afford arylethylidene in the absence of any solvent. This process is simple, efficient, economical and environmentally benign. This method is well tolerate to wide variety of functional group such as amide, anhydride, ester, β-dicarbonyl compound.

44. Salt gradient solar pond: an important research in the field of alternative energy for national rural development

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Present trend of research is towards alternative sources of energy. In the proposed research scheme is aimed at the aforementioned strategic objectives through which exploring solar energy and more importantly explore the feasibility of enhancing local security and independency of electricity supply to the rural area of country. The merit of this scheme lies in the fact that solar energy harvesting, storage, and utilization are holistically considered and thereafter they will be meticulously investigated. One way to tap solar energy is through the use of salt gradient solar ponds. Solar ponds are large-scale energy collectors with integral heat storage for supplying thermal energy. It can be use for various applications, such as process heating, water desalination, refrigeration, drying and electricity generation. This is the most economical energy conversion system to reduce green house gas emissions is studied and included in the paper.

45. An inventive idea to collect solar energy from environment: salt gradient solar pond

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Fossil fuel, the principal resource of energy, is getting depleted rapidly. The alternative sources of energy which are well known to everybody, but what we need is the technology to harness them in a cost effective manner. Fossil fuel resources are adding a great burden to Indian economy due to their import. The present paper reviews the environmental as well as Economical aspect of alternative sources of energy and explores their futuristic perspective. The sun is the largest source of renewable energy and this energy is abundantly available in all parts of the earth. It is in fact one of the best alternatives to the non-renewable sources of energy. Salt gradient solar pond (SGSP) is the most economical solar energy harnessing system. With The salt gradient solar pond we can generate Electricity, which is not only Economical at commercial level but Environmental Friendly also. The approach is particularly attractive for rural areas in developing countries like in India with low investment cost for power generation. Locally available material like clay, plastic liner and salt can be used. India has a vast coastal line that provides saline water free of cost. The present work aims to give a rational design of SGSP considering various design parameters.

46. Salt gradient solar pond: an environmental friendly futuristic energy option

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Economical availability of energy is the first step towards development. Fossil fuel resources are getting depleted rapidly and are adding a great burden to Indian economy due to their import. Compared to other alternative sources of energy, solar energy is viable, environmental friendly and available in abundance. Salt gradient solar pond (SGSP) is the most economical solar energy harnessing system. With The salt gradient solar pond we can generate Electricity, which is not only Economical at commercial level but Environmental Friendly also. The approach is particularly attractive for rural areas in developing countries like in India with low investment cost for power generation. Locally available material like clay, plastic liner and salt can be used. India has a vast coastal line that provides saline water free of cost. The present work aims to give a rational design of SGSP considering various design parameters. In the present work, an attempt is done to develop a
simple expression to predict the thermal performance of SGSP. The expression is developed by solving the heat balance equation applicable to the storage zone with certain simplifying assumptions. For simplicity in analysis, ambient conditions (temperature and radiation) are considered to be constant. A simulation model is also developed by solving the heat flow equation. The results obtained by both the methods are compared and found to be in good agreement with each other. The present expression provides a great simplicity in calculations and saves computational time. In fact it allows manual calculations for estimation of salt gradient solar pond and eliminates the necessity of computer.

47. Physicochemical impact assessment of paper industrial effluent and ground water quality

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Water is an essential component for the survival of the eco systems and all the living organisms on the earth. Due to agricultural activities, rapid industrialization and growth in urban population, the water sources are being contaminated by anthropogenic activities. Keeping in view the rapid industrialization in East Godavari region, it is proposed to characterize the effluent water generated from the paper industry and ground water collected from the surrounding areas to assess the impact of paper industrial effluent on ground water quality. The present work is focused on characterization of effluent and ground water collected around the paper industry are characterized for physiological parameters Viz; PH, EC, TDS, TH, TA, Chloride, Sulphate, Nitrate, Phosphate, Na, K, Ca, Mg for assessing the chemical contamination of water. The statistical results revealed that higher values of TDS, TA and TH in some water samples indicate the presence of soluble solids and alkalinity of water. Higher values of TH in some samples indicate the encrustation nature of waters which make the waters unsuitable for drinking and domestic purposes. Presence of pathogenic bacteria like E.coli, Enterobacter, Pseudomonas, Klebsiella and Basillus indicate the microbial contamination of water and hence this water can be cause waterborne diseases if consumed.

48. Ion chromatography method for trace level azide determination in candesartan drug with suppressed conductivity detection

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A simple, specific, accurate and sensitive ion chromatography method has been developed using a Dionex ICS-5000 chromatography system for the determination of azide content in Candesartan drug substance. Azide is a process impurity during the synthesis of Candesartan, which is used for the treatment of hypertension and heart failure. Due to the toxic nature of sodium azide, reliable determination of azide in Candesartan is necessary. Efficient chromatographic separation was achieved on Dionex Ionpac AS15 column 250 mm long with 4.0 mm i.d., 9 µm particle diameter with AG 15 Guard Column and Dionex ASRS 4 mm suppressor. Mobile phase consists of 65 mM sodium hydroxide solution in water. The mobile phase was delivered in an isocratic mode at a flow rate of 1.2mL/min the column temperature was maintained at 30°C and analytes were monitored by a conductometric detector. The method was validated for specificity, precision, linearity, solution stability and accuracy. The limits of detection (LOD) and limits of quantification (LOQ) established
for azide are 0.60 ppm and 1.80 ppm respectively. The average recoveries for azide are in the range of 91.8 % - 98.5 %. Results prove that the validated method can be successfully applied for the routine analysis of azide content in Candesartan cilexetil drug substance. The proposed method has a potential for application to other Sartan drug substances which may contain traces of azide.


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A simple and reliable head space gas chromatographic method has been developed for the determination of residual Ethanol, Isopropyl alcohol and Toluene in Amiodarone hydrochloride drug substance. The proposed method is based on flame ionization detection technique with DB624 as stationary phase. Linearity of detector response was established up to 150% of the Limit Level for Ethanol, Isopropyl alcohol and Toluene and the Quantitation limit was 80 ppm for Ethanol, 40 ppm for Isopropyl alcohol and 4 ppm for Toluene respectively. Performance of the method was assessed by evaluating the recovery, repeatability, reproducibility, linearity and limits of detection and quantification. The proposed method has a potential for application to drug substances which may contain traces of residual solvents. Results prove that the validated method was suitable for determining the residual Ethanol, Isopropyl alcohol and Toluene in Amiodarone hydrochloride drug substance.

50. Ion chromatography method for determination of dimethyl sulphate content in lornoxicam drug substance with suppressed conductivity detection

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A simple and sensitive ion chromatography method has been developed for the determination of dimethyl sulphate content in Lornoxicam drug substance. Efficient chromatographic separation was achieved on IonPac AS10, anion column 250 mm long with 4 mm i.d., 8.5 µm particle diameter. Mobile phase consists of 2.7mM Na2CO3 + 0.3mM NaHCO3. The mobile phase was delivered in an isocratic mode at a flow rate of 1.5 mL/min at ambient temperature conditions and the analyte was monitored by conductometric detector. The method was validated for specificity, precision, linearity, solution stability and accuracy. The limits of detection (LOD) and limits of quantification (LOQ) established for dimethyl sulphate are 1.60ppm and 3.85ppm respectively. The average recoveries for dimethyl sulphate are in the range of 103.4 % -105.3 % and the method can be successfully applied for the routine analysis of Lornoxicam Drug substance.

51. Synthesis of 6-Bromo-2,3-O,O-Dibenzyll-Ascorbic acid

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L-ascorbic acid derivatives was synthesized on treatment with acetone and acetyl chloride afforded 5,6-acetal of L-ascorbic acid then benzylation of C-2& C-3 hydroxyl groups of the lactone ring was accomplished using K₂CO₃ and benzyl bromide in DMF. And then deblocking of the 5,6-O,O-protected derivative of L-ascorbic acid with acetic acid and methanol gave 2,3-O,O-dibenzyl-L-ascorbic acid. Subsequently mono-tosylation at 6 position of 2,3-O,O-dibenzyl-L-ascorbic acid was carried out with addition of p-toluenesylchloride (PTSC) in pyridine and MDC solvent medium gave 2,3-O,O-dibenzyl-6-O-tosyl-L-ascorbic acid and finally tosyl group at 6 position of 4 is substituted by sodium bromide in acetone afforded 2,3-O,O-dibenzyl-6-bromo-L-ascorbic acid. All the structures were characterized by ¹H NMR, ¹³C NMR and Mass Spectroscopy.

52. Comparative analysis of attacks in wireless communication networks


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The wireless network technology is growing and has greatly benefited for human being, but has helped to bring about unscrupulous, amoral and conscienceless packets. Particularly one who has inclination to exploit others, uses the technology for one’s nefarious purpose. Sniffing, spying, data blocking and stealing both information and capital are various forms of wireless threats. And these threats are increasing rapidly in all the way over the network last few years. Hence there is a need to have comprehensive understanding of these threats and its classification. The purpose of this study is to do a comprehensive analysis of these threats in order to create awareness about the various types of attacks and their mode of action so that appropriate countermeasures can be initiated against them especially focuses on highly challenging Wireless ad-hoc networks.

53. Environmental effects of chemicals used in agriculture

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With the growth of population, it became necessary to achieve the targeted level of food grain production. To meet the increasing food grains demand, 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 begins. Therefore, agricultural 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 environment quality.

54. BIS process in ocean and seas, bisinduced catastrophies, aggressive non-violence, ecowarriors, our duties and responsibilities

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Neurocysticercosis is the most common parasitic disease of the central nervous system. The disease in human is caused by the form of the tapeworm *Taenia solium*. Neurocysticercosis has a word, especially in Latin America the Indian subcontinent, China and most of Asia and Africa. It also occurs in industrialized nation largely as a result of the immigration of infected person from the endemic areas. In countries where the disease is endemic, cysticercosis may affect 2.4% of general population. Sero-epidemiological studies in India have demonstrated that approximately in their serum. The highest prevalence of cysticercosis is in communities where there is a close contact between human and pigs, and where hygiene standard are low. It is disease produced by poor sanitation, lack of a proper water supply and sewage, and poor personal hygiene. The vast hinterland of the Region lying in the area beyond DMA in the three Sub-Regions is characterized by a fairly well developed rural as well as urban economy represents comparatively some of the best areas of the respective States. The Region’s economy is based on agriculture and other primary activities, although significant developments in industrial and commercial sectors have also taken place. Industrial centers in Uttar Pradesh, Rajasthan and Haryana have been playing an important role in the overall economy of the respective Sub-regions. The Delhi Metropolitan Area or more precisely, the towns falling in DMA, due to the advantage of their dose proximity to Delhi, where diseconomies and other problem of metropolitan city exist, have been attracting large number of economy of these towns, which was mainly agricultural, has swiftly become manufacturing and industrial. In the context of the policy of deflecting urban population from Delhi to the priority town beyond the DMA, it is proposed to developed such activities that are appropriate to the location of priority town, having due regard to their potential and the growth process that has already set in. Delhi has been the nucleus with major corridors converging into it.

55. Role of science and technology in women empowerment

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Empowerment is a multifaceted and multidimensional concept. It involves upliftment by enhancing skill & efficiency which include education, health, employment, economic dependence, literacy, awareness, self-control access & control on production resources etc. empowering women influences them with greater self- respect and places them on a equal platform.

Science and technology can act an important role in this direction. A gender neutral simple devices/equipment for crop production, garments production etc, and their adoption by women will help in improving their position, economic condition, health care etc. for this, a short term training is necessary. Women should be made friendly with technological activities. Like in education and politics, women should be given reservation in all their activities for their empowerment. National institute of Science & Developmental studies, New Delhi has conducted study to assess the impact of new technologies on women’s participation in agriculture.

56. Equivalence between electric field and supersaturation ratio

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The electric field exists in the clouds. The maximum electric field produced near the lightning channel affects the rate of condensation of water. The formation of the same size of critical nucleus in
absence and presence of electric field is considered. An equivalence between supersaturation ratio and external electric field shows that the super saturation ratio decreases exponentially with increase in external electric field.

57. Membrane resistance, capacitance and impedance spectra of parchment supported inorganic precipitate membranes

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The impedance characteristics of cupric carbonate, Nickel carbonate and complex cupric-nickel carbonate parchment supported membranes have been analyzed to understand the mechanism of ionic transport through these membranes under various conditions of bathing electrolyte concentrations and oscillator frequencies. The observed values of membrane resistance ($R_m$), capacitance ($C_m$) and impedance ($Z$) were found to be dependent on the concentration of bathing electrolyte and applied oscillator frequencies. The results are interpreted in terms of changes produced in the electrical double layer at the membrane/electrolyte interface. The values of interfacial double layer capacitance derived by the equations of Armstrong and Longer were found to be different due to the presence of polarizing charge and other structural details of membrane matrix. The values of membrane resistance, capacitance and impedance have been computed by considering different equivalent electrical circuit models.

The electrical impedance spectra have been found to deviate from the theoretical predictions at low frequencies due to non homogeneity and roughness of the membrane surface.

58. Estimation of domain mean using two phase sampling and two auxiliary characters

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Two phase sampling is a cost-effective method of estimation, while the use of two auxiliary characters is a better choice than single auxiliary character. In this paper, we have proposed estimation of domain mean using two auxiliary characters x and z, with (known) and (unknown). A two phase sampling estimator for domain mean using auxiliary characters x and z have been proposed and its properties has been studied. A comparative study of the proposed estimator has been compared with conventional ratio and generalized estimators using single auxiliary character in terms of absolute relative bias (ARB) and simulated relative standard error (SRSE). The empirical study shows that the proposed estimator is more efficient than the relevant estimators using single auxiliary character.

59. Predictors of infant deaths in India

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Child mortality being important indicator reflecting level of socio-economic development, existence and utilization of health services. Reduction of child mortality to the maximum extent is, therefore, highly desirable. India launched many programmes to reduce it; still infant mortality is of major concern; for which policy makers need modifiable determinants to reduce IMR. With this view, present analysis was carried on NFHS 3 data using logistic regression analysis to identify modifiable
determinants of IMR. The logistic regression findings indicated that place of residence, religion, sex of child and place of delivery were not associated with IMR. Compared to the born of southern region the risk of infant death were higher in north, north-east, central and east respectively. The risk of death was also high in born to low aged mothers. Educational attainment had significant impact. Similarly risk of infant deaths increased with decreasing wealth index. Compared with a child of very small size at birth, risk of death during infancy was higher among born of size very large, larger than average, average, smaller than average. Regional variation in services indicates strengthening of health services in poor performing states, hence priority be given to these states for maximum IMR reduction.

60. Radio and product type estimators for population mean using auxiliary character the presence of unit nonresponse on study and auxiliary character

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In this paper we have proposed two ratio and product type estimators for population mean using auxiliary character in the presence of unit nonresponse on study and auxiliary character. The properties of the proposed estimators have been studied. A comparative study has been made with the relevant estimators and empirical study has been given in the support of the problem.

61. Kinetics and mechanism of Pd(II)-catalysed oxidation of allyl alcohol by N-Chlorosuccinimide in aqueous alkaline medium

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The kinetics of oxidation of allyl alcohol by N-Chlorosuccinimide (NCS) in the presence of alkaline solution of palladium chloride has been investigated. The kinetic results show first order kinetics with respect to \([\text{NCS}]\) and zero-order in \([\text{OH}^-]\). First order dependence of the reaction on [Allyl alcohol] and [Pd (II)] at their lower concentrations tends to Zero-order in their higher concentrations. Initially added Succinimide [NHS] decreases the rate of reaction. Increase in ionic strength and added [Cl\textsuperscript{-}] were found to have negligible effect on the rate constant. The mechanistic steps conforming to the observed kinetic data are proposed.

62. Geochemical heterogeneity along the vema fracture zone: implications for the reunion plume – central Indian ridge interaction

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Magmatic and tectonic processes associated with the interaction between mantle plume and ridge axis melt have been the central topic of interest in earth science. The Vema Fracture Zone (VMFZ) in the southern Indian Ocean along the Central Indian Ridge (CIR), a divergent plate boundary, provides such a window to understand the generation and transport of melt; and mechanism of emplacement of oceanic crust along the ridge axis in an environment influenced by Reunion Plume dynamics. The petrology of rocks from the VMFZ and nearby ridge segment reveals that while basalts
are composed of plagioclase and clinopyroxene, the peridotite consists of serpentine, olivine, pyroxene and Cr-spinel. Geochemically these rocks are found to be evolved, and tholeiitic to calc-alkaline in composition. Serpentinitized peridotites appear to represent the mantle residue, while the basalts are derived by variable degrees of partial melting of depleted to enriched spinel lherzolite mantle having contributions from EM-1 ocean island basalt (OIB) component. Petrological and geochemical signatures collectively suggest that the oceanic crust exposed at VMFZ preserves signature of plume-ridge melt interaction during the movement of Indian and African plates over it prior the formation of the CIR.

63. Unsteady flow of Walter's visco-elastic fluid through porous medium in a long uniform rectangular channel

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The unsteady flow of Walter's visco-elastic fluid through porous medium in a long uniform straight channel of rectangular cross-section under the influence of time varying pressure gradient has been studied. The exact solution for the velocity of fluid has been obtained by using integral transform technique. Some particular cases of pressure gradient have been discussed in detail. Also we have discussed the case when porous medium is withdrawn. Besides, the corresponding viscous flow problem has been derived as a limiting case when the relaxation time parameter tends to become zero. We have also derived the case when porous medium is withdrawn i.e. if $K = \infty$.

64. Catalytic applications of Fe doped TiO$_2$ nanoparticles in dissipation kinetics of herbicide residues in soils

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The dissipation kinetics activity of FeTiO$_2$ nanoparticles on herbicides (dicamba, imazethapyr) in soil was investigated. The decontamination effect of catalyst on the residues of dicamba and imazethapyr, was studied at four different soils (Sandy loam, Loamy sand, Sandy clay and Clay soil). The decontamination of herbicides on soil surface in Sunlight under natural climatic conditions was studied. The effect of concentration of FeTiO$_2$, pH of soil, moisture content and humic acid content on the decontamination of herbicide in photocatalysis were investigated. Kinetic parameters such as rate constant ($k$), DT$_{50}$ and DT$_{90}$ were calculated using the dissipation data of all herbicides. The degradation was high in clay soil for dicamba when compare to other soil, the degradation order was < Sandy loam < Loamy sand < Sandy clay < Clay soil. The degradation was high in sandy loam soil for imazethapyr when compare to other soil, the degradation order was Sandy clay < Loamy sand < Clay < Sandy loam soil. The optimum concentration of catalyst required for the rapid decontamination of herbicide residues on soil was established by varying the amount of catalyst in the range of 0.2 to 1.0 % w/w. The optimum concentration of catalyst was 0.6% w/w.

65. Pre-concentration of toxic pesticide residues in environmental water samples using multiwalled carbon nanotubes (MWCNT)

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The multiwalled carbon nanotubes (MWCNT) by chemical vapor deposition method were tested for their adsorption capacity in the pre-concentration of residues of pesticides in water. The MWCNT 20 to 50 nm diameters and 1 to 5 μm length. The solid phase extraction (SPE) cartridges were prepared by filling the empty cartridges of 5.5 cm length and 0.3 cm i.d. with 200 mg of nanotubes and protected between two polytetrafluoroethylene (PTFE) frits. To avoid the passage of nanotubes, 2% solution of polystyrene in chloroform was passed through PTFE frits and dried in air for two hours at room temperature before fitted into the cartridges. This process is to reduce the pore size of the PTFE frits. These cartridges are used in pre-concentration of different types of residues of pesticides in water. The pesticides were tested for the pre-concentration are hexazinone, bensulfuron, chlorimuron. The water samples were spiked with aliquots of pesticides and were passed through the cartridges. The amounts of the pesticide adsorbed on the cartridges were tested. The results of fortified sample analysis were compared with the data obtained from the commercially available C18 cartridges for the sample volume. For the quantification of residues of pesticides in water a new analytical HPLC method was developed.

66. **Catalytic applications of zinc oxide nanoparticles in decontamination of pesticide residues in water**

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Zinc oxide nano particles (ZnO) is the most widely accepted photocatalyst because it is non-toxic, stable to photo corrosion, low cost and can potentially work using sunlight rather than artificial sources of light when zinc oxide nano particles are illuminated by UV radiation. The photo-catalytic activity of zinc oxide nanorods on pesticide residues (strobilurin fungicides of azoxystrobin and Pyraclostrobin) in water was investigated. The decontamination of the pesticide residues was studied in Milli-Q water, pH 4, pH 7 and pH 9 water solutions under sunlight in natural climatic conditions. Kinetic parameters such as rate constant (k), DT50 and DT90 were calculated using the dissipation data of all pesticides. The degradation order was pH 4 < Milli-Q water < pH 7 < pH 9 for azoxystrobin and Pyraclostrobin. The optimum concentration of catalyst required for the rapid decontamination of pesticide residues in water was established by varying the amount of catalyst in the range of 0.02 to 0.1 g/L. The optimum concentration of catalyst was 0.06 g/L.

67. **Determination of the residue of trifloxystrobin and its metabolite in coffee bean, decoction and soil**

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A simple and inexpensive method was developed using solid-phase extraction, together with gas chromatographic method for determination of trifloxystrobin and its metabolite residues in coffee bean, decoction and soil. The mean recovery percentage of trifloxystrobin was 87 ± 3.06, 86 ± 3.21 and 88 ± 3.06 at 0.01 mg/kg fortification level; 88 ± 2.08, 87 ± 2.08 and 91 ± 2.00 at 0.05 mg/kg fortification level and 91 ± 1.53, 90 ± 1.53 and 93 ± 1.53 at 0.1 mg/kg fortification levels, respectively in coffee bean, decoction and soil. The Metabolite (CGA321113) has the recovery 86 ± 3.21, 86 ± 4.16 and 87 ± 3.21 at 0.01 mg/kg fortification level; 87 ± 2.65, 86 ± 2.08 and 91 ± 2.52 at 0.05 mg/kg fortification level and 90 ± 1.00, 88 ± 1.53 and 92 ± 1.15 at 0.1 mg/kg fortification levels, respectively in coffee bean, decoction and soil. The limit of quantification was 0.01 mg/kg (LOQ) for trifloxystrobin, its metabolite CGA 321113.
68. A novel LC-MS/MS method for determination of pyrazosulfuron-ethyl residues in paddy

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The paddy samples were analysed for pyrazosulfuron-ethyl and its metabolite Sulfonamide acid content by a validated LC-ESI-MS/MS method till the attainment of bellow detectable limit. The method showed acceptable mean recoveries of 97.6 ± 4.1, 93.0% ± 4.36 and 96% ±1.0 at 0.005 mg/kg fortification level and 94% ± 1.3 and 89% ± 2.6 and 95% ± 2.0 at 0.05 mg/kg for Paddy grain, straw and soil in pyrazosulfuron-ethyl. The metabolite Sulfonamide acid showed recoveries upto 99.0 % ± 2.3, 95.0% ± 1.7 and 99% ± 2.4 at 0.005 mg/kg fortification level; and 100% ± 1.5, 98% ± 2.9 and 99% ± 1.9 at 0.05 mg/kg fortification level. The method has a Limit of quantification (LOQ) as 0.005 mg/kg for pyrazosulfuron-ethyl and its metabolite.

69. A new method for determination of buprofezin residues in okra fruit

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The okra samples were processed and analysed for the residues by a validated HPLC-UV method. The average percent recovery for buprofezin was found to be 97.4 ± 1.6 and 97.2 ± 1.6 at 0.01 ppm fortification level 96.9 ± 1.0 and 96.8 ± 0.4 at 1.0 ppm fortification level for Okra and soil samples, respectively. The limit of quantification (LOQ) of the method was 0.01 ppm. A storage stability study was conducted at -20 ± 1°C with fortified concentration of buprofezin in okra and soil samples at 2.0 ppm. Okra and soil samples were stored for a period of 30 days at this temperature. Analysed the content of buprofezin before storing and at the end of storage period. The percentage dissipation observed for a period of 30 days storage was only 4% for okra and 5% for soil. Hence, there is no significant loss of residues on storage.

70. Efficacy of ionic liquids as green mobile phase system in thin layer chromatography of amino acids

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A green thin layer chromatography (TLC) has been developed for the identification and separation of amino acids on silica gel (SG) and cellulose:SG static phases in combination with aqueous solutions of ionic liquids as mobile phase. Better separation efficiency was observed with silica gel as compared to the mixed stationary phase consisting of cellulose plus SG. The resolution of three-component mixture (L-lysine+L-glutamic acid+DLisoleucine) was successfully achieved on silica gel layer using 1% aqueous hexadecyltrimethylammonium-chloride as mobile phase. The proposed method has been successfully applied for identification of L-lysine and L-glutamic acid in Ferseng-vit* syrup, and DLisoleucine in Zisscovit® syrup.

71. Thermal studies of ZnO/Poly acrylonitrile and ZnO/ Poly methyl methacrylate nanocomposites synthesized by adopting green chemistry approach

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In the present work zinc oxide (ZnO) nanoparticles were synthesized by using zinc nitrate, sodium hydroxide precursors and starch extracted from potatoes as stabilizing agent. Thereafter two polymers (polyacrylonitrile, poly methyl methacrylate) and two nanocomposites (ZnO/polyacrylonitrile, ZnO/ poly methyl methacrylate) have been synthesized by using microwave assisted green chemistry approach. Formation of nanoparticles was confirmed by Fourier transform infrared spectroscopy and ultraviolet visible spectroscopy. The size of the nanoparticles was determined by powder X-ray diffraction (XRD) and transmission electron microscopy (TEM). XRD analysis and TEM images indicated particle size of nanoparticles in the range 2.80-36.72 nm. Morphology of nanocomposites was investigated by means of scanning electron microscopy (SEM) Thermogravimetric analysis (TG) and differential thermogravimetric analysis were used to investigate the thermal stability of polymers and nanocomposites. TG analysis of nanocomposite showed that thermal stability of nanocomposite ZnO/Polyacrylonitrile nanocomposite has increased as compared to PAN. However, the thermal stability of ZnO/ poly methyl methacrylate has decreased as compared to PMMA.

72. Synthetic, structural and biological properties of Co(II), Ni(II), Cu(II) and Zn(II) metal complexes with novel 2-Hydroxy-4,5-dimethyl isonitroso acetophenone ligand.

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The novel complexing reagent 2-Hydroxy-4,5-dimethyl isonitroso acetophenoneneand different metal complexes have been prepared by treating with cobalt(II) sulphate, Nickel(II) sulphate, Copper(II) sulphate and Zinc(II) sulphate.

The present reagent and metal complexes have been characterized by elemental analysis and various physicochemical techniques such as electronic absorption, molar conductance, magnetic susceptibility, Infrared spectral studies and Thermal studies. The results of various physicochemical techniques discussed in detail and the possible structure proposed to the reagent and complexes. The biological applications of reagents and complexes have been carried using selected bacterial strain.

73. Thermodynamics of ion association and solvation in 2-methoxyethanol: behavior of some thiocyanates from conductivity and ultrasonic data

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2-Methoxyethanol is an amphiprotic dipolar solvent of low dielectric constant (D= 16.84 at 298.15K) with large dipolar moment (μ=2.36D). 2-ME could be considered as a moderate Lewis acid ( pkauto=20.5 at 298.15 K), and is a probable solvent for anions through its hydrogen bonding network and dipole induced interactions. It has unique solvating properties associated with its “quasiaprotic character” and is widely used for electrochemical investigations and various industrial processes. Even though 2-ME has drawn much attention in recent years as a solvent for analytical investigations, very few reliable studies on the electrolytic behavior in this non-aqueous medium have so far been made. Study of thiocyanate is important due to its application in catalysis, agri-chemicals, and rust-inhibition and dye-printing of textiles. Therefore, as a part of investigations on the chemical nature of
structure of ions on their mutual and specific interactions with solvent molecules, we have performed conductivity and ultrasonic measurements on 2-Methoxyethanol solution as a function of temperature. Trends in thermodynamic properties with change in temperature and composition can offer some qualitative assessment of solution behavior. The results have been interpreted in terms of specific constitutional and structural factors of the solvent molecules and of the solutes.

74. Detection and optical imaging of induced convective flow under the action of static gradient magnetic field in a non-conducting diamagnetic fluid

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The report elaborates experimental observations of magnetically induced convective flow in a non-conducting diamagnetic fluid. Suspension of Deionized (DI) water and Lycopodium pollen grains was used as the fluid in a test tube. Permanent magnets having field strength of 0.12T each were used to provide the static gradient magnetic field. The convections were visually observed and recorded using travelling microscope attached with a web camera. Various geometrical configurations of magnets in the vicinity of test tube were used which provided different types of orientation of convective flows in the test tube. Convections were observed over a range of fluid volumes from 0.2ml-10ml. The driving force for the convections arises from the interaction of the gradient magnetic field and the diamagnetic water molecule. This force is called as Faraday force given as \( f = \chi \mu H \partial H / \partial z \). Under various experimental conditions, it was observed that the convections were established only when the fluid was exposed to gradient magnetic fields. These results provide first proof of concept of the occurrence of convective flow in water with the use of static gradient magnetic field. Being a non-trivial phenomenon and irrespective of the weak interactions of diamagnetic fluids with magnetic fields, this effect can be easily observed.

75. Discovery, synthesis and properties of quasicrystals

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Quasicrystalline structure was discovered by D. Shechtman and his Co-workers in 1982 on rapidly solidified Al-Mn alloys that exhibited with icosahedral symmetry. The door to potential applications was open in 1987 by discovery of stable quasicrystals. A binary stable icosahedral quasicrystal using Ca-Cd and Yb-Cd was first synthesized in 2000. The first naturally synthesized quasicrystal consisting of micron-sized grains of Al\(_6\)Cu\(_{24}\)Fe\(_{13}\) with icosahedral symmetry obtained from the Khatyrka River in Chukhota, Russia have been reported in 2009. The discovery of quasicrystalline materials has changed completely the understanding of crystallography. In 1992, the International Union of Crystallography change the official definition of the crystal to incorporate Shechtman’s discovery. For his discovery professor D. Shechtman was awarded the 2011 Nobel Prize in Chemistry. The icosahedral quasicrystals form one group and polygonal another (8, 10, 12 fold) symmetries. Generally quasi periodic materials can be synthesized by traditional heat treatments, rapid solidification followed by cooling, sol-gel, coprecipitation, evaporation, controlled crystallization of amorphous precursors and other methods. Quasi-periodic materials have certain unique properties such as optical, electrical, hardness and non-stick properties. It has low co-efficient of friction, low surface, energy, good wear-resistance different from those of their metallic and amorphous materials, that may the more suitable for industrial applications. In past numerous papers have appeared which discuss alternative models for the icosahedral phases of quasicrystals. The present review summarizes the discovery, synthesis, and properties of quasicrystals.
76. Synthesis, characterisation and biological properties of novel nickel metal complexes

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The different novel nickel(II) complexes were prepared with hydrazone derivatives. The metal complexes have been characterized by elemental analysis and various physicochemical techniques such as infrared spectral, $^1$H-NMR, molar conductance, electronic absorption, magnetic susceptibility and TG-DTA analysis. On the basis of results the bonding and structure of the complexes discussed in details. The hydrazone derivatives and their metal complexes screened for antibacterial and antifungal activity against by selected bacterial strains.

77. Toxic pesticide residue analysis in environmental water samples using silica nanoparticles

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The silica nanoparticles prepared by stober’s mechanism by reaction of tetraethylorthosilicate (TEOS) with ammonia was tested for their adsorption capacity in the pre-concentration of residues of pesticides in water. The synthesized nanoparticles were characterized by Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM) and X-Ray Diffraction (XRD). The size of the silica nanoparticles were 50 to 250 nm. The solid phase extraction (SPE) cartridges were prepared by filling the empty cartridges of 5.5 cm length and 0.3 cm i.d. with 200 mg of nanoparticles and protected between two polytetrafluroethylene (PTFE) frits. To avoid the passage of nanoparticles, 2% solution of polystyrene in chloroform was passed through PTFE frits and dried in air for two hours at room temperature before fitted into the cartridges. These cartridges are used in pre-concentration of different types of residues of pesticides in water. The pyrethroids tested for the pre-concentration are transfluthrin, metofluthrin, esbiothrin. The water samples were spiked with aliquots of pesticides and were passed through the cartridges. The amounts of the pesticides adsorbed on the cartridges were tested. The influence of temperature, sample volume, flow rate, pH and ionic strength on the performance of the cartridges was checked. The results of fortified sample analysis were compared with the data obtained from the commercially available C18 cartridges for the sample volume. The separation parameters were established for the simultaneous determination of residues using GC-EI-MS. The method was validated by means of linearity, precision, assay accuracy, limit of detection (LOD) and the limit of quantification (LOQ).

78. Preparation, characterization and biological evaluation of heterocyclic Schiff base metal complexes

Y. Prashanthi

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Biologically important Schiff bases MIIMC; MMIIMC and CMIIMC have been synthesized by condensation of 3-amino-5-methyl isoxazole with formyl chromone, substituted formyl chromones and their metal chelates with Cu(II), Ni(II), Co(II) and Zn(II) are synthesized. And these have been characterized by using elemental analysis, IR, UV-VIS, $^1$H, $^{13}$C, Mass spectra, magnetic susceptibility, conductance measurements and thermo gravimetric studies. Based on the data obtained,
it was found that the ligands behave as neutral, bidentate coordinating through carbonyl oxygen and azomethine nitrogen. Antimicrobial activity of the ligands and metal complexes are tested invitro against bacteria and fungi by paper disc method. The MIC value against the growth of microorganisms is much larger for metal chelates than the ligand. The DNA binding studies of Cu(II) complexes have been investigated by UV-Vis spectroscopy. MTT is used to test the anticancer effect of the complexes with HL60 tumor cell. The research showed that the complexes inhibit obvious morphological changes. The inhibition ratio was accelerated by increasing the dosage, and it had significant positive correlation with the medication dosage.

79. Ultrasonic studies of some amino acids

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The ultrasonic method plays an important role in understanding the physico-chemical behavior of liquid. The velocity gives information about the bonding between the molecule and formation of complexes at various temperatures through molecular interactions. Various workers have studied the acoustical properties of binary liquid mixtures, non-aqueous solutions aqueous solution and electrolytes. However, little work has been done for the solutions of drugs. In the present research work, the acoustical property of ultrasonic studies of amino acids at different temperatures and at different concentrations has been studied. In most of the chemical and industrial processes, the provide a wide range of mixtures of two or more components in varying proportions so as to permit continuous adjustments of desired properties of the medium. Ultrasonic velocity together with density and viscosity data furnished wealth of information about the interaction between ion, dipoles, hydrogen bonding, multipolar and dispersive forces. The liquid mixtures are of interest to organic chemists who want to know about the types of bond, type of molecular interaction, etc. further, the values of ultrasonic velocity, density, viscosity and adiabatic compressibility as a function of concentration will be of much help in providing such information.

80. Effect of anionic micelles of sodium lauryl sulphate on the reaction of hydroxide ion with 4-chloro-3-methyl phenyl phosphate monoester and 4-chloro-dimethylphenyl phosphate monoester

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Department of Chemistry, B.S.A. College, Mathura

The micellar catalysed reaction with hydroxide ion and mono-phosphate ester of 4-chloro-3-methyl phenyl (4-CMPP) and 4-chloro-dimethyl phenyl(4-CDMPP) has been examined in buffered solution medium (at pH 8.0-10.0) with borate ions. First order rate constant for the reaction of OH ion with 4-CMPP & 4-CDMPP through maxima inhibited the concentration of sodium lauryl sulphate (Nals), micelles of Nals are least reactive. Anionic micelles of [Nals] have little effect on the reaction rates probably because anionic micelles strongly inhibit the nucleophilic effect.

81. Irrigation waters and their suitability for different crops at district Mainpuri

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About 78% of India's population lives in villages and most of them depend upon agricultural practices for their livelihood. Previously, they depended upon the rainfall for the irrigation purposes,
which was quite uncertain. They, then, started using underground water of wells, tubewells, ponds, rivers etc. This study has been done in order to find out the means of measuring the amounts of different chemical constituents in different irrigation waters and soils of nearby villages of district Mainpuri to find out the suitability for different crops and their varieties.

82. Toxic effects of Cypermethrin on tomato plants

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Besides other toxicants, the use of synthetic pyrethroids has been in the upstring in the recent past. Cypermethrin is one among the other important synthetic pyrethroids. It is largely used as a pesticide for vegetable crops. This compound has proved to be remarkably toxic to pests with a relatively low toxicity. The studies on phytotoxicity of pesticides are lacking and therefore, in the present work, the studies on toxic effects of Cypermethrin (a pyrethroid) on tomato plant have been carried out.

83. Shellac film coating sheets using electrochemical polymerization technique

Madhuri Kumari

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The electrolysis of shellac in the aqueous ammoniacal solution leads to formation of adherent film onto different metal anode such as Fe, Cu, Pt, and Pb. The yield of deposited films increases with the time of electrolysis and current levels and is dependent on the nature of electrode materials. Therefore, the film thickness is well controlled by the impressed current level and electrolysis time. The addition of methylacrylamide to the shellac solution gives more adherent and smoother coating onto the metal sheets than those obtained in the absence of the monomer. The film formation also takes place potentiodynamically. A plausible reaction mechanism of the shellac coating is suggested.

84. FT-IR, FT-Raman spectra, ab initio and density functional computations of the vibrational spectra, molecular geometry, and some other molecular properties of 2,5-difluorobenzonitrile

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Several benzonitrile derivatives have important applications and the importance of these compounds has been reviewed recently. Many derivatives of benzonitrile are used in medicine as urinary antiseptic in the form of salt and in vapour form for disinfecting bronchial tubes. From the spectroscopy point of view the vibrational spectra of benzonitrile and its mono- and di-substituted derivatives have been studied extensively. The fluoro- and chloro- substituted benzonitriles have been specially studied by vibrational spectroscopy. However, a complete vibrational analysis of 2,5-benzonitrile is not available in literature yet. Therefore, in the present study, we report for the first
time the molecular geometry, and a few other molecular and thermodynamic properties of of 2,5-DFBN using DFT Method at the B3LYP/6-311++G(3df,pd) level and harmonic vibrational frequencies at B3LYP/6-31G** level. Because theoretical methods do not adequately reproduce all the experimental patterns of wavenumbers with enough accuracy, we have used linear scaling procedure to improve the results. C≡N stretching frequency has been identified at 2230 (scaled value 2272) cm⁻¹. As it is separated from other frequencies, it is expected to be almost a pure frequency. The calculation confirms this expectation, as there is about 85% of C≡N stretching character in this frequency. It mixes with C-CN stretching mode to the extent of 13%. The ν(C-F) have been identified at 1290 (scaled value 1287) and 1135 (scaled value 1137) cm⁻¹. Overall, scaling equation procedure appears to be very accurate with less than 5% of error, and it is very general and simple to use.

The bond length of C≡N bond in 2,5-DFBN (1.1514 Å) remains almost the same as that of in BN (1.1522 Å). However, with the C≡N substitution the angle on position 6, instead of lower than 120°, as in BN(119.99°), it is a little higher, 120.55°.

85. The science learning through simulation experiments and hands-on-activities

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It is well-known fact that the average retention rate of active or participatory teaching/learning methods is always greater than passive or traditional classroom-teaching/learning methods. But compared to traditional methods, active teaching/learning methods require well trained demonstrators and setup of huge laboratories. Also, active participation of college students in the role of demonstrators or volunteers taking parts in hands-on-activity can facilitate learning process. Increase in the retention rate through hands-on-activity can be accomplished by making students participate in teaching activity as per the pyramid learning. Further, computer assisted material with simulation experiments will accomplish the task of ample learning through participatory teaching/learning techniques.

86. Influence of pentaerythritol as co stabilizer for calcium/zinc one pack system stabilizers to rigid PVC applications

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¹School of Basic Sciences, Department of Chemistry, Jaipur National University, Jaipur
²Work place: Galata Chemicals India Pvt Ltd, Mumbai

The stabilization effect of zinc laurate (ZnL) with calcium stearate (CaSt₂) combined with β-diketone and pentaerythritol (PE) was studied in rigid poly (vinyl chloride) PVC application. The performance was characterized during thermal processing of PVC. The long-term heat stabilization efficiency of pentaerythritol was investigated, when added to calcium/zinc stabilizers and compare with conventional lead stabilizer. Investigation of prepared one pack thermal stabilizers was measured by Congo red test in air at 200°C, thermal aging test and torque Rheometry study. Visual color evolution and thermal stability time was examined at 190°C in air. The results revealed that combination of pentaerythritol and B-diketone with CaSt2/ZnL stabilizers enhance stabilization efficiency to poly (vinyl chloride) (PVC) and extended degradation time. Pentaerythritol and β-
diketone with zinc laurate and calcium stearate exhibit better stability than the stabilizers containing zinc stearate stabilizers.

87. Application of pomegranate albedo for biosorption of methylele blue dye

Bharat G. Pawar

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This study offers the removal of methylene blue dye with biosorbent prepared from waste albedo of Pomegranate. The dried albedo were ground prior to their activation by carbonization in muffle furnace at 700°C for 1 hours. These carbonized pomegranate albedo (CPA) used as low-cost, and environment-friendly adsorbents as a new source for active carbon, for the removal of dyes. The Characterisation of biosorbent was made by Fourier transform infrared Spectroscopy (FTIR) and Scanning Electron Microscopy (SEM). Activated carbon used for the study of Methylene blue (MB) dye removal with help of spectrophotometer. PH and conductivity were also studied in aqueous solution of activated carbon.

88. Nonclassical properties of two-mode quantum vortex state

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²Physics Department, Bhavan's Mehta Mahavidyalaya, Bharwari, District-Kaushambi

Nonclassicality of optical fields play an important role in quantum information processing. Recently, Agarwal [New J. Phys., 13, 073008(2011)] proposed a method for engineering of a two-mode vortex state, a non-Gaussian state, by subtracting a photon from a two-mode squeezed state produced by down-converter from idler mode via a beam splitter with low reflectivity and detection of one photon by the avalanche photo diode (APD), or even better by a single-photon detector. We study the nonclassicalities of this state in terms of squeezing, antibunching, photon number correlation and distribution of photon number. In addition, we study higher-order nonclassical properties, viz., sum squeezing. We find that the non-Gaussian state shows strong nonclassical effects.

89. Formation constants and free energies of some mixed ligand complexes of some lanthanide ions.

Ravi Prakash, Harkesh Gautam and K.C. Gupta

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The formation of (1:1:1) mixed ligand complexes by La(III), Ce(III) and Pr(III) with cis1,2,3,4 Cyclopentanetetra carboxylic acid (CPTA) as primary ligand (A) and L-Histidine and L-Cysteines as secondary ligand (B) were studied Protentiometrically by employing modified method of Irving and Rossetti. The formation constant (logK_{MA}) were determined at±25

MAB

°C in aqueous medium at μ = 0.2M (NaCl04)

A Philips digital pH meter PP-9045 with accuracy rang ±0.02 pH ± 0.1 digit was calibrated with buffer solution. The temperature was maintained constant by circulating the hot water through double walled beaker with the help of thermostat.

The free energies of formation (ΔF^0) were calculated from the following equation.
\[
\Delta F = -RT \log K \text{MA}
\]

<table>
<thead>
<tr>
<th>System</th>
<th>(MA) log KMA R</th>
<th>(\Delta F \text{ (K.cal/mole)})</th>
</tr>
</thead>
<tbody>
<tr>
<td>La(III)-CPTA-Histidine</td>
<td>7.05</td>
<td>-9.61</td>
</tr>
<tr>
<td>La(III)-CPTA-Cysteine</td>
<td>8.80</td>
<td>-12.00</td>
</tr>
<tr>
<td>Ce(III)-CPTA-Histidine</td>
<td>5.14</td>
<td>-7.00</td>
</tr>
<tr>
<td>Ce(III)-CPTA-Cysteine</td>
<td>6.15</td>
<td>-8.38</td>
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<tr>
<td>Pr(III)-CPTA-Histidine</td>
<td>3.15</td>
<td>-4.30</td>
</tr>
<tr>
<td>Pr(III)-CPTA-Cysteine</td>
<td>5.10</td>
<td>-7.36</td>
</tr>
</tbody>
</table>

90. A novel pretreatment of rice straw using petha waste water and mausami waste for optimum production of ethanol

Dolly Kumari, Pooja Chahar, Radhika Singh*

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The present work proposes a new and novel pretreatment of rice straw using petha waste water (PWW) and mausami waste (MW) for its optimal conversion to ethanol. This approach is an example of waste-to-waste pretreatment. The organic matter present in the rice straw has been utilized as the source for the production of biofuel by the action of the anaerobes present in the microbial culture utilized (cow dung). To enhance the production of biofuel, chemical and green pretreatment methods were used to solubilise the lignocellulosic content into reducible sugars. Further microwave pretreatment in addition to the above pretreatment methods were also used to have better production of ethanol. All reactors were maintained for two batch runs. The maximum bioethanol yield was 28.75 mg/L for PWW and microwave pretreated rice straw.

91. High efficiency, high fill factor and cost favourable thin-film solar cell

Madhavi Sharad Darekar

Pune

In present work, it is proposed to synthesize thioglycerol capped CdS and Cu₂S nanoparticles using non-aqueous chemical method. It is also proposed to prepare thin-film solar cell with p-n heterojunction having high solar energy conversion efficiency and high fill factor using CdS and Cu₂S nanoparticles as compared with previous work done by others by different methods.

In my Ph.D. work, I have synthesized thioglycerol capped CdS nanoparticles using non-aqueous chemical method at room temperature. Capping agent has been used to passivate particle surface. CdS nanoparticles have been investigated using characterization techniques like UV-Vis Absorption, X-ray Diffraction.

Bulk band gap of CdS is 2.42 eV at room temperature. UV-Vis absorption peak appears at 513 nm. I prepared three samples. In first sample, UV-Vis absorption peak is observed at 290 nm (energy gap~ 4.28 eV), in second sample peak is observed at 310 nm (energy gap~ 4.00 eV) and in third sample peak is observed at 380 nm (energy gap~ 3.26 eV). Sizes of particles in these samples are 2.2, 2.3 and 2.7 nm respectively. This is indication of formation of nanoparticles with narrow size distribution and increase in energy gap with decrease in particle size.
XRD technique was employed to estimate average size of CdS nanoparticles and to check their crystallinity. Average particle size calculated for CdS nanoparticles by Debye-Scherrer formula is about 3.5 nm.

Cu$_2$S nanoparticles prepared using non-aqueous chemical method will be investigated using characterization techniques like UV-Vis Absorption, X-ray Diffraction and good results will be obtained as compared with previous work.

92. Microbial processing of iron rich waste pickle liquor of steel industries to synthesize iron oxide based magnetic nanoparticles

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Biologically controlled mineralization (BCM) is a proven mechanism in synthesis of value added products from pure solutions. This work describes application of two different genera of microbes to a common effluent source, pickle liquor of steel industry. Pickle liquor contains 95g/L Fe(II) in presence of other ions like Zn, Cr and free acid (150g/L). The acid can be recovered by simple solvent extraction process. The metal values of iron can be converted to fine disseminated sizes to find applications in doping and magnetic domains.

In one method, facultative iron reducing bacteria isolated from iron mineralized zone of copper mines were able to synthesize maghemite particles of 10-20nm diameter, with high coercivity and magnetization of 110G and 66emu/g respectively at room temperature. Alternatively, iron oxidizing bacteria of *Leptospirillum* and *Acidithiobacillus* genera were also employed on diluted ferrous solution, yielding by virtue of biologically induced mineralization an array of Fe.O.OH particles of ultrafine nature (<5nm) in the cellular entities and good coercivity of 40-45G.

93. Study of intermolecular interaction and dielectric parameters of hydrogen bonded solvent binary mixtures in polar liquids

Anand Pandey and K P Tiwari

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An investigation of intermolecular interaction behaviour of hydrogen bonded solvent binary mixture of polar liquids had been conducted. The compounds under study are N-Methyl form amide and form amide. The static dielectric constant and Kirkwood correlation factor values of the mixture of these compounds have been measured for large composition range at different temperature range and compared with the measured values of these constants by the other workers. The difference in the measured values interpreted through different theories which conclude that there is strong hydrogen bond interaction between unlike molecules of amide mixtures. The efforts have been made to compare this model with ion dependent theory of crystals and it is observed that similar study for mixed binary crystals can also be performed. Certain industrial and technological applications have been suggested too.

94. Electrical parameters of semiconducting nano-composites and their applications

K P Tiwari, Anand Pandey and C V Singh
Nano-composites are size dependent and different from those of atomic and bulk components. The hybrid materials are combinations of one or more inorganic nano-particles with a conducting polymer so that unique properties of these materials can be used for wider applications. We have prepared a nano-composite of II-IV semiconducting nano-material and a conducting polymer by precipitation method. The synthesized nano-composites with different weight percentage of semiconducting nano-particles were characterized by UV-Vis spectroscopy, SEM and four probe techniques for electrical conductivity etc. Different electrical parameters of theses composites are measured and corresponding conclusions have interpreted in comparison of certain other studies. The mechanism of charge transport in conducting polymers can be studied by knowing the values of electrical parameters of electrical conductivities. The activation energy and electrical parameters of these nano-composites have been calculated from the plots between conductivity and temperature. The results obtained from these graphs shows that the electrical conduction behaviour of these composites is the intermediate behaviour of conducting polymer and pure semiconducting nanocrystal. Certain technological applications in various nanoelectronic devices have been suggested by controlling the size, shape and temperature.

95. Facilitating and promoting research initiatives for the sustainable national development

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The sustainable development of any country depends upon the progress made by the scientific community on research front and the use of the developed technology for the better cause of the humanity. The investment made in giving an impetus to the research and development initiatives in all frontier or state-of-the-art areas keeping in view of the needs of the society will certainly pay off in terms of enhancement in the standard of living of the people at large. In fact all research initiatives are meaningful and productive provided they are in tune with the requirements of the society. There have to be consistent and concerted efforts in inculcating, nurturing the research bent of mind and furthering research competencies among the masses to evolve at solutions which will address the problems of the various sections, strata of the society. The continuous advancement in various research areas is a must as the tastes, preferences, likes, dislikes, attitudes of the end users and stake holders are continuously changing at an unprecedented rate. The shelf life of technology on its design and development is dwindling fast and is getting obsolete, outdated, outmoded at a very fast rate. We can bring in sustainability in arriving at the solutions provided we use the resources at our disposal optimally and all out initiatives should be aimed at conserving the limited resources as well as we bring in a paradigm shift in our approach by adopting to those resources which are non-conventional, non-exhaustive, and eco-benign. So far the research initiatives undertaken have brought about the development which is more of a unbridled and lopsided and at the cost of ecological degradation. So the sustainable development to bring about the research initiatives have to go hand in hand with the efforts leading to preservation of ecological balance and the solutions derived out of it should address the problems confronted by the society across the board.

This paper will highlight the need of the research, various frontier areas, their contribution in the national development, sustainability issues in technology development etc.

96. Preparation of fatty acid methyl esters from triglycerides by In-Situ Transesterification
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The aim of present work is to prepare fatty acid methyl esters directly from naturally occurring plant material like seeds of Bombax Malabaricum by in-situ transesterification reaction. One can prove the effectiveness of the new source of fatty acid methyl esters by using a single step reaction, i.e. preparation of triglycerides(oil) by extraction and its reaction with the mixture of alcohols to obtain triglycerides. The seeds are found to have triglycerides (oil) in the range of about seventy percent yield. Reaction

\[
\text{triglycerides} \xrightarrow{\text{in-situ transesterification}} 3 \text{H}_3\text{C}-\text{O} \rightarrow \text{R} + \text{HO} \rightarrow \text{OH} \rightarrow \text{Glycerol}
\]

97. Teaching polymer science using posters and craft from waste plastics

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Plastics (a modern material) have replaced several traditional materials in our daily life like wood, metal, glass, ceramic, leather etc. Plastics have several extra-ordinary properties which cannot be achieved from a single material in the current world. In the present study we tried to explain the various properties of polymers using models (structure property relationship, concept of molar mass in polymers). World without plastics is impossible to imagine, but we can change our habits by adopting effective use of plastics thus avoiding pollution. It developed keen interest among students regarding the subject and it inculcates the thought in their minds that waste plastics can be re-used again. It is a new innovative teaching method and has been appreciated by students/teachers with an enthusiastic approach.

98. Ethanol induced hepatotoxicity by Terminalia Chebula

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²Department of Chemistry, Savitribai Phule Pune University, Pune

In the present investigation, phytochemical screening of Terminalia Chebula revealed the presence of polyphenolic compounds and it is also contains phytoconstituents such as azulene, eugenol, rhamnetin, monoterpenes and sesquiterpenes all of which are known to have antioxidant activity and which have already been reported to have hepatoprotective activity. In antioxidant activity assays by using the fruit powder if Terminalia chebula, hexane extracts exhibited significant antioxidant action by scavenging DPPH by virtue of its reducing power and reducing the formation of MDA by antagonizing lipid peroxidation mechanism. The administration of HETC effectively inhibited the abnormal increase in serum biomarkers viz, ALT, AST, ALP, TBIL, restoring TPROT, the endogenous enzymatic (CAT) and non enzymatic (GSH) and antioxidant parameters, inhibiting
lipid peroxidation. The above results were supported by the histopathological findings. However, the principle components responsible for this activity and extract mechanism of action are currently unclear. So further phytochemical investigation using HPLC and HPTLC are required to identify, isolate principles responsible for antioxidant, hepatoprotective activity and the existence of possible synergism, if any, among the compounds.

99. Delineation of morphogenetic regions of Maharashtra: a GIS approach

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¹Department of Geography, Shankarrao Bhelke College, Nasarapur, Bhor, Pune-412213
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Regional study of any geographic or geomorphic phenomena is important in different aspects such as understanding the region, resource management and application of the knowledge for the regional development. Understanding the physical set up of these regions is the basis of such regional assessment. In the same context, identification morphogenetic region(s) is of interest to the Geoscientists, Geotechnical experts and planners. Regional setup with respect to morphogenetic regions is not well studied in many parts of the world. Present study is carried out to understand the morphogenetic regions of Maharashtra State in India, to know the characteristics of each morphogenetic region with reference to climatic conditions prevailed over long time and processed operated in the region. In order to understand the climatic conditions, the climate data for 63 years (1951-2013) in the grid format has been opted for analysis. The elevation data is extracted by using SRTM Digital elevation model (DEM) 30 meters spatial resolution. Using both these data sets in GIS platform, primary morphogenetic regions for Maharashtra State have been identified. These regions are further characterized with the help of denudational processes such as weathering processes and their types, erosion processes and mass movement which dominant operate in those morphogenetic regions. Based on the analysis carried out, four morphogenetic regions are identified as tropical semi-arid, tropical wet-dry, humid temperate and humid tropical regions covering the entire Maharashtra State.

100. Synthesis and characterisation of copper oxide-water based nanofluid for heat transfer applications

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Department of Physics, Shikshn Prasarak Mandal’s Parshurambhau College, Pune – 411 030

The aim of the current research is to manufacture copper oxide–water based nanofluids and to study its various properties. In the present work, nanocrystalline copper oxide powder was synthesized using surfactant assisted wet chemical method. The structural and optical characterization of synthesized powder was carried out using XRD, SEM and UV-Vis. spectroscopy. The average crystallite size of the particle was found to be 14 nm. The UV-Vis spectrograph shows absorption peak at 314 nm from which direct band gap was calculated as 3.9 eV which is higher than indirect band gap of 1.2 eV. This supports the nanosized crystalline nature of the copper oxide powder. Synthesized nanopowder is used for making nanofluid of Copper Oxide (CuO) by sonification method. The nanofluid of CuO is prepared using water as a base fluid for potential use as a coolant for heat transfer applications. The structural characterization of nanofluid was carried out using SEM and EDS. The heat exchange characteristics (thermal conductivity, specific heat and viscosity) of copper oxide nanofluid were determined using experimental set up designed in laboratory. These results are compared with the results of this application by using plain water. An increase in thermal conductivity of the prepared copper oxide nanofluid was found to be 21.64 % compared to deionised water which is 9 % higher than the earlier reported values. This is an achievement of the present work.

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\textit{Department of Chemistry, Shivaji Science College, Amravati.}

A sulfonatothiacalix[4] arene is a special host used for complexation of few transition metal ions. A fluorescein and M²⁺ (Co²⁺, Ni²⁺, Cu²⁺, Zn²⁺) have been used to understand the complexing behavior with water soluble p-sulfonatothiacalix[4] arene by using spectrofluorometric method. In present study interesting to note that the order of binding of transition metal ions obtained as Cu²⁺ > Zn²⁺ > Co²⁺ > Ni²⁺ which is supported by Irving-Williams series. ¹H NMR, 2D NMR and IR spectra supported complexation behavior. The system is applied for testing antimicrobial activities.

[Fig. Sulfonatothiacalix[4]arene]

102. Synthesis and anticancer evaluation of some coumarin derivatives as future lead molecules

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"Department of Advanced Science & Technology, NIET, Nims University, Jaipur
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Many of coumarins isolated from plants were reputed for their medicinal use because of their antibacterial, anti-coagulants, antibiotic, anti-fungal, anti-cancer and anti-inflammatory properties. Coumarins also have extensive and diverse applications in our daily life as food additives, pesticides, cosmetics, pharmaceuticals, optical brightening agents, dispersed fluorescent and laser
dyes. Since 7-hydroxy coumarin acts as fluorescent compound under alkaline conditions, which could be an easier way for the quantification leads the scientist to study the metabolism of coumarin to 7-hydroxy coumarin. Coumarin and its analogues/derivatives are playing important role as therapeutics and in the present work series of six novel 8-N-substituted cyanoacetamido-7-hydroxy-4-methyl coumarin derivatives were synthesized and tested for their anticancer potential using computational approach.

103. Asymmetric synthesis of Gingerdiols using proline catalysed iterative α-aminooxylation

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Gingerdiols (3R,5S)-1 and (3S,5S)-2 were first isolated in 2007 along with Gingerol by Liang and co-workers from Ramulus cinnamomom, known for centuries in China as the traditional Chinese medicine “GuiZhi”. Such compounds are common in the ginger family, Zingiberaceae, which having anti-inflammatory, antitumor, and chemo preventive, and bacteriostatic activities. Very few total synthesis were reported in literature which involves use of chiral pool materials, exotic reagents and harsh reaction conditions. Due their important biological activities and our continuing interest in the sequential proline-catalyzed synthesis of bioactive molecules, herein we have developed novel synthetic route for Gingerdiol1 and Gingerdiol2 by employing L/D-Proline catalysed iterative α-aminooxylation followed by Wittig olefination using cheaply available starting materials with 17.8% overall yield (Scheme 1)

104. Fluorescence sensing of metal ions by Thiazole-SDS ensemble

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Detection of metal ions has drawn great attention due to their toxicity and the increasing concerns on environmental safety and human health. Generally sensor system for metal ions consists of a receptor and a transducer (probe). Surfactant systems can act as a receptor for binding the metal ions and also can enhance the sensing capability of fluorophore towards the metal ions. Interaction of
fluorophores with the analytes in hydrophobic environment of surfactant assemblies or binding of ionic active species at the oppositely charged micellar surface exhibits great potential to modulate the communication between two active species in pure aqueous systems. In our work we have studied a thiazole based fluorophore (2-pyridyl 4-aryl thiazole) for metal ions sensing which was prepared by reacting 4-pyridine thioamides derived from the corresponding nitriles with different para substituted phenacyl bromides. This fluorophore has been modulated using different charged surfactants (anionic, cationic, non-ionic). Electrostatic interactions of PTCN with SDS lead to enhanced fluorescence. This PTCN-SDS sensor system has been used to sense metal ions and their detailed mechanism of interaction is predicted in this work.

105. Supramolecular interaction of anthraquinone derived podands with leucine, glycine and valine
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A series of anthraquinone derived receptor 1-(1-anthraquinonloxy), 3,6,9 triaoxanonane–9–methane(A1), 1-(1- anthraquinonloxy), 3, oxapentane – 5 – methan (A2), 1, 5 bis-(2-(2-hydroxyethoxy) ethoxy) ethoxy) anthracene-9-10 dione (A3) have been synthesized by condensation of 1-chloroanthraquinone with tri ethylene glycol mono methyl ether, diethylene glycol mono methyl ether and diethylene glycol in THF under N2 atmosphere. In order to know the supramolecular interaction of these synthesized receptors with non-essential amino acid glycine and essential amino acids leucine,valine. We have performed isolation study by mixing of various ratio of amino acids with receptors (A1, A3) in different solvents. These prepared complexes were characterized and confirmed by m.p., TLC, elemental analysis and IR, 1H NMR spectral analysis and cyclic voltammetry. Stoichiometry of these complexes were found to be 1:2. These complexes are important in analytical, biochemical and pharmaceutical applications.

106. Application of calixarene for the synthesis of nanocomposite materials for high performance super capacitor electrode
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A functionalised calixarene [4-Sulphatocalix [6] arene Hydrate (SC6)] stabilises MoS2/partially reduced graphene oxide (rGO) nanosheet. Such stabilised SC6-rGO/SC6-MoS2 and SC6 doped polyaniline (PANI) together forms a nanocomposite hybrid material for supercapacitor
electrode. The nanocomposite was fabricated by an in situ polymerization method. TEM results suggest that PANI nanostructures grow homogeneously onto the surfaces of SC6 functionalised MoS$_2$. Calixarene acts as a dopant for PANI as well as a stabiliser for the 2D nanosheets of rGO/MoS$_2$. The characterisation of composites together with basic components was done by using various techniques namely, FT-IR, XPS and XRD. The electrochemical performance was analysed by CV, galvanostatic charge/discharge and EIS. It was found that the SC6 functionalised MoS$_2$ and SC6 doped PANI formed a uniform nanocomposite. The synthesised composites show high specific capacitance (691 F/g) and good cycling stability during the charge-discharge process when used as supercapacitor electrodes. The improvement in electrochemical performance of composites is assigned to synergistic effect of SC6 stabilised MoS$_2$ and doped PANI. Our investigation highlighted the importance of use of calixarene in composites for above stated supercapacitor performance. The role of calixarene in the present study opens a way for the application of alike materials in the composite supercapacitors for energy storage applications.

107. Synthesis, spectroscopic, DFT and molecular structural investigations of Thiosemicarbazone Schiff base and its oxidovanadium (IV) and dioxidovanadium(V) complexes

P. K. Vishwakarma, P. S. Jaget and R. C. Maurya

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This paper reports the synthesis, spectral, thermal, electrochemical and DFT studies of thiosemicarbazone derived ONS donor Schiff base oxidovanadium(IV) and dioxidovanadium(V) complexes. The interaction of bis(acetylacetonato)oxidovanadium(IV), [VO(acac)$_2$] with ONS-donor Schiff base ligands HL in 1:1 mole ratio [where, HL= dehydroaceticacid-N-thiosemicarbazone, Hdha-tsc (I); dehydroaceticacid-N-4-methyl-3-thiosemicarbazone, Hdha-mtsc (II) or dehydroaceticacid-N-4-phenyl-3-thiosemicarbazone, Hdha-ptsc (III) in methanol for 15 minutes yields oxidovanadium(IV) complexes of composition [VO(L)(acac)]. Aerial oxidation of [VO(L)(acac)] for 5 days yields dioxidovanadium(V) complexes of composition [VO$_2$(L)(H$_2$O)]. The Synthesized complexes were characterized by physicochemical analyses involving magnetic measurements, infrared, electronic, ESR, NMR spectral, and thermal studies. Thermogravimetric (TG) curve was used to arrive at the insights of thermal stability of one of the synthesized complexes. The resulting pyrolysis was further manipulated to evaluate the related thermodynamical and kinetic parameters. Based on the thermal analysis order of decomposition (n), activation energy (E$_a$), entropy ($\Delta$S), free energy ($\Delta$G) and enthalpy changes ($\Delta$H) for each of the three stages of the thermal degradation/pyrolysis have also been evaluated.

DFT studies have been carried out for the two representative complexes 3 and 6. The molecular structures, infrared intensities, charge distribution and molecular orbital descriptions HOMO–LUMO, absolute electronegativity ($\chi_{abs}$) and absolute hardness ($\eta$), non linear optical (NLO) properties, NBO, MESP, were obtained for molecule using the B3LYP density functional theory (DFT) with the standard B3LYP/LANL2DZ basis set. The nonlinear optical properties viz., dipole moment ($\mu$), mean polarizability ($\alpha$) total first hyperpolarizability ($\beta_0$) are also reported. The stability of the molecule arising from hyper-conjugative interaction and charge delocalization has been analyzed using NBO analysis. The combined experimental and calculated results justify the proposed octahedral geometry of the compounds.

108. Copper (II) complexes as superoxide dismutase mimics for reducing oxidative stress: synthesis, spectroscopic, molecular structural and DFT studies

P.S. Jaget, R.C. Maurya, P.K. Vishwakarma and D.K. Rajak
The bioinorganic chemistry of copper(II) complexes that contains hydrazones derived ONO donor Schiff base ligand and substituted imidazole and benzimidazole ligands have been studied. The general composition formula as [Cu(dha-sahz)(L)], where (dha-sahz) = N-Dehydroacetic acid-salicylic acid hydrazide, L is H₂O, imidazole (imdH) or benzimidazole (bimdH). Spectroscopic, electrochemical and computational studies have been carried out for the synthesized copper complexes. The molecular structures, vibrational intensities, charge distribution and molecular orbital descriptions (FMOs, MEP) were obtained for molecule using the density functional theory with the standard B3LYP/LANL2DZ basis set. The nonlinear optical properties viz., dipole moment (µ), mean polarizability (α), total first hyperpolarizability (β₀) are also reported. The stability of the molecule arising from hyper-conjugative interaction and charge delocalization has been analyzed using NBO analysis. The combined experimental and calculated results justify the proposed square planer geometry of the compounds. The superoxide dismutase mimetic activity of the compounds is measured. The superoxide dismutase activity reveals that these two complexes catalyze the fast disproportionation of superoxide in DMSO solution.

109. Dioxidomolybdenum(VI) hydrazone complexes: synthesis experimental and theoretical spectral studies, molecular structural and NLO properties

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The synthesis and characterization of hexacoordinated cis-dioxidomolybdenum(VI) complexes of heterocyclic ONO donor tridentate Schiff base ligands were derived from dehydroaceticacid and hydrazides having general formula [Mo⁶O₂(L)(CH₃OH)] are reported. These complexes were obtained by the interaction of bis(acetylacetonato)dioxidomolybdenum(VI) with the said ligands in 1:1 metal-ligand ratio in methanol. All these complexes have been characterized by elemental analysis, ¹HNMR, IR, mass, electronic spectral and electrochemical studies. Molecular structure, natural atomic charges, HOMO- LUMO and molecular electrostatic potentials (MEP) were performed with the Gaussian 09 software package by using DFT methods with B3LYP hybrid exchange-correlation functional and the standard LANL2DZ basis set for a representative complex, [Mo⁶O₂(dha-sah)(CH₃OH)] (1). The experimental spectral analysis has been found in an excellent agreement with the theoretical results. The overall study has revealed that the complexes under investigation possess a cis-octahedral geometry.

110. Shoreline Change Detection using Multitemporal Satellite Data: a case study of Mhasla Creek Raighar District Maharashtra, India

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The combination of multi-temporal satellite imagery and geoinformatics can provide a better insight into the coastal dynamics study. Proper monitoring of the shoreline changes is an essential component of any kind of coastal management activities. This study aims to assess the rate of shoreline change over the past four decades (1978-2015) in the dynamic coastal belt of Mhasla creek from Murud at north to Dighi at south, using Landsat imagery and Digital Shoreline Analysis System.

The study concluded that this creek is accretionary in nature though the reason behind accretion and erosion in not stated as this shoreline change assessment is purely statistical. The scope of this study can be further extended with the calculation of Linear Regression Rate (LRR) of individual transects in DSAS for future shoreline prediction.

111. Enrichment of Cd, Cr and P band detoxification strategy in sewage- irrigated soil

Dinesh Mani, Chitranjan Kumar, Vipin Sahu and Bechan Singh

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Application of Sewage water for irrigation purpose has increased over the past years. Long-term use of sewage-sludge and improper management of agricultural lands can lead to elevated heavy metal concentrations in the soil resulting in a barren soil. The present investigation was carried out with a view to study the influence of different soil characteristics on enrichment of Cd, Cr and P band their detoxification strategy in sewage irrigated soil profiles of Allahabad region. It was observed that surface soils contained higher amount of DTPA-extractable heavy metals (Cd 3.00-3.20mgkg⁻¹, Cr 5.20-6.40mgkg⁻¹ and Pb 6.80-7.20mgkg⁻¹) and these amounts along with CEC[26.10 Cmol(p+)/kg] and organic carbon (OC) content (0.58%) decreased with the depth of soil profiles. Higher retention of these heavy metals was observed in the upper horizon in comparison to lower horizon which was closely correlated with the organic matter (OM) and CEC distribution in the profiles. The study showed ameliorative response of heavy metals in terms of higher OC and higher CEC contents of soils at their limited concentrations and deteriorative response in terms of lower OC and lower CEC contents of soils at concentrations higher than maximum permitted concentrations (MPCs). The authors emphasize for adoption of novel strategies through biological systems to detoxify heavy metals especially discharge of properly treated sewage and rapid detection of toxicants in consumable items, to achieve safe and secure soil environment.

112. Cadmium-Zinc interaction and Zinc solubilizing bacteria in relation to lettuce growth

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A field experiment was conducted on alluvial soil (ENTISOLS) of Sheila Dhar Institute Experimental Farm, Allahabad in order to find out the possible effect of Zinc and Zinc solubilizing bacteria *Enterobacter cloacae* Strain ZSB14 on Yield and uptake of Cadmium in Lettuce. Cd was applied as CdCl₂ @ 0, 20 and 40 ppm and Zn was applied as ZnSO₄ @ 0, 40 and 80 ppm. After 7 days of growth, the lettuce seedlings were inoculated with ZSB14 strain having a final Zn concentration of 0.1% at 30°C with a concentration of approximately 10¹¹ colony forming units (cfu) per ml. It was observed that Zn application up to 80ppm and inoculation of ZSB synergistically increased the yield of lettuce and decreased Cadmium concentration particularly in shoots of lettuce. However, application of Cadmium without Zinc and ZSB applications reduced the yield of lettuce and necrosis was observed on leaves of lettuce plants. The reduced uptake of Cadmium was observed in Zinc and
ZSB treated plots. The authors conclude to apply ZnSO$_4$ @ 80ppm along with ZSB inoculation to significantly reduce Cd uptake in shoots of lettuce grown in Cd-contaminated soils.

113. Pocket size fluorescence microscope

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Fluorescence microscopy has gained much attention from the life-sciences community since its inception. It has enabled high resolution imaging of protein molecular, DNA, cells etc. Though the advent of fluorescence microscope is common to the University research laboratories, it has limited accessibility to many bio-research laboratory and science students in colleges due to high cost and maintenance viability. We present a demonstration of portable fluorescence microscope assembled from common laboratory equipments and its application in fluorescence imaging of biological species. This setup can be easily constructed and implemented under resource limited schools and colleges with a similar efficacy to that of a bench top microscope.

114. Inter comparison of heat & CO$_2$ fluxes in crop & grassland ecosystems

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In the present study, we report initial results on analysis of carbon dioxide (CO$_2$), water vapor (H$_2$O), and energy fluxes (Latent heat flux (LE) & Sensible heat Flux (H)) over crop and grassland ecosystem in Nawagam, Gujarat and Chandan Jaisalmer, Rajasthan respectively during the June 2016 to December 2016 using Eddy Covariance flux tower datasets to study the seasonal variations of carbon dioxide fluxes due to soil and vegetation-atmosphere interactions as part of INDO-UK collaborative project INCOMPASS. It is observed that there is significant change in the H, LE, G, and CO$_2$ flux during the active vegetative phase (Aug.–Sept. 2016) due to phenological changes. For cropland system, LE was found to vary in the range of 200–300 Wm$^{-2}$ during the active vegetative phase followed by a decrease to 50-100 Wm$^{-2}$ towards ripening phase. In case of grassland system, the daytime LE has peak value of 150-250 Wm$^{-2}$ and for a shorter period.). Daytime H is in higher range of 100 – 250 Wm$^{-2}$ in arid grassland while it is in lower range of 10 – 50 Wm$^{-2}$ in cropland. The half-hourly measurement showed that maximum amount of CO$_2$ was sequestered for photosynthesis in crop land ecosystem (monthly mean of $-25 \mu$mol/m$^2$ /s) compared to grassland ecosystem (monthly mean of $-8 \mu$mol/m$^2$/s) during intense vegetative active period. The mean evapo-transpiration (ET) was estimated to be 11mm & 8mm in Nawagam and Chandan respectively during the observation period. The day daytime average Evaporative Fraction (EF) is found to be correlated with midday time EF which is an important observation when using satellite derived Evaporative Fraction (EF). More over Surface conductance for heat (H, LE) and mass (CO$_2$) exchange act as couplers between soil-canopy cover complex and atmosphere within surface layer of atmospheric boundary layer (ABL). These ground observed Fluxes will play an important role while comparing the simulated heat fluxes from different land surface models such as JULES, NOAH and NWP.
115. Evaluation of electricity generation by Microbial Fuel Cell from hypersaline Indian soda lake

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World has faced for more electricity generation and in search of alternative for the traditional sources and due to the lack and depletion of primary sources. Microbial Fuel Cells (MFCs) is an alternative source for the renewable energy and electricity generation. The objective of this study was to investigate the electricity generation from the extremophilic bacterium isolated from Lonar lake (India). A totally twenty eight bacterial culture were isolated, which ARS was selected for the further MFC was investigated. The two-chamber MFCs were used to conduct experiments. The MFC was constructed and measure the electricity generation after various intervals, 387mV was electricity was generated after 1h, but after 48h the electricity generation dramatically decreases 229mV. The effect of salt on MFC was also studied, NaCl enhanced electricity compared the KCl, indicating requirement of NaCl for bacterium ARS4 MFC. Supplement of glucose, increases electricity generation was found to be increases (170mV). Our results also suggest that seeking for and isolating novel bacteria that are more halophilic and alkaliphilic from Lonar crater could be a new strategy to generate bioelectricity from MFCs.

116. Fluorescence sensing of fluoride ions by C. dots synthesised from soyabean seeds

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C.dots are carbonaceous nanoparticles with size below 10nm. High photo luminescence, aqueous solubility, photo stability and non toxicity are some of the unique characteristics which makes C.dot acceptable compared to its semiconductor counterpart Q.dots. Since synthesized from natural sources using low cost and energy efficient method of synthesis, they are considered as green and environmental friendly fluorosensors. Use of C.dots for the fluoride (F⁻) detection has got its own importance. Anions are important targets for binding and detection due to their ubiquitous nature and public health relevance. Fluoride, for example, is of interest due to the importance of fluoridated water in promoting dental health but at the same time excessive amounts of fluoride, by contrast, can lead to fluorosis. Here C.dots are synthesised from soyabean seeds by microwave methodology and has been successfully applied for the detection of fluoride ions in presence of KMnO₄.

117. Controlled release of ibuprofen from pH and temperature sensitive modified agar based hydrogel

Pranjali Date

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Nowadays, pH and temperature sensitive hydrogels are preferred in drug delivery. Agar based hydrogels can be used as a drug carrier because it shows wide range of applications in biomedical and pharmaceutical field due to their important physical properties like biocompatibility and biodegradability.

Highly pH and temperature sensitive hydrogels, based on agarose (AG) and polyvinyl alcohol (PVA) were synthesized using a cross-linking agent (MBA). Prepared hydrogel was characterized by different techniques. The chemical structure of AG-g-PVA hydrogel was investigated by FTIR and surface morphology of that grafted hydrogel was examined by FESEM. Swelling behavior of the
prepared hydrogels in different pH media were studied at room temperature (RT) and at 37°C. Maximum swelling was observed at pH 7.4 and slow or controlled drug release observed at pH 1.2. Similarly the release behavior of ibuprofen (IBU) was studied at RT and at 37°C in different pH. Very slow and controlled drug release was observed in pH 1.2 due to high osmotic pressure and maximum release observed at pH 7.4.

118. Biofilm based biotransformation of hexavalent chromium into trivalent chromium

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Contamination with heavy metals represents highly hazardous threat for ecosystem and environment. There are two oxidation states of chromium; trivalent and hexavalent in soils and aqueous systems. Due to higher toxicity, the hexavalent form is of particular concern. The trivalent form of chromium, namely Cr (III), on the other hand, is about 1 000 times less toxic than Cr(VI). Among the several technologies proposed to overcome the threat, the bioremediation offers relatively safer, cleaner, cost effective, ecofriendly, and sustainable approach. The process of bioremediation utilizes the potential of various living entities, such as higher plants, algae, bacteria and fungi etc., and efficiently either remove the contaminants or reduce their bioavailability from the contaminated sites (both in situ and ex-situ). Microbes, in the form of biofilm on an appropriate substratum can execute the process more efficiently. Considering the said potential of microbes, we isolated different bacterial strains from semi solid industrial waste from Richai Industrial area of Jabalpur. The isolates were obtained by enrichment technique in M9 minimal media amended with Cr⁶ up to 3 generations. Almost all the isolates exhibited minimum inhibitory concentration in the range of 4.0-8.0 mM for Cr⁶. The ability of the isolates to form biofilm was determined using lignocellulosic substratum such as sugarcane bagasse. The bioremediation efficiency of the biofilm developed onto the substratum was quantified. Additionally, the PGP traits-nitrogen fixation, siderophore, EPS production, enzyme, sugar utilization etc., were also evaluated to determine the suitability for potential application in association with plant assisted bioremediation.

119. Toxicological evaluation of physico-chemical constituents of particulate matter

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Toxicological, clinical and epidemiological studies investigated consistent association between PM exposure and increased morbidity and mortality. Present study screened the PM₁₀ and PM₂.⁵ samples collected from Pune city for the extraction of their metal content, microorganisms and potential health risks associated with them. The average concentration of both PM₁₀ and PM₂.⁵ exceeded the Indian National Ambient Air Quality Standards. Various metals (Fe, Cr, Mn, Co, Cd, Ni and Pb) were found to be present in the PM of Pune. A concentration-dependent effect of PBS extracted PM samples was found in the A549 and Peripheral Blood Mononuclear cells (PBMC) treated with PM of varying concentrations, after 24 hrs of exposure. An average of 48 and 36 % of cell death was observed when cells were exposed to the 100 µg ml⁻¹ of the PM mass concentration. The cytotoxic effect of PM on A549, PBMC and RBC can be explained by the metal induced ROS associated with the inhaled particles which causes damage to the internal cellular structures and the surface of the cell membrane. PM samples showed a range of potency to produce reactive oxygen
species (ROS). Significant correlation was found between metals (Co, Cd, Cu, Fe, Ni, Cr) and ROS ($r = 0.65$-$0.74$).

120. Assessment of particulate matter bound microbes and their mitigation by natural polymer based nanofiber

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Exposures to particulate matter (PM) have been consistently related to increases in mortality and morbidity. Bio-aerosols which include bacteria, fungi and virus contribute to about 5-34% of indoor air pollution and are linked with various infectious diseases, respiratory diseases and cancer. In this regard nano fibers are an exciting new class of material which becomes very effectual for remediation of PM components. In the present study, CS-PVA (different ratio) and CS-PVA-MMT nano fibers were prepared by Electro spinning for the alleviation of PM Bound microbes. The morphological studies of the electro spun mats revealed that uniform bead-free nano fibers were formed with an average diameter of 236 ± 148 and 120 ± 110 nm in CS-PVA and CS-PVA-MMT. FTIR and XRD results showed the complete and successful blending of the polymers with each other and complete exfoliation of nano clays (MMT) in CS-PVA mixture as indicated by the absorption peaks corresponding to 469 and 512 cm⁻¹ observed in the spectrum of pure MMT and CS/PVA MMT respectively. Antimicrobial activity of both CS-PVA and CS-PVA-MMT assessed by optical density and disc diffusion method showed significant antibacterial properties. On comparing between CS-PVA and CS-PVA-MMT, the inhibition rate of microbial growth was found to be higher by CS-PVA-MMT which can be explained by the modification of the fiber in presence of MMT. Therefore, these nano-fibers can be useful for the purpose of mitigating environmental contaminants.

121. A comparison of chitosan (C) and chitosan-Poly Vinyl Alcohol (P) composite films for the extraction of Cr (VI) from aqueous systems

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Adsorption of Cr (VI) is a convenient way of its removal from waste water. In the present work four different films were fabricated and their Cr (VI) adsorption efficiency was compared. The films were pristine chitosan (C), glutaraldehyde crosslinked chitosan (C+G), chitosan+ Poly Vinyl Alcohol (C+P) and crosslinked chitosan + Poly Vinyl Alcohol film (C+P+G). Langmuir and Freundlich adsorption models have been studied. The sorption of Cr (VI) is maximum at acidic pH due to protonation of amino group in C however pristine C is soluble in acidic solution. Crosslinking decreases the solubility of C in acids. The percentage extraction of Cr (VI) for C+P (55 %) is lower as compared to C+G (95 %) film at pH =2. Temperature enhances the percentage extraction of Cr (VI) for C+G film however it reduces for C+P film due to solubility of P at higher temperature. P in the films does not contribute to enhanced Cr (VI) extraction but P imparts flexibility to the film due to which it can be reused till three cycles of Cr (VI) extraction whereas the C+G film lacks flexibility and turns brittle in the first cycle itself. Thus out of all the four films C+G+P was found to be reusable and gave maximum Cr (VI) extraction.
Synthesis of biological active new 3-arylaminophthalides and 3-indolyl-phthalides using ammonium chloride

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A new method for the synthesis of 3-arylaminophthalides and 3-indolyl-phthalides was developed through imine cyclisation using ammonium chloride. The reaction of o-phthalaldehydic acid with aromatic, aliphatic amines and heterocyclic amines gave 3-aryliminophthalides and 3-aminophthalides whereas reaction of o-phthalaldehydic acid with the indole gave 3-indolyl-phthalides with high yields.

Scheme: - Synthesis of 3-aryliminophthalides using ammonium chloride.

The development of new synthetic approaches for the efficient preparation of heterocycles containing phthalides is an interesting challenge since they show biological activities, such as antibacterial, hypotensive and vasorelaxant and anti-inflammatory in addition to their capacity to recover energy metabolism. Herein, we report an efficient synthesis of substituted 3-aryliminophthalides and 3-indolyl-phthalides, which were prepared via imine cyclisation using ammonium chloride as a catalyst at room temperature with excellent yields. The resulting amino phthalide compounds were evaluated for antimicrobial activity and were observed to possess excellent anti-tubercular activity. The in silico docking simulations are in coordination with in-vitro results.

Development of HPTLC-MS method for the estimation of salicylic acid in spices

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The aim of the present piece of work is to develop, simulate and validate a simple HPTLC based method for the detection of commonly used adulterant (Salicylic acid) in coriander powder and Garam Masala powdered spices. The separation and quantification of salicylic acid was carried out over aluminium baked HPTLC plates pre-coated with silica gel 60 F254s using optimized triphasic solvent system n-Hexane: diethyl ether: acetic acid (3:7:0.1; v/v/v) with saturation time being 5min. Validation of the method was carried out by checking its specificity, linearity, accuracy, inter and intraday precision, repeatability, limit of detection and limit of quantification in accordance with ICH guidelines. Ten samples each of coriander powder and Garam Masala powder were collected from market and tested for the presence of salicylic acid in them out of which four samples of coriander powder and three samples of Garam Masala were found adulterated with the target species. Camag TLC-MS interface was used to carry out the confirmation for the adulteration in samples. MS studies provides characteristic molecular ion peak of salicylic acid at m/e value of 137.19 confirming the adulteration in spices samples.
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