

DEVELOPMENT OF INFECTION-RESISTANT SURFACES FOR HUMAN HEALTHCARE SYSTEMS

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Dr. Bhuvanesh Gupta is the Founding President of Asian Polymer Association- a Society dedicated to the development of polymer science at the International forum. Dr. Bhuvanesh Gupta is the Professor of Polymers and Textiles at Indian Institute of Technology, New Delhi, India. Dr. Gupta did his PhD from IIT Delhi and spent two years as post-doc in Paris. Subsequently, Dr. Gupta worked for almost eight years in France, Sweden and Switzerland under different capacities in several laboratories.

Dr. Gupta initiated research career in the field of polymer functionalisation, biomaterials and tissue engineering. This work is being carried out in collaboration with University of Uppsala, Sweden and INSERM Paris, France. At the national level, the research collaborations are with AIIMS New Delhi, PGI Chandigarh, Panjab University Chandigarh, Jamia Hamdard University, NEHU, Shillong and Sikkim Manipal University, Gangtok. Dr. Gupta has been awarded medals at the University Level and has been granted several Visiting Fellowships in different European countries. He has been the member of DBT talk force of Government of India. He is the coordinator of the Indo-Italian Forum on Tissue Engineering. He is on the editorial board of seven journals and is associated with more than a dozen national and international societies, which includes Indian Plastics Institute and Fibre Forum India. Dr. Gupta has about 150 publications in International journals and more than 250 conference presentations in India and abroad along with 24 patents to his credit. Dr. Gupta has authored eight books published by International publishers and has been invited by several laboratories across Europe for delivering talks. Eight PhDs have been awarded their degrees and 12 PhD students along with several graduate students are still working on different areas of biomedical technology in the group of Dr. Gupta.

Infection is a serious problem in biomedical application of polymers. This infection can be fatal in nature and may lead to significant loss of lives together. This is where it becomes very important to have materials which are inherently capable of taking care of the infection. Polymeric materials, especially hydrogels and hydrocolloids have been a boon to human healthcare due to their very innovative and beneficial life support features. Hydrogel dressings retain moisture and warmth, have been shown to reduce the incidence of wound infection and are a more appropriate treatment than gauze dressings. However, the development of such materials requires a close collaboration between medicine, microbiology and materials chemistry.

The development of polymers with bioactive coating is an important area of research focused on solving the problem of contamination by infection in sutures and in wound care systems. We have observed that a bioactive component may be incorporated within the hydrogel matrix to make it infection resistant. Because of the inert nature of most polymers, they must undergo surface functionalization prior to attachment of a bioactive compound. The plasma functionalization offers an effective method by which desired features can be achieved on a

material surface. Desired chemistry can be generated on the polymer surface by appropriate selection of the gaseous medium and has been very effective in developing sutures and wound dressings. Herbal bioactive agents have been used for this application. Nanosilver nanohydrogels (nSnH) of poly(methacrylic acid) were synthesized and stabilized using gamma irradiation by water in oil nanoemulsion polymerization. Herbal materials such as *aloe vera* and *curcumin* have been observed to be very interesting components of a bioactive chemistry leading to the wound care dressings.

Herbal drugs can be incorporated into either natural hydrogels like pectin and carboxymethyl cellulose by blending approach. These dressings have been evaluated for their efficiency in wound healing using Swiss albino mouse. Excellent healing by hydrogel dressing has been observed with a complete control over the infection on the wound site.

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STATUS, PROSPECTS AND STRATEGIES FOR DEVELOPMENT OF ORGANIC BEEKEEPING IN HIMACHAL PRADESH

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Prof. Vinod K. Mattu is associated with Academic and Research world since last 35 years and his major areas of interest include Biodiversity, Sociobiology, Behavioural Ecology, Pollination Ecology and Acarology. He is consistently working for enrichment of discipline of Life Sciences and is devoted to preserve, protect and conserve the environment with a vision of Sustainable Development and services to mankind, due to which he has been honoured with 13 National and International awards including prestigious ZSI, IAES and Global Excellence awards. Presently he is Chairman of the Department of Biosciences, H.P. University, Shimla and earlier he headed the Institute of Integrated Himalayan Studies (IIHS) - A UGC Centre of Excellence in the capacity of Director. He has been teaching in the Department of Biosciences for the last 34 years and during his scholastic journey, he has guided 20 Doctoral and 38 M. Phil. students. Presently he is the Convener of Indian Chapter of Asian Apicultural Association, Japan; Executive Member of International Union for the Study of Social Insects (IUSSI), Netherlands and Member HP State Biodiversity Board and High Powered Committee on Climate Change. Recently he has been nominated as Executive member of Haryana Kisan Ayog and Senior Vice President of "The Association of Entomologists". Earlier he remained Member of International Task Force on Beekeeping Development in Asia (1998-2002), Governing Body, H.P. STEP, Himachal Pradesh University, Shimla (1997-2005), Renuka Development Board, Ministry of Environment and Forests, New Delhi (1999-2005) and many other National bodies. He is also associated with CARE International, New Delhi and ICFRE, Dehradun, Uttarakhand as a Project Consultant and Advisor, Research Board of American Biographical Institute. He is Editor of many International Journals published from U.K., France, Germany and Canada. Prof. Mattu is Fellow of 5 prestigious Scientific Bodies and life member of 24 Scientific Societies/Associations. He has to his credit 5 Books and more than 200 Research Papers and Review articles, published in Journals of International and National repute, in addition to several Monographs and Research reports.

Mountain regions all over the world not only represent the most spectacular of the ecosystems on earth but have historically been the habitat of flourishing civilizations. Today the entire Himalayan region is facing a near crisis situation, both economical and environmental. This is because of the increasing unsustainability of production potentials of the natural resource base as a result of demographic pressure and the emergence of new needs. In these mountain regions, pressure on land, always a precious and scarce source, has been mounting at an unprecedented rate. Consequently, serious environmental problems such as soil erosion, degradation of watersheds and catchments, deforestation etc. are cropping up in the mountain ecosystems. Mountain development strategies, therefore, need a reorientation in order to strike a satisfactory balance between population resource base and environmental health. Apiculture (beekeeping) is one such important resource base of mountain farming systems that offers specific advantages for developing sustainable agriculture. It is destined

to play a crucial role in the present context of commercialization of agriculture and liberalization of Indian economy. Bees and beekeeping also provide free ecosystem services in the form of crop pollination thereby helping in conservation of forest and grassland ecosystems. The role of beekeeping in improving the subsistence economy of farmers can not be overlooked as it has been linked with the socio-economic, cultural, religious and natural heritage of communities living in rural India. Therefore, it is fast becoming an important component of present day strategies for sustainable development and organic farming programmes.

Himachal Pradesh has very rich potential for the development of organic beekeeping because of ideal climatic conditions, multiplicity of flora and rich bee genetic resources. It is an important source of income for small and marginal farmers, landless labourers and others who live on, or near subsistence level. This cottage industry is creating off-farm employment and diversifying the economy of the region. All the four species of the genus *Apis* viz., *A. cerana* F., *A. mellifera* L., *A. dorsata* F. and *A. florea* L. are present in this region. The European hive bee, *A. mellifera* was introduced in mid-sixties in some parts of this region on experimental basis. But so far, this exotic species is doing well in the plain areas and is not adapting well to the higher altitudes due to a variety of reasons. On the other hand, native bee *A. cerana* is best adapted to its specific climate and environment and has many valuable biological and economic characteristics which have not been scientifically explored so far.

Native *A. cerana* is kept in both primitive traditional as well as modern bee hives by the farmers and beekeepers. Wooden boxes, mud receptacles, hollowed out logs, earthen pitchers and wall hives are traditional ways of keeping *A. cerana*, whereas, modern hives used for this species are movable wooden frame hives (called ISI villager's hive). *A. mellifera* is kept in standard Langstroth hives. The honey flow seasons in the hilly belts of this region are May-June and September-October, whereas, in the plain areas, the honey flow season varies from October to March depending upon the locality. The annual average honey yield from *A. cerana* and *A. mellifera* is 4 -10 and 10-25 kg per colony respectively. The major honey plants are: temperate fruits, agricultural crops, bushes, shrubs, forest and avenue trees. Amongst them: *Plectranthus* sp., *Brassica* sp., *Helianthus* sp., *Berberis* sp., *Medicago* sp., *Eucalyptus* sp., *Dalbergia* sp., *Toona* sp., *Pyrus* sp., *Prunus* sp., *Rosa* sp., *Acacia* sp., *Robinia* sp. etc. are some of the important honey plant resources.

The most dangerous enemies of honeybees in the Himachal Pradesh are parasitic mites, wax moths, predatory wasps, and birds. Among the important diseases, nosema, acarine and viral diseases are very prominent in this region. In recent years, Thai sac brood disease caused the major havoc to the beekeeping industry of *A. cerana* in India including Himachal Pradesh. Therefore, much encouragement was given for large-scale importations and propagation of exotic *A. mellifera* due to its certain desirable biological traits especially higher honey yields. At present, *A. mellifera* is doing very well in low and mid hills, but in hilly belts, *A. cerana* seems to survive and flourish best. Due to the large-scale propagation of *A. mellifera*, further research for improving beekeeping with *A. cerana* is being neglected, which may have serious consequences in long run. In the present paper, some practical measures have been suggested for the improvement of organic beekeeping in Himachal Pradesh in a sustainable manner.

Key words: Apiculture, Pollination, Honey, *A. cerana*, *A. mellifera*

ROLE OF MAGNETIC NANOPARTICLES IN THE IN ULTRA-HIGH FREQUENCY RANGE

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Professor Mahavir Singh commonwealth Fellow dedicated to the development of nano science especially role of magnetic nano particles in various innovative fields at the International forum. Dr. Mahavir Singh is the Professor of Physics at physics Department Himachal Pradesh University Shimla has recently joined as Vice-Chancellor IEC University Baddi Solan. Dr. Singh did his PhD from H.P. University in collaboration IIT Delhi and spent one years as commonwealth Fellow in Dundee Scotland UK. Subsequently, Dr. Singh worked for almost six months in Brest France, under visiting Professor.

Dr. Singh initiated research career in the field of magnetic nano particles and its engineering. This work is being carried out in collaboration with University of Brest, France and Dundee Scotland UK., At the national level, the research collaborations are with IUAC New Delhi, IUAC &CAT Indore, DRDO, Delhi University. Dr. Singh has been awarded Best Researcher Award from Governor (Chancellor) Himachal Pradesh and Global Achiever Award at the University Level He has been the member of MRS USA, EMSI of India. Dr. Singh has about 140 publications in International journals and more than 160 conference presentations in India and abroad. Twenty PhDs have been awarded their degrees and 8 PhD students along with several graduate students are still working on different areas of nano technology in the group of Dr. Singh

Miniaturized reconfigurable antennas with efficient electromagnetic performance at ultra high frequencies beyond 1 GHz are the necessity to fulfill the demand of fast developing wireless communication systems. Besides other magnetic materials, magnetic nanoparticles have been proposed as suitable magnetic materials for high frequency applications and diverting the research in the field of nanoferrites to the synthesis of magnetic nanoparticles with low magnetic and electric losses and high permeability and permittivity in the ultra high frequency range. In the literature nanocrystalline spinel Ni-Zn ferrites at higher frequencies are proposed as suitable candidates for several electromagnetic devices such as broadband transformers, modulators, antennas, high quality filters, high speed digital tape, etc. due to their high resistivity, low eddy current loss, high curie temperature, high permeability, etc. Another reported best suitable material that can meet the present need is Co₂Z hexanoferrite with excellent electromagnetic properties in the ultra high frequency region. Co₂Z hexanoferrite with high ferromagnetic resonance frequency and high permeability is suitable for inductor cores, antenna cores, electromagnetic noise absorbers, and other microwave devices that send, receive, and manipulate electromagnetic signals in ultra high frequency region. At such higher frequencies the real challenge is to control the magnetic and electric losses. Keeping in view these major challenges we seek to prepare low loss nanoferrites/magnetic nanoparticles for ultra high frequency antenna applications. We have reported the electromagnetic properties of substituted soft spinel nanoferrite (NZFO) and Z-type hexanoferrite (Co₂Z). Divalent ion dopants were incorporated into the systems NZFO and Co₂Z in order to obtain low loss nanoparticles with enhanced magnetic properties. These nanoferrites have been prepared via sol-gel auto combustion method.

IRON-CATALYZED OXIDATIVE CONDENSATION REACTIONS

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Dr. Gopalaiah Kovuru graduated from Sri Venkateswara University in 1998. He received his Ph.D degree from Indian Institute of Science Bangalore in 2005. Subsequently, he moved to the University of Paris-Sud, France for his post-doctoral studies to work with Prof. Henri B. Kagan, where he carried out asymmetric synthesis of nitrogen-containing biologically active compounds. He has been with the Department of Chemistry at the University of Delhi since 2010 as Assistant Professor. His research interests include C-H bond activation, transition metal-catalyzed organic reactions, heterocyclic chemistry and asymmetric catalysis. He has received Prof. Sudheer K. Banerjee Memorial Award - 2014 from Indian Council of Chemists for his outstanding contributions to research in the field of Organic Synthesis, Outstanding manuscript award from American Chemical Society in 2013. He has authored 30 journals and conference papers for his credit.

Oxidative condensation reactions towards C–C and C–heteroatom (N, O and S etc.) bond formations promoted by transition metals have attracted extensive attention in the past decades. Most of the efforts were focused on the use of noble metal catalysts, such as Ru, Rh, Pd, Ir, etc. However, the limited availability of these metals as well as their high price and considerable toxicity makes it desirable to search for clean, sustainable and environmentally friendly alternatives. Therefore, chemists are focusing their attention to the use of first-row transition metals, especially iron and copper, which have their own obvious advantages.¹

Iron is most abundant metal in Earth's crust (~ 4.7 wt %) after aluminium. Iron is cheap, less toxic, benign, shows variable oxidation states, and amenable to ligation with nitrogen-, oxygen- or phosphorus-based ligand sets. That the salts of iron function as good Lewis acids is an additional feature. Iron is present in many oxidative enzymes (oxidases) such as cytochrome P-450, nitrogenase and methane monooxygenase, which perform some of the most difficult chemical transformations with admirable ease. The desire to emulate iron-catalyzed biological processes *in vitro* constitutes one important source of inspiration for the iron chemistry.

In this presentation the use of iron catalysts for oxidative coupling reactions will be presented. Some novel approaches for the synthesis of benzimidazoles, benzoxazoles, benzothiazoles,² and bis(indolyl)methanes,³ will be discussed.

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NOVEL FERROELECTRIC MATERIALS AND THEIR COMPOSITE FILMS: AN INTRODUCTION

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Professor Neeraj Kumar has received his Bachelor's and Master's degrees from Rohilkhand University Bareilly in 1997 and 1999 respectively. He has awarded his Degree of Doctor of Philosophy (Ph.D.) from Indian Institute of Technology (IIT) Roorkee in Experimental Solid State Physics with "A" Grade in 2005. He has done some advanced research work at Pennsylvania State University USA during his Post-Doctoral Fellowship in 2006. He has been serving his duties as a Head in the Department of Physics at the Amity University Rajasthan, Jaipur since 2007. His area of research interest includes "Development and Characterization of Polymer – Ferroelectric Nanocomposite Films for Low Voltage Operated Devices. He has published his quality work in peer reviewed Journals of International repute like Journal of Applied Physics, Ferroelectrics, IEEE Transaction on Dielectric and Electrical Insulation, Journal of Phys. D: Applied Physics, Polymer Engineering and Science and many more. He has visited USA, China, and South Korea for his presentations as a speaker.

In the recent past, ferroelectric materials and its composite films have remarkable progress in the fundamental Physics of thin films with their wide variety of applications as ferroelectric electronic devices and arising photovoltaic devices. Ferroelectric materials belonging to the ANO_3 ($A = \text{Na, K, and Cs}$) family may be suitable for memory applications, giving high remanent polarization (P_r) and low dielectric constant. It is also not easy to fabricate these materials in the form of thin film due to their brittle nature. By considering the limitations of pure phase ferroelectric materials, recently the composite materials which contain two or more phases have been widely investigated for various applications.

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SELF-ASSEMBLY OBSESSED BIODEGRADABLE AND BIOCOMPATIBLE NANOMATERIALS FOR FAVORABLE GADOLINIUM ENSNARING

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Dr Pankaj Thakur has received his Masters and PhD (Chemistry) from Guru Nanak Dev University, Amritsar in 2005 and 2009 respectively. Dr Thakur is presently associated as Collaborator Scientist with the Italian Institute of Technology (IIT@CRIB), Naples (Italy) since 2012. In the year 2011, he initiated his Post-doctoral Research in European-Union funded TEAM Project at the Faculty of Chemistry, University of Warsaw (Poland). As Assistant Professor (Sabbatical), he is also concomitant with the School of Chemistry, Shoolini University, Solan (India) since 2010. Having a distinction of working in pharmaceutical majors Cipla and Dr Reddys Labs, Dr Thakur's present research endeavor at IIT@CRIB comprises the development of Theranostics nanocarriers for targeted drug delivery and Magnetic Resonance Imaging (MRI). His research interests also embrace semiconductor & inorganic nanomaterials for energy propositions.

Significantly, idyllic MRI contrast agents voluntarily paves the way to degradation and clearance from the body after its functions were over. Thus, biocompatible and biodegradable nanoparticles, possessing significantly low or trifling safety risks and convenient preparation in large quantities, have been suggested as novel candidates for molecular imaging contrast agents. Ethylene glycol based block copolymers are few of the commonly used polymers which allow the formation of a stable nano-particulate suspension in an aqueous solvent. A systematic variation in their chemical structure, composition, lyophilic character, size, and architecture; block copolymers offer advantages in tuning their shape and functionality in comparison to conventional amphiphiles such as low molecular weight surfactants and lipids.

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ORAL PRESENTATIONS

SECTION: A



CS/O/01

**SYNTHESIS, CHARACTERIZATION AND ANTIMICROBIAL ACTIVITY OF
SOME NOVEL 3-(2- BROMOACETYL) PHENYL BENZOATE
DITHIOCARBAMATE DERIVATIVES**

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3-(2-bromacetyl) phenyl benzoate is key starting material used in synthesis of phenylephrine, (R)-3-[-1-hydroxy-2-(methylamino)ethyl] phenol which is selective α 1-adrenergic receptor agonist used primarily as decongestant, as an agent to dilate the pupil, and to increase blood pressure. Hence the current research work was aim to synthesize a series of 3-(2-bromacetyl) phenyl benzoate derivatives by treatment of secondary amines with carbon disulphide and 3-(2-bromacetyl) phenyl benzoate in presence of strong base in ethanol afforded the corresponding Dithiocarbamates. Their chemical structures are characterized by ¹H & ¹³C NMR, MS, Elemental analysis, and chromatography methods (TLC). The antimicrobial activity was evaluated by their MIC and zone of inhibition by taking Gentamycin as standard reference. The microbial assay revealed that compounds D4 and D5 show the most potent antimicrobial activity, which may be a promising antimicrobial leading compound for the further research.

Key words: 3-(2-bromacetyl) phenyl benzoate, dithiocarbamates, carbon disulphide, antimicrobial activity.

CS/O/02

**MODIFICATION OF MILD STEEL SURFACE AND ITS CORROSION
PROTECTION STUDIES IN HYDROCHLORIC ACID MEDIUM**

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The modification of mild steel surface was achieved by immersion method using a condensation product formed between furfural and amino benzoic acid (FFBA). The product molecule possesses heterocyclic ring, imine group and -COOH group. The corrosion protection of modified mild steel surface was investigated using electrochemical method. The studies pertain to the effect of surface treatment time, concentration of the surface treatment solution, acid concentration and temperature. The results showed that the treated mild steel surface possessed good corrosion resistant compare to untreated mild steel. The corrosion protection was interpreted on the basis of formation of protective film on the modified metal surface, which isolates metal surface from the corrosive medium. Scanning electron microscopic analysis, FTIR spectra and UV-Visible spectral studies were carried out to confirm the formation of protective organic layer formed on the modified mild steel surface.

Key words: Corrosion protection, mild steel, polarization measurements, Tafel lines and SEM analysis.

CS/O/03

SYNTHESIS AND CHARACTERIZATION OF VANADIUM (III) HYDROXAMATE COMPLEXES

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The vanadium(III) hydroxamate complexes of composition $[V(HL^{1-2})_3]$ (I-II) ($HL^1 = 4-NO_2C_6H_4CONHO^-$; $HL^2 = 2-Cl-4-NO_2C_6H_3CONHO^-$), have been synthesized by the reactions of VCl_3 with three equivalents of potassium 4-nitrobenzohydroxamate, 2-chloro-4-nitrobenzohydroxamate ligands (KHL^{1-2}) in THF and characterized by elemental analyses, molar conductivity, molecular weight determination, magnetic moment measurements and spectroscopic techniques (FT IR, UV-Vis) and mass spectrometry. The magnetic moment and electronic spectra are consistent with +3 oxidation state of vanadium. The IR spectra and molecular modeling dynamics indicated bidentate nature of hydroxamate ligands involving bonding through hydroxylamine and carbonyl oxygen atoms (O, O coordination). The distorted-octahedral geometries around vanadium (III) have been proposed. Thermal behaviour of complexes has been studied by TG-DTA techniques. Complexes have shown single step decomposition yielding VO_2 as the decomposition product supported from FTIR spectra and XRD pattern of residue.

CS/O/04

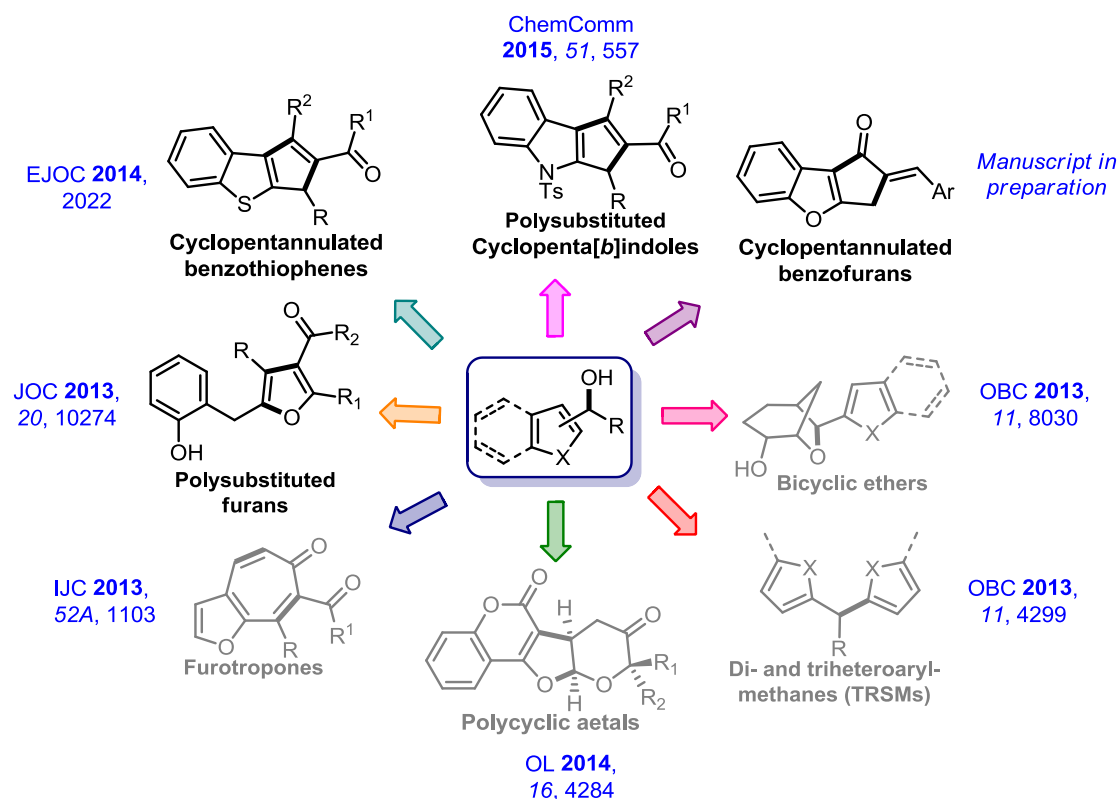
ON THE CYCLOPENTANNULATION OF HETEROARYLS

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Heterocycles are common structural motifs present in over 80% of the currently marketed small-molecule drugs in market. Artificially mimicking the heteroatom containing natural products present in biological systems such as nucleic acids, amino acids, carbohydrates, vitamins and alkaloids in a subtle manner can lead to potential new drug candidates. Our lab has been actively involved in developing new methods towards the synthesis of complex heterocycles starting from readily available precursors. Earlier, we have reported successful C-C, C-N, C-O, C-S bond forming reactions of heteroaryl carbinols. These findings were further elaborated towards the development of unprecedented strategies for the cyclopentannulation of heteroaryls. In this context, I am going to briefly talk about i) the discovery of an unprecedented (benzo)furan ring opening followed by furan recyclization leading to the formation of tri- and tetrasubstituted furans, ii) solvent-free Brønsted acid mediated cyclopentannulation of benzothiophenes, iii) synthesis of cyclopentannulated indoles via gold(I)/Brønsted acid relay catalysis, and related findings.



CS/O/05

USE OF D-GLUCOSE DERIVED NON – IONIC GEMINI SURFACTANTS AS REVERSE MICELLIZATION FOR ENCAPSULATION OF SOME D- AND L- AROMATIC α - AMINO ACID IN N- HEXANE

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Gemini surfactants are a relatively new class of amphiphilic molecules containing two head groups and two aliphatic chains, linked by a rigid or flexible spacer. They typically show greatly enhanced surfactant properties relative to the corresponding monovalent (single chain, single head group) compounds—surface activity can be increased 1000-fold. Reverse Micelles formed by surfactants can be used for selective solubilisation and reactions which exploit their nanometer size and mimic the membranous biological system i. e. Gemini Surfactants are typically employed to encapsulate some D- and L - Aromatic α – amino acids. Novel glucose derived Non – ionic Gemini surfactants having flexible aliphatic spacer with varying tail lengths of 12, 14 and 16 carbons have been synthesized in our laboratory. The structure and purity of these surfactants were confirmed using elemental analysis, ESI mass spectrometry and ^1H and ^{13}C NMR spectroscopy. These amphiphiles were explored as reverse micellization probes for encapsulation of D- and L – Aromatic α – amino acids viz. Histidine, Phenylalanine, Tyrosine, Tryptophan. These amino acid are encapsulated in the sequence Histidine > Phenylalanine > Tyrosine > Tryptophan. The effect of tail length of the gemini surfactants on encapsulation is also studied.

Key words: Reverse Micelles, Non – ionic Gemini Surfactants, Tail length, D- and L - Aromatic α – amino acids, flexible aliphatic spacer.

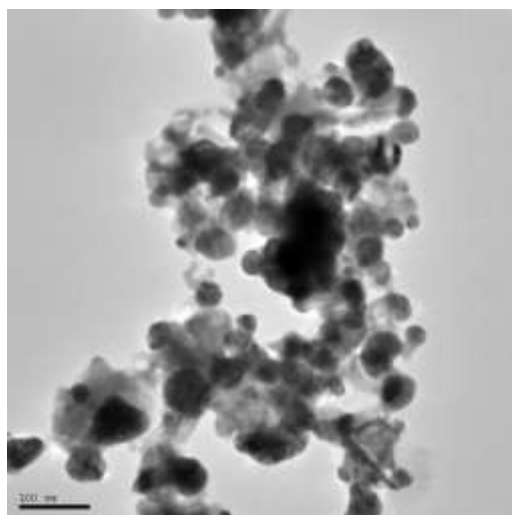
CS/O/06

RADIATION SYNTHESIS OF NANOSILVER NANOHYDROGELS OF POLY(METHACRYLIC ACID)

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Nanosilver nanohydrogels (nSnH) of poly(methacrylic acid) were synthesized and stabilized using gamma irradiation. The main objective of this study was to develop silver nanoparticles and to evaluate the antimicrobial activity. Radiation helps in the polymerization, crosslinking and reduction of silver nitrate as well. Highly stable and uniformly distributed silver nanoparticles have been obtained within hydrogel network by water in oil nanoemulsion polymerization and were evaluated by dynamic light scattering (DLS) and transmission electron microscopy (TEM) respectively.



TEM image of nanosilver nanohydrogel (nSnH) of poly(methacrylic acid) particles

TEM showed almost spherical and uniform distribution of silver nanoparticles through the hydrogel network. The mean size of silver nanoparticles ranging is 10-50 nm. The nanohydrogels showed good swelling in water. Antibacterial studies of nSnH suggest that it can be a good candidate as coating material in biomedical applications.

CS/O/07

**SYNTHESIS, CHARACTERIZATION AND KINETIC STUDY OF THERMAL
BREAKDOWN OF COPOLYMER DERIVED FROM 2,4-
DIHYDROXYPROPIOPHEONE, ADIPAMIDE AND FORMALDEHYDE**

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2,4-Dihydroxypropiophenone-adipamide-formaldehyde (2,4-DPAF) copolymer has been synthesized using the monomers 2,4-dihydroxybenzoic acid, phenyl hydrazine and formaldehyde in 2:1:3 molar proportions. The structure of 2,4-DPAF copolymer has been elucidated on the basis of elemental analysis and various physicochemical techniques, i.e. UV-Visible, FT-IR, ¹H-NMR and ¹³C-NMR spectroscopy. Detailed thermal degradation study of the new copolymer has been carried out to ascertain its thermal stability. Thermal degradation curve is discussed which shows three decomposition steps. The activation energy (E_a) and thermal stability calculated by using the Freeman-Carroll, Sharp-Wentworth, Freidman's, Chang and Coat Redfern methods. Thermodynamic parameters such as entropy change (ΔS), apparent entropy change (S^*) and frequency factor (Z) have also been evaluated on the basis of the data of Freeman-Carroll method.

CS/O/08

NANO ALUMINA AS REINFORCEMENT IN STYRENE- BUTADIENCE RUBBER

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Nano alumina (Al_2O_3) was prepared by gel combustion method. X-ray diffraction (XRD) and scanning electron microscopy (SEM) were used to characterize the nano alumina. The results show that the prepared alumina was in nano meter range. It was added as reinforcing filler in styrene butadiene rubber (SBR). Mechanical property improvements were achieved by the addition of low amounts of nano alumina along with maleic anhydride as compatibilizer. Method of preparing an emulsifier useable in emulsion polymerization processes, comprising the steps of subjecting rosin, polyunsaturated fatty acid or mixture thereof to disproportionation reaction, in the presence of a catalyst of iron iodide, and then neutralizing with alkali, and use of such emulsifier in emulsion polymerization processes.

CS/O/09

A STUDY ON MICELLIZATION BEHAVIOUR OF BILE SALTS (SODIUM CHOLATE AND SODIUM DEOXYCHOLATE) IN AQUEOUS SOLUTIONS OF OLIGOSACCHARIDE (MALTODEXTRIN) AT VARIOUS TEMPERATURES: CONDUCTOMETRIC APPROACH

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Specific conductance of bile salts i.e. sodium cholate (NaC) and sodium deoxycholate (NaDC) in aqueous solution of maltodextrin (0.5, 1.0 and 1.5% w/v) has been measured at temperatures 293.15, 298.15, 303.15, 308.15 and 313.5K. The critical micelle concentration (CMC) of bile salts has been determined from the plots of specific conductance (κ) vs [bile salts], in aqueous maltodextrin solution and explained in terms of hydrophobicity as well as hydrophilicity of NaC and NaDC in aqueous solution of these additives. The CMC values of both the bio-surfactants decrease with increase in percentages of maltodextrin. Thermodynamic parameters such as standard Gibbs free energy ($\Delta_{mic}G^{\circ}$), enthalpy ($\Delta_{mic}H^{\circ}$), and entropy ($\Delta_{mic}S^{\circ}$) of micelle formation have also been calculated to extract information regarding the nature of micellization of bile salts in aqueous solutions.

Key words: sodium cholate; sodium deoxycholate, standard Gibbs free energy; enthalpy; entropy; critical micelle concentration; maltodextrin.

CS/O/10

SYNTHESIS, CHARACTERIZATION, DFT AND X-RAY CRYSTALLOGRAPHIC STUDIES ON 6,12-DIHYDRO-5H-BENZO[F]THIAZOLO[2,3-B]QUINAZOLINE HETEROCYCLIC SYSTEM

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The quinazoline moiety is a building block for numerous naturally occurring alkaloids and drugs. The natural quinazolines and their synthetic analogs possess a variety of biological activities including antimalarial, anticonvulsant, antibacterial, antidiabetic, anti-inflammatory and anticancer. Further, thiazolidin-4-one and its derivatives extensively present in natural products are well known heterocyclic compounds with tremendous structural as well as pharmacological importance. In view of the wide spectrum activities of condensed 4-thiazolidinones it was thought worthwhile to undertake the synthesis of heterocyclic systems in which thiazolidin-4-one nucleus is fused to quinazoline ring affording synergistically more potent biologically active heterocyclic system. We report in this paper the synthesis of fused thiazolo-quinazoline system in which thiazolidin-4-one nucleus is fused with benzo[f]quinazoline moiety to yield two new heterocyclic systems as 12-(4-chlorophenyl)-

6,12-dihydro-5H-benzo[f]thiazolo[2,3-b]quinazolin-10(9H)-one and 13-(4-chlorophenyl)-6,9,10,13-tetrahydro-5H,11H-benzo[f][1,3]thiazino[2,3-b]quinazolin-11-one.

The regiochemistry of the cyclocondensation reaction of an unsymmetrical thione, obtained from condensation of 1-tetralone, p-chlorobenzaldehyde and thiourea in acidic medium, with bifunctional compounds such as haloacids and dibromoalkanes, is studied and the structure of regioisomers is established by spectral (IR, NMR and Mass), Computational and X-ray diffraction data.

CS/O/11

MORITA-BAYLIS-HILLMAN ASSISTED SYNTHESIS OF PYRAZOLE FUSED-AZEPINONE DERIVATIVES AS ANTI-INFECTIVE AGENTS

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Pyrazole derivatives occupies a significant importance in medicinal chemistry as they are gifted with many pharmacological activities including antianxiety, antipyretic, analgesic, PDE-4, anticancer, antimicrobial and anti-inflammatory. As a result there is continued interest to develop methodologies for preparing diverse pyrazole-based compounds. In the present work, the synthesis of pyrazolo[3,4-c]azepinone derivatives starting from bifunctionalised pyrazole aldehyde is described. Synthesis of bifunctionalised pyrazole derivatives was achieved via Vilsmeier Haack reaction of hydrazone derivatives that was generated on water. Next the pyrazole derivatives were subjected to MBH reaction with several activated alkenes in presence of DABCO under neat conditions. The resulting MBH adducts were further acetylated and subjected to substitution reaction with various primary amines to afford the expected substitution products which resulted in in situ cyclization to generate the desired pyrazolo[3,4-c]azepinone derivatives.

CS/O/12

IN VITRO RELEASE DYNAMICS OF MODEL DRUG ORNIDAZOLE FROM STERCULIA-PSYLLIUM BASED HYDROGELS

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The aim of this study was to investigate the swelling properties and drug delivery in polymeric hydrogels. Polymeric hydrogels consisting of acrylamide (AAm), psyllium and sterculia gum (psy-co-ster-cl-poly(AAm) hydrogel. Hydrogels containing different concentration of monomers were obtained. The reaction mixture was irradiated with gamma rays in ⁶⁰Co gamma chamber for different time (hrs) with different radiation dose (kGy). The polymers thus formed were stirred for two hours in distilled water: ethanol (1:1) to remove the soluble fractions in the polymers and were then dried in oven at 37°C. These polymers were named as psy-co-ster-cl-poly(AAm) hydrogels.

The hydrogels showed large extents of swelling in water, the swelling being highly dependent on the chemical composition of the hydrogels and irradiation. The polymers thus formed were stirred for two hours in distilled water: ethanol (1:1) to remove the soluble fractions in the polymers and were then dried in oven at 37°C. These polymers were named as psy-co-ster-cl-poly(AAm) hydrogels and used for drug delivery. Polymeric Hydrogels play an important role in drug delivery.

Key words: Radiation, acrylamide, psyllium and sterculia.

POSTER PRESENTATIONS

SECTION: A



CS/P/01

SYNTHESIS OF 4-{{(4-METHYL-COUMARIN-7-YL)AMINO]METHYL}- COUMARIN DERIVATIVES

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An efficient and simple method has been developed for the synthesis of 4-arylaminoethyl coumarins by the condensation of 7-amino-4-methylcoumarin to 4-bromomethylcoumarins. The advantages of this procedure are mild reaction conditions, high yields of products, and operational simplicity.

Key words: 4-bromomethylcoumarins, 7-amino-4-methylcoumarin, 4-{{(4-methyl-coumarin-7-yl)amino]methyl}-coumarin.

CS/P/02

ELECTROCHEMICAL SYNTHESIS OF COPPER OXIDE NANOPARTICLES: PHOTOCATALYTIC AND ANTIMICROBIAL ACTIVITY

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The electrochemical method has been investigated for the synthesis of copper oxide nanoparticles (CuO NPs) under different reaction conditions. The morphological features of the CuO NPs were effectively determined at parameters such as electrolyte, solvent, current, surfactants and reaction time. All the reactions were conducted at sacrificial copper anode and inert platinum cathode in undivided cell under amperostatic condition at room temperature. The results revealed the great impact of reaction parameters on the shape and size of CuO NPs. The nanoparticles were characterized by different techniques such as UV-Visible spectroscopy, FTIR, XRD, SEM, and TEM. The sizes of the CuO NPs obtained were in the range from 17 to 30 nm. The CuO NPs were used as excellent photocatalyst for the degradation of three different dyes under the illumination of sunlight irradiation. The highest degradation of 93% was observed for methylene blue as compared to methyl red (90%) and congo red (85%) respectively. The rate constant was found to be first order with values 0.02059 min^{-1} , 0.02046 min^{-1} and 0.01749 min^{-1} for MB, MR and CR, respectively. The antimicrobial efficiency of synthesized CuO NPs was investigated against different bacterial and fungal pathogens.

Key words: nanoparticles, Copper oxides, electrochemical, reaction parameters, antibacterial activity and photodegradation

CS/P/03

KINETICS STUDIES OF METHYLENE BLUE ADSORPTION ONTO GUAR GUM BASED SUPERABSORBENTS

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Grafting of itaconic acid onto Guar gum polysaccharide using ammonium persulphate as an initiator, hexa-amine as a cross linker and water as a reaction medium, was carried out under the influence of microwave radiations. A cross-linked network of Guar gum–itaconic acid was obtained. Different optimized reaction parameters for the graft copolymerization of Guar gum with itaconic acid were monomer concentration, initiator concentration, cross linker concentration, polymerization time, microwave power, amount of solvent and pH of reaction mixture to get the candidate polymer with maximum percentage swelling. Ggum-cl-poly(IA-ANI) interpenetrating network (IPN) was synthesized by a two-step aqueous polymerization method, in which aniline monomer was absorbed into the network of semi-IPN. The hydrogel structure was characterized by using techniques like Fourier transform infra-red spectroscopy (FTIR) and scanning electron microscopy (SEM). The adsorption kinetics of superabsorbent has been described by using pseudo first and pseudo second order kinetics models.

Key words: Guar gum, polyitaconic acid, swelling, thermal stability, dye adsorption, Kinetics.

CS/P/04

DEVELOPMENT OF ANTIBACTERIAL AND HYDROPHOBIC COCONUT FIBERS VIA LACCASE- CATALYZED BIOGRAFTING

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Biografting of different phenols (ferulic acid, syringaldehyde, eugenol and p-coumaric acid (PCA) was carried out onto coconut fibers. Reaction conditions such as laccase concentration, phenol concentration and incubation period were optimized. Laccase concentration of 40U/g was found to give the best results of biografting in case of PCA, ferulic acid and syringaldehyde and 80 U/g for eugenol at 24 h incubation period. Grafted coconut fibers were characterized by FTIR, SEM, XRD and TGA techniques, in order to know the grafting, change in morphology, crystallinity and thermal stability respectively. Hydrophobicity and antibacterial activities were found to be developed in biografted fibers as comparison to the untreated coconut fibers. PCA and ferulic acid has shown the best antibacterial activities against both the bacteria (*E. coli* and *S. aureus*) and maximum hydrophobicity has developed by PCA. It is analyzed that Laccase catalyzed biografting of natural fibers is a green method to confer fiber with new and beneficial properties.

Key words: Biografting, hydrophobicity and antibacterial activity.

CS/P/05

SYNTHESIS AND CHARACTERIZATION OF CORN STARCH/POLY(VINYL ALCOHOL) BIOCOMPOSITE BLEND FILMS

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Biocomposite films of starch/poly(vinyl alcohol) reinforced with delignified *Grewia optiva* fibre and methyl methacrylate (MMA) grafted fibres were prepared using citric acid as plasticizer and glutaraldehyde as the crosslinker. The biocomposite films were subjected to evaluation of mechanical properties, biodegradability and antibacterial properties. The biocomposite films were characterized by using Fourier transform infrared spectrophotometry (FTIR), scanning electron microscopy (SEM) and thermogravimetric analysis (TGA/DTA/DTG). Scanning electron microscopy illustrated a good adhesion between St/PVA blend matrix and fibres. The antimicrobial activity of biocomposite films against pathogenic bacteria such as *Staphylococcus aureus* and *Escherichia coli* was also explored.

Key words: Composites; thermal properties; mechanical properties; antibacterial activity.

CS/P/06

CHITOSAN-G-POLY(ACRYLAMIDE)/CUS NANOCOMPOSITE FOR CONTROLLED DRUG DELIVERY AND ANTIBACTERIAL ACTIVITY

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Chitosan-g-poly(acrylamide)/CuS (CPA/CS) nanocomposite have been utilized for control delivery of ofloxacin. The CPA/CS nanocomposites were characterized by Fourier transmission infrared spectroscopy (FTIR), UV-visible spectroscopy (UV), scanning electron microscopy (SEM), X-ray diffraction (XRD) analysis. From the FTIR spectra, the various groups present in CPA/CS nanocomposite were monitored. The homogeneity, morphology and crystallinity of the CPA/CS nanocomposite were ascertained from SEM/EDX and XRD data, respectively. The kinetics of ofloxacin drug delivery was investigated at different pH. The drug released studies at were investigated at different pH (2.2, 7.4 and 9.4) and time intervals (2, 4, 6, 8, 10, 12, 14, 16 h). The drug release behavior depends upon the pH of medium and the nature of matrix. The maximum drug loading efficiency of 85% was recorded for CPA/CS. The CPA/CS nanocomposites were also studied for their antibacterial activity against *E. coli* bacteria.

Key words: Chitosan, Nanocomposite, Ofloxacin, Acrylamide, Drug delivery, Antibacterial.

CS/P/07

PHYSICO-CHEMICAL STUDIES ON THE MICELLIZATION BEHAVIOR OF CATIONIC SURFACTANT (CTAB) IN AQUEOUS GLYCINE AT DIFFERENT TEMPERATURES

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The effect of glycine with varying concentration range on the micellization behavior of cationic surfactant, Cetyltrimethylammoniumbromide (CTAB) has been studied by using Density & Sound Analyzer (DSA-5000) and conductance measurements over a wide temperature range (25-40) °C at an interval of 5 °C. From density and sound velocity values, partial molar volume (Φ_v), adiabatic compressibility (β), and apparent molar compressibility (Φ_k) have been calculated. These parameters throw light on hydrophilic and hydrophobic interactions prevailing in amino acid–surfactant–water systems. The result shows the effect of amino acid on the micellization behaviour of cationic surfactant. The steric effect is predominant over hydrophobicity during the interaction process between glycine and CTAB. It is observed that at low concentration of surfactant, there is measurable electrostatic interaction among the charged site of glycine with the charged site of the CTAB leading to electrostatic binding but at higher concentration of the surfactant, micellization plays their major role. These all observations are also well justified with the conductance studies carried out between glycine and CTAB. The effect of temperature has also been studied.

Key words: CTAB, Glycine, Density and sound velocity, Conductance.

CS/P/08

ADSORPTION DYNAMICS OF CATIONIC DYES ON MARIGOLD (TAGETES ERECTA) LEAF POWDER

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This study reports on the feasibility of employing marigold (*Tagetes erecta*) leaf powder (MLP) as an adsorbent for the removal of cationic dyes such as Methylene blue (MB), Malachite green (MG), Rhodamine-B (RB), Brilliant green (BG) from aqueous solution. The MLP was characterized by Fourier transform infrared (FTIR) spectroscopy and scanning electron microscope (SEM). The effects of various parameters such as solution pH (2–7), MLP dose (0.5–3.0 g/L), ionic strength (0 – 0.1 mol/L), initial dye concentration (10–50 mg/L), temperature (303-323 K) and contact time on the adsorption system were investigated. The pH pzc of MLP and the optimum adsorbent dose was found to be 6.2 and 2 g/L, respectively. The extent of the dye removal increased with increase in the initial

concentration of the dye and the initial pH of solution. Adsorption data were modeled using Langmuir, Freundlich, Temkin and Scatchard isotherms and the constants of the isotherms were determined by using the experimental data. Available models like Lagergren's pseudo-first order kinetics, Ho's pseudo-second order kinetics and intraparticle diffusion were used to evaluate the kinetics and the mechanism of the adsorption. Negative values of Gibb's free energy change (ΔG°) showed that the adsorption was feasible and spontaneous in nature and negative values of enthalpy change (ΔH°) confirmed exothermic adsorption.

Key words: Adsorption, isotherm, kinetics, thermodynamics, ionic strength, *Tagetes erecta*.

CS/P/09

EFFECT OF MONO AND DI-SACCHARIDES ON THE CRITICAL MICELLE CONCENTRATION OF DTAB IN AQUEOUS SOLUTIONS AT DIFFERENT TEMPERATURES: A SURFACE TENSION STUDY

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Surface tension (γ) of cationic surfactant dodecyltrimethylammonium bromide (DTAB) in the presence of aqueous solution of saccharides (fructose and maltose) having concentrations 0.01 and 0.10 mol·kg⁻¹ have been measured at different temperatures (293.15, 298.15, 303.15, 308.15 and 313.15 K). The CMC values of DTAB in aqueous solutions of saccharides (fructose and maltose) have been calculated from surface tension values. It has been observed that CMC values decrease in the presence of added saccharides and the effect is more prominent in case of maltose. From the CMC values, parameters like surface excess (Γ_{\max}), minimum area occupied by the surfactant molecule at the saturated air/solution interface (A_{\min}) and surface film pressure (Π_{CMC}) have been computed. All the Γ_{\max} values are positive and decrease with rise in temperature, but increase with an increase in concentration of saccharides. This decrease in Γ_{\max} values with temperature in aqueous solution of saccharides may be due to involvement of both electrostatic and hydrophobic interactions in specific binding between surfactant and saccharides. The A_{\min} and surface pressure Π_{CMC} decreases with rise in temperature and increases slightly with concentration of saccharides.

Key words: Dodecyltrimethylammonium bromide; fructose; maltose; surface tension and surface excess concentration.

CS/P/10

VOLUMETRIC STUDIES OF DODECYLTRIMETHYLAMMONIUM BROMIDE (DTAB) IN AQUEOUS SOLUTIONS OF TETRAALKYLAMMONIUM BROMIDE SALTS AT DIFFERENT TEMPERATURES

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The density (ρ) and speed of sound (u) of a cationic surfactant, DTAB (dodecyltrimethylammonium bromide) (3.0 to 30.0) mmol·kg⁻¹ in the absence and presence

of $0.01 \text{ mol}\cdot\text{kg}^{-1}$ aqueous solutions of tetraalkylammonium bromide, R_4NBr (R= propyl, butyl and pentyl) have been measured over a wide range of temperature (293.15 to 318.15) K at an interval of 5 K. Various volumetric and compressibility parameters such as apparent molar volume (V_ϕ), isentropic compressibility (κ_S) and apparent molar adiabatic compression ($\kappa_{S,\phi}$) have been calculated using experimental data. Both V_ϕ and $\kappa_{S,\phi}$ vary non-linearly at lower surfactant concentration and tend to achieve linearity at higher concentration of surfactant in the presence of tetraalkylammonium bromide salts. It may be attributed that the dependence of V_ϕ and $\kappa_{S,\phi}$ on [DTAB] reflects the modification of water–water interactions described as hydrophobic hydration of the surfactant molecules on addition of quaternary ammonium salts. The κ_S values decrease linearly with rise in concentration of surfactant and temperature. The variation of all these parameters has been interpreted in terms of hydrophobic interactions between the surfactant and tetraalkylammonium bromide salts.
Key words: Density, speed of sound, DTAB, tetraalkylammonium bromide salt, hydrophobic interactions.

CS/P/11

INTERACTIONS OF DTAB WITH ANTIBIOTIC DRUG (AMIKACIN SULPHATE) IN AQUEOUS MEDIUM: A VISCOMETRIC STUDY

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Interactions of cationic surfactant–dodecyltrimethylammoniumbromide (DTAB) ($3\text{--}30 \text{ mmol}\cdot\text{kg}^{-1}$) with amikacin sulphate, an antibiotic drug (0.001 and $0.01 \text{ mol}\cdot\text{kg}^{-1}$) in aqueous media have been investigated by using viscosity measurement over a wide temperature range $20\text{--}40^\circ\text{C}$ at the interval of 5°C . Viscosity data have been used to calculate various parameters like viscous relaxation time (τ), relative viscosity (η_r), free volume (V_f), internal pressure (Π_i) and molar cohesive energy (MCE). Viscosity value increases with increase in concentration of surfactant; however it shows a decrease with rise in temperature. The increase in values of τ , Π_i and MCE with concentration of surfactant may be due to the formation of aggregates of solvent molecules around the solute, which in turn result in the structural rearrangements. This may be attributed to the presence of strong solute–solvent interactions. Viscometric studies clearly reveal the presence of electrostatic or ionic interactions between solute–solvent molecules.

Key words: Amikacin sulphate, DTAB, relaxation time, relative viscosity, free volume, internal pressure and molar cohesive energy.

CS/P/12

EFFECT OF ISO-PERTHIOCYANIC ACID (IPA) ON MICELLIZATION BEHAVIOUR OF SODIUM DODECYLSULPHATE IN DMSO

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The effect of a heterocyclic compound, iso-perthiocyanic acid (IPA) with different concentrations (0.01, 0.05, and 0.10 mol·kg⁻¹) has been studied on the micellization behaviour of sodium dodecylsulphate (SDS) (1-52 mmol·kg⁻¹) in dimethylsulphoxide (DMSO) by employing the conventional techniques density and speed of sound measurements over a wide temperature range (293.15-313.15 K). From density and speed of sound values, the critical micelle concentrations (CMC) have been determined, and the results have been discussed in terms of hydrophobic and hydrogen bonding interactions between SDS and IPA in DMSO. The density and speed of sound data have also been used to evaluate the volumetric and compressibility parameters like apparent molar volume (v_{ϕ}), isentropic compressibility (κ_s), and apparent molar isentropic compression ($\kappa_{s,\phi}$) to get more clear insight with regards to solute-solute / solute-solvent interactions existing in the present SDS-IPA-DMSO ternary system.

Key words: Sodium dodecyl sulphate, Iso-perthiocyanic acid, dimethylsulfoxide, CMC, micellization

CS/P/13

PHOTOCATALYTIC AND ANTIBACTERIAL ACTIVITY OF PECTIN - ZIRCONIUM (IV) SILICOPHOSPHATE COMPOSITE ION EXCHANGER

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Pectin - zirconium (IV) silicophosphate nanocomposite (Pc/ZSPNC) ion exchanger has been prepared using simple sol-gel method. Pc/ZSPNC was characterized using X-ray diffraction (XRD), scanning electron microscopy (SEM), transmission electron microscopy (TEM) and Fourier transform infrared spectroscopy (FTIR). Thermal stability, pH titration, elution concentration, elution behavior and distribution studies of Pc/ZSPNC were investigated. Pc/ZSPNC was found thermally more stable and retained 59% ion exchange capacity at 400^oC. Photo catalytic activity of Pc/ZSPNC was explored for the degradation of methylene blue (MB) dye in presence of solar irradiation. It was recorded that 97.02% of MB dye was degraded after 60 min of irradiation. The photo degradation of MB follows pseudo-first-order rate order kinetics with rate constant K of 0.0919 min⁻¹ and R₂ of 0.9977. The antimicrobial activity of Pc/ZSPNC was also ascertained against bacteria using well diffusion method.

Key words: Nanocomposite ion exchanger, photo catalysis, heavy metals, antibacterial

CS/P/14

**RHF AND DFT STUDIES OF THE VIBRATIONAL SPECTRA OF THE
GLUCOSAMINE AND GLACTOSAMINE**

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The vibrational frequencies for the fundamental modes and the low lying states of glucosamine and galctosamine at HF with different basis sets and DFT(B3LYP)/6-31G(d) have been performed. Net atomic charges, bond length, dipole moment and total energy of glucosamine and galctosamine were also compared in order to explore the finer details of these molecules. The calculated vibrational frequencies, so obtained, have been compared with experimental observation of IR spectrum. It is found that galctosamine is more stable than glucosamine taken for the present study. The order of the proton affinity of these biomolecules is Glucosamine > Galctosamine, which reveals that Glucosamine has greater tendency to form cation than Galctosamine. The atomization energies are found to be in the order of Galctosamine > Glucosamine, while for EA and IP the order is Galctosamine > Glucosamine and Glucosamine > Galctosamine respectively. The Ionization Potential, an amount of energy required to remove an electron from a molecule has greater value in Galctosamine explaining its stability in gaseous state as compared to Glucosamine. The ionization energy is thus, an indicator of the reactivity of a molecule in gaseous state. Comparison of the geometry of neutral and cationic form of Glucosamine and Galctosamine reveals that, cationic form of Glucosamine has more relaxed and stable geometry. As cationic form of Glucosamine is an open chain while in cationic Galctosamine, the amine group becomes ammonium (NH₃⁺), giving more reactive sites hence more reactive. Greater proton affinity and lower atomization energy values of Glucosamine than Galctosamine explains that why most of its products are widely used for the treatment of Osteoarthritis, because the oral Glucosamine supplementation really get to the right place in the joint to stimulate new cartilage growth.

CS/P/15

**VOLUMETRIC AND VISCOMETRIC STUDIES OF TETRAPENTYL
AMMONIUM IODIDE IN BINARY MIXTURE OF N,N-
DIMETHYLFORMAMIDE AND WATER AT DIFFERENT TEMPERATURES**

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Density (ρ) and Viscosities (η) of tetrapentylammonium iodide (Pen₄NI) in N,N-Dimethylformamide (DMF), Water (H₂O) and DMF + H₂O solvent mixtures containing 0, 20, 40, 60, 80 and 100 mol % of DMF at 298, 308 and 318K have been reported. The experimental values of Density (ρ) and Viscosities (η) were used to calculate the values of

the apparent molar volume (ϕ_v), partial molar volume (ϕ_v^0) at infinite dilution. The viscosity data have been analysed in terms A- and B- viscosity coefficients of the Jones Dole equation. Both A- and B coefficients have found to be positive over the entire solvent composition range at all temperatures. The activation parameters have been examined as a function of solvent composition to interpret the solution behaviour of tetrapentyl ammonium bromide (Pen_4NI) in binary mixture of DMF- H_2O . The behaviour of these suggests strong ion-solvent interactions in these systems and that Pen_4NI act as structure-maker in $\text{EMK}+\text{H}_2\text{O}$ mixed solvents.

CS/P/16

PREPARATION AND PHOTOCATALYTIC ACTIVITY OF ZnWO_4/CaO NANOCOMPOSITE FOR OXYTERTACYLINE REMOVAL

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The precedent work explains the solar light activity of CaO supported ZnWO_4 (ZnWO_4/CaO) for the removal of oxytetracycline (OTC). ZnWO_4/CaO was characterised by various spectral techniques such as scanning electron microscopy (SEM), tunnelling electron microscopy (TEM), X- ray diffraction (XRD), electron diffraction X-ray (EDX), Fourier transform infrared spectroscopy (FTIR) and UV-visible(UV-vis) analysis. The results indicated CaO with porous surface were well dispersed on the surface of ZnWO_4 . $\text{ZnWO}_4 / \text{CaO}$ exhibited rod like structure and length was varied from 45 nm to 147 nm and diameter from 26 nm to 36 nm. Both H_2O_2 and ZnWO_4/CaO had synergistic effect for the removal of oxytetracycline (OTC). It was observed that photocatalytic degradation of oxytetracycline obeyed pseudo first kinetics. The effect of process parameters such as catalyst loading, H_2O_2 , pH and solar light was studied. A significant removal of OTC was achieved in 60 min during simultaneous adsorption and photodegradation (A+P) using solar/ H_2O_2 ZnWO_4/CaO system. The oxidative removal occurred mainly through hydroxyl radical formation. ZnWO_4/CaO exhibited excellent photocatalytic property to remove selected pollutants in aqueous solution.

Key words: CaO Supported- ZnWO_4 ; H_2O_2 ; enhanced-photocatalysis; antibiotic removal; kinetics.

CS/P/17

AB-INITIO STUDY OF VIBRATIONAL SPECTRA OF ALANINE AND GLYCINE IN GAS PHASE

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HF and DFT calculations with different basis sets 6-31G, 6-31G(d), 6-31G+(d), 6-31G++(d), 6-31G(d,p) have been performed on the electronic structure and vibrational frequencies of alanine and glycine. Net atomic charges, bond length, dipole moment and total energy of these amino acids were compared in order to explore the finer details of these molecules. Further comparison of total energy from the ADMP calculations with DFT (B3LYP)/6-31G(d) level reveals the high reactivity of alanine as compared to glycine, as O-H bond of alanine dissociates at -323.636Hartree and N-H bond -284.314Hartree in 0.7 fs and 0.9 fs whereas there is no such breakage of O-H and N-H bond in glycine had found. All these observations show that the alanine has a greater tendency to form zwitterion than glycine.

CS/P/18

A MULTIPURPOSE CHEMICAL COMPOSITION FOR DETECTION OF FINGERPRINTS AT CRIME SCENES

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The simplest and most commonly used method for detecting latent fingerprints is powder dusting. This technique relies on the mechanical adherence of the detecting composition to the moisture content of sweat. Under the present work, a novel, fluorescent, non-toxic and cost-effective powder composition for detection of latent fingerprints has been developed. The fluorescent component of the formulation is the brilliant blue R stain. The powder, when suspended in water, along with a few drops of a commercial liquid detergent acts as a small particle reagent (SPR) and develops latent fingerprints on non-porous wet surfaces. The composition has multipurpose utility since in powdered state; it develops sharp and detailed fingerprints on an array of articles removed from conventional crime scenes, while in SPR state lifts clear fingerprints on moist non-porous items.

CS/P/19

PHOTOCHROMIC BEHAVIOR OF POT. HEXACYANOFERRATE (II) IN CRESOL RED SYSTEM

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Photochromism is a light induced reversible change of colour. Photochromic dyes are used in textile industries for evaluation of photochromic textile during traditional colour measurement. In the present paper the photochromic behavior of Hexacyanoferrate (II) in o-Cresolphthalein system was observed Spectrophotometrically. Hexacyanoferrate (II) ejects electrons, which abstracts H^+ from indicator molecule and this molecule of the indicator changes into their quinonoid form which is coloured. The effect of various parameters like pH, concentration of reactants, light intensity etc. was observed on photochromic behaviour shown by this system. A tentative mechanism was proposed for this photochromic behaviour.

Key words: Photochromism, phthalein, cresol red

CS/P/20

A BRIEF OVERVIEW OF BIOLOGICAL ACTIVITIES OF ORGANOTIN COMPOUNDS

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Organotin compounds have been broadly studied for the structural varieties, topologies and their biological activities. They are generally active towards antitumour, pharmacological, antiviral and antineoplastic activities. Many Organotin compounds have been evaluated for their in vitro activity against a large variety of tumor lines and have been found to be as effective as traditional heavy metal anticancer drugs such as cis-platin. It is well known that the biological activities of Organotin compounds are related to the type of alkyl groups attached to the tin atom. Trialkyl and triaryl compounds appear to be more contaminated than the tetra-, di-, or mono-compounds of the same chain length. Aryltin compounds are less toxic than alkyltin compounds. The trimethyl and triethyltin compounds are well absorbed from the gastrointestinal tract and are relatively toxic. Triethyltin particularly affect the white matter of the central nervous system. Most of the other alkyl and aryl tin compounds are poorly absorbed from the gastrointestinal tract, and are less toxic. Certain dialkyltin compounds have been shown to cause adverse effects on cell-mediated immunity, distinctively on the T cell lymphocyte.

It is elementary that research emphasize particularly of phenomena and processes rather than creation of a catalogue of comments, so that efficient management of ecological effects is possible before serious problems occur.

Key words: Organotin compounds, biological activities

CS/P/21

PREPARATION OF BSA-ZnWO₄ NANOCOMPOSITES WITH ENHANCED ADSORPTIONAL PHOTOCATALYTIC ACTIVITY FOR METHYLENE BLUE DEGRADATION

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This study explains the effect of adsorption on dye degradation using Bovine serum album and ZnWO₄ based nanocomposite (BSA-ZnWO₄). The synthesis of was performed by hydrothermal method involving the encapsulation ZnWO₄ with BSA. BSA-ZnWO₄ was characterized by SEM, TEM, XRD, FTIR and UV-Vis spectral techniques. The photocatalytic experiments were performed under solar light. The dye removal was investigated under different reaction conditions. The photocatalytic efficiency of solar/BSA-ZnWO₄ process was higher as compared to solar/ ZnWO₄, dark/BSA-ZnWO₄, solar /BSA, dark/ZnWO₄ and solar light systems. The simultaneous adsorption and photodegradation process (A+P) was the most efficient process due to rapid destruction of adsorbed dye molecules. BSA-ZnWO₄ showed superior degradation efficiency and reusability than ZnWO₄ for MB degradation.

Key words: BSA-ZnWO₄, photodegradation, adsorption, reusability.

CS/P/22

NOVEL SPION/B-CD CORE-SHELL NANOSTRUCTURES FOR OIL SPILL REMEDIATION AND REMOVAL ENDOCRINE DISRUPTOR MICROPOLLUTANTS

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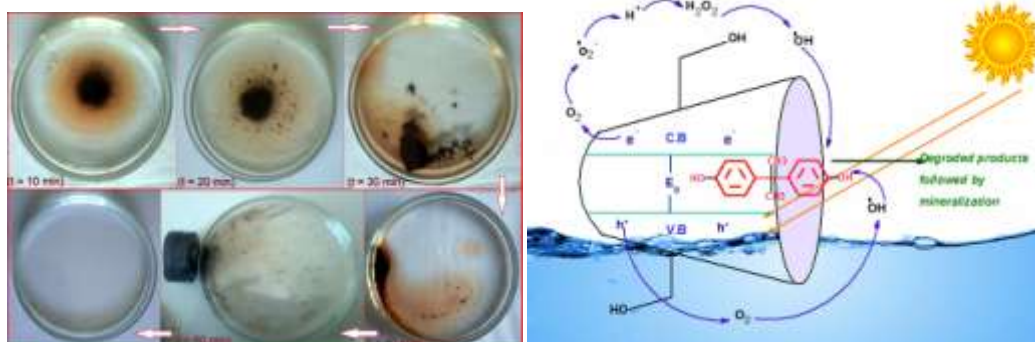
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Water contaminated by oil, dyes and micropollutant as Bisphenol A (BPA) pose challenges to the management of water resources.. Among various endocrine disrupting substances such as bisphenol A (BPA), estradiol, and estrone are typical emerging pollutants commonly found in water resources and industrial effluents. Used or spent oils discharge and oil spills in water bodies have led to overture of new undesirable pollutants which need to be treated because oils are toxic to flora and fauna of marine environment.

In this small scale laboratory experiment we report the synthesis of superparamagnetic iron-oxide nanoparticles (SPIONs) and their nanocomposite with β -cyclodextrin characterized by Fourier transform infra-red spectroscopy (FTIR), X-ray diffraction (XRD), scanning electron microscopy (SEM), energy dispersive X-ray (EDX), high resolution transmission electron

microscopy (HRTEM), small area electron diffraction (SAED), Photoluminescence, UV–Vis spectroscopy, Mossbauer and Vibrating Sample Magnetometry (VSM). Visible light assisted photooxidation of BPA was investigated in presence of SPION and β -CD. The treatment performances were evaluated in terms of BPA degradation using UV-Visible spectrophotometer, GC-MS, Total Organic Carbon analysis (TOC), COD analysis and CO_2 emission. An oil retention capacity of 7.2g/g of nanocomposite has been found. Interestingly, the higher removal efficiency and reusability studies confirm the suitability for oil spill remediation.



CS/P/23

A NOVEL METHOD FOR THE ESTIMATION OF ARSENIC (III) IN ORGANIC COMPOUNDS AND ITS COMPLEXES

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Oxidimetric quantitative determination of organic arsine and their complexes with tin(IV) and copper (II) has been done visually, potentiometrically and conductometrically. In each method, standard potassium bromated and iodate oxidant have been used in absolute alcohol medium. In these methods, known weight of organic arsines was dissolved in a mixture of absolute alcohol and concentrated hydrochloric acid. The resulting solution is titrated with standard potassium bromated and iodate as oxidants using CCl_4 as indicator in visual method. The results obtained by different method were compared which leads to authenticity of the result obtained.

Key words: Arsenic, Volumetric, Potentiometrically, Conductometrically

CS/P/24

SYNTHESIS, CHARACTERIZATION OF POLY(ITACONIC ACID)-BOVINE SERUM ALBUMIN FOR DRUG DELIVERY AND INACTIVATION OF BACTERIAL ACTIVITY

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Poly(itaconic acid)- bovine serum albumin (PIA-BSA) composite has been prepared at 60 °C in presence of ferrous ammonium sulphate and N-N-methylene bis-acrylamide as initiator

and crosslinking agent. The reaction mixture was heated at 50°C for one hour. The synthesized composite has been characterized using various techniques such as ultraviolet spectroscopy (UV), scanning electron microscopy (SEM) Fourier transform infrared spectroscopy (FT-IR), thermal gravimetric analysis (TGA) etc. The complex formed is further studied for its antibacterial activity and drug delivery behavior.

Key words: Itaconic acid, BSA, antibacterial activity, drug delivery

CS/P/25

DEVELOPMENT OF DEXTRAN/SOY PROTEIN ISOLATE/CHITOSAN MEMBRANES AS WOUND CARE SYSTEM

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Effective wound management requires not only the selection of an appropriate dressing but plays an important role in both recovery and esthetic appearance of the regenerated tissue. Dextran reduces the formation of vascular endothelial growth factors resulting in rapid angiogenesis and soy protein integrates into blood clots, stimulating collagen deposition, thus activating cells to produce new tissue with no need for expensive growth factors. In addition, chitosan induces the migration of polymorphonuclear neutrophils which aids in scar prevention.

This work focuses on the preparation of dextran/soy protein isolate/chitosan (D/SPI/C) membranes using solvent casting methodology. Soy protein isolate was used to reinforce the membranes and glycerol was used as the plasticizer. Dextran, soy protein and glycerol concentration were optimized to obtain membranes that can promote maximum regeneration. The membranes were further characterized using Scanning Electron Microscopy (SEM) and Attenuated Total Reflectance (ATR). Antimicrobial as well as Water Vapor Transmission Rate (WVTR) studies of the membranes were also conducted. This work could prove to be a major advancement in wound repair and management.

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CS/P/26

POLYACRYLAMIDE ZR(IV) VANADOPHOSPHATE NANOCOMPOSITE ION EXCHANGER AS POTENTIAL CANDIDATURE FOR DYE REMOVAL

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Polyacrylamide Zr(IV) vanadophosphate (PAM/ZVP) nanocomposite ion exchanger was synthesized using simple sol-gel method. The synthesized PAM/ZVP nanocomposite ion

exchanger shows high ion exchange capacity. Synthesis was ascertained by adopting various characterization techniques like SEM, FTIR and XRD. The synthesized composite can withstand fairly high temperature and as it retains significant ion exchange capacity up to 400⁰ C and its bifunctional nature was proved by pH titration curves. The XRD studies showed that the ion exchange is semi-crystalline in nature. Congo red dye was successfully degraded by it after its exposure to sunlight in two hours. It is clearly revealed that PAM/ZVP has good dye removing potential under coupled adsorption and photo degradation. The dye is adsorbed onto photocatalyst and simultaneously degraded under coupled conditions and this is responsible for good photo catalytic activity of nanocomposite. Thus it implies that PAM/ZVP is a potential advanced hybrid photo catalyst for environmental remediation.

Key words: Nanocomposite ion exchanger, congo red, photocatalyst, polyacrylamide.

CS/P/27

SUPERABSORBENT POLYMERS BASED ON POLYASPARTIC ACID AND 2-ACRYLAMIDO-2-METHYL PROPANE SULFONIC ACID FOR WOUND DRESSINGS

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Polyamino acids have been in focus for varied applications viz. drug delivery systems, tissue engineering applications, etc. Polyaspartic acids (PASP) have been explored as anti-scaling agents replacing polyacrylates. The market for superabsorbents is dominated by polyacrylates and polyacrylamide and their copolymers. It is a step towards green chemistry especially for their application in disposable medical products viz. diapers, wound dressings have led to development of different polymers be graft polymers, co-polymers and interpenetrating polymers¹⁻⁵.

In this study PASPs have been prepared by solventless technique. Superabsorbent polymers have been prepared using these PASPs and 2-acrylamido-2-methylpropanesulfonic acid and crosslinkers. Studies have been carried by varying the polymerization conditions i.e. time and crosslinker concentration. The prepared superabsorbents have characterized for water absorbency, swelling properties, absorbency under load (AUL), gel strength, absorbency under different conditions-salt, pH, temperature. The mechanism for absorption has been studied along with their antibacterial activity. The results have shown that this superabsorbent polymer can be used for wound dressings.

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CS/P/28

GRAPHENE BASED AU-TIO₂ (NR) NANOCOMPOSITE FOR EFFICIENT HYDROGEN PRODUCTION UNDER VISIBLE LIGHT IRRADIATION

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The pioneer work of Fujishima and Honda on photocatalysis of water into H₂ initiated the development of semiconductor (SC) based photocatalysis with maximum thrust on TiO₂ as a photocatalyst, but its band gap (3.2 eV) allow to absorb in UV region. Techniques like noble metal (Au, Ag and Cu) loading were used to enhance sensitivity of TiO₂ in visible region; these metals possess a strong absorption in visible region because of surface plasmon resonance phenomenon. Moreover, one dimensional nanostructure of TiO₂ like nanorods (NR), nanotubes and nanowires etc have been reported as best morphology for various photocatalytic reactions. Herein, we have synthesized graphene based Au (NR)-TiO₂(NR) photocatalysts by three step synthesis technique. TiO₂ (NR) were synthesized by microwave-assisted method, Au (NR) were synthesized by seed mediated approach and the Graphene-Au-TiO₂ nanocomposite was synthesized by microwave hydrothermal method. The above synthesized visible light active composite was characterized by techniques like UV-Vis, XRD, EDX, TEM etc. The effect of graphene introduction and Au loading on TiO₂ was studied for photocatalytic water splitting using sodium carbonate as electron donor. The loading of the Au (NR) which broadens the visible light response of TiO₂ due to the surface plasmon resonance (SPR) effect, and the introduction of graphene which functions as rapid electron transfer units, facilitating the space separation of photo electron and hole pairs. Optimized GC method was used for H₂ quantification with production of 150 μmol of H₂ after 4 hour visible light (50 mWcm⁻²) irradiation.

Key words: Photocatalysis, water splitting, H₂ production

CS/P/29

UNIFORMLY DISPERSED COINAGE METAL NANOPARTICLES IN MESOPOROUS SBA-15 FOR HIGHLY SELECTIVE NITROAROMATIC REDUCTION

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Coinage metal nanoparticles (Au, Ag and Cu) of different morphologies into the pores (~8 nm) of 3-aminopropyltriethoxysilane (APTES) modified mesoporous SBA-15 were prepared and their catalytic activity was evaluated for selective catalytic reduction of *m*-dinitrobenzene to phenylenediamine. Significant changes in the surface structural and physicochemical properties were revealed with the formation of metal nanoparticles within the sieves, as confirmed by XRD, TEM and surface area analysis. Metal nanospheres of size ~5 nm (Au), ~11 nm (Ag) and ~13 nm (Cu) were formed within the channels of SBA-15 while nanorods were also observed in case of Ag and Cu. The catalytic activity was found to depend on

nature, size and dispersion of metal nanoparticles relative to negligible reactivity of bare SBA-15. Au nanospheres (~5 nm) impregnated SBA-15 exhibited the best catalytic activity for *m*-dinitrobenzene reduction with 89% selectivity to *m*-phenylenediamine.

CS/P/30

COINAGE METAL-TiO₂ NANOCATALYSTS FOR HIGHLY EFFICIENT PHOTOCATALYTIC ACTIVITY UNDER SUNLIGHT IRRADIATION

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This study deals with the comparative report on the nature of the coinage metal NPs (Au, Ag and Cu) co-catalysts for enhancement of the photoactivity of TiO₂ under visible light irradiation. Coinage metal nanospheres of similar sizes (3-5 nm) were prepared using sodium citrate as a capping agent and characterized through UV-vis spectrophotometer, DLS and TEM analysis. These NPs were impregnated onto TiO₂ to produce metal-TiO₂ nanocomposites, operating efficiently under visible light owing to the surface plasmon resonance effect of metallic particles. The shift of optical band gap 3.2 eV of TiO₂ from UV to 2.9 eV in the visible region is ascribed to the strong plasmonic interaction between coinage metal and TiO₂ particles. The comparative impact of Au, Ag and Cu-TiO₂ nanocomposites was evaluated by utilizing them for the photodegradation of benzaldehyde and nitrobenzaldehyde. The average relaxation time $\approx 18 \mu\text{s}$ (bare TiO₂) < $24 \mu\text{s}$ (Au-TiO₂) < $27 \mu\text{s}$ (Ag-TiO₂) of photoexcited charge species revealed by current-voltage studies strongly established that Ag-TiO₂ interface acts as a better electron sink to capture and store photogenerated electrons, thus displaying superior photocatalytic activity than Au/or Cu-TiO₂ interface.

Key words: Metal-TiO₂ interface; Coinage metal-TiO₂ nanocomposites; Plasmonic interaction; Visible light photoactivity.

CS/P/31

STUDIES ON THE PHYSICO-CHEMICAL PARAMETERS OF DRINKING WATER BODIES OF SOLAN, HIMACHAL PRADESH

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The various physico-chemical parameters, which determine the quality of drinking water of three main sources, ground water supply (hand pumps), river water supply (tanks) and gravitational water supply (springs), of Solan District of Himachal Pradesh, collected from October 2006 to December 2007 have been studied. The physico-chemical properties such as temperature, iron, free chlorine, chloride (Cl⁻), sulphate (SO₄²⁻) and hardness, of the 45

samples are being studied and investigation shows that the water sources were safe for drinking when purified during that particular period.

Key words: Solan district (Himachal Pradesh), Physico-chemical Parameters, Drinking Water

CS/P/32

PREPARATION OF POLY (VINYL ALCOHOL) – G – POLY (N – HYDROXYL - ACRYLAMIDE) AND STUDY OF ITS METAL BINDING PROPERTIES

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Crosslinked poly (vinyl alcohol), preirradiated in air with r-rays, was grafted with ethyl acrylate in dioxane and water. A detailed study of grafting was made under various reaction conditions. The graft copolymer was treated with potassium hydroxamate in ethanol. The resulting polymer contained pendant hydroxamic acid groups (– CO – NHOH) and was studied for the formation of complexes with Fe (III), Cu (II) and Ni (I). The effect of pH on the metal ion uptake by the polymer was also studied.

CS/P/33

OPTICAL AND ELECTRICAL CHARACTERIZATION OF CADMIUM OXIDE NANOPARTICLES EMBEDDED IN CONDUCTING POLYMER

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Cadmium Oxide (CdO) nanoparticles have been synthesized by simple approach of sol-gel method at room temperature using cadmium acetate (precursor) and starch as stabilizing agent. The precipitate of cadmium hydroxide after hydrolysis by using ammonia was heated overnight and then sintered in muffle furnace up to 600⁰C steps so as to get the brown colour of CdO nanoparticles. Nanocomposites of Polyaniline with CdO nanoparticles have been synthesized by using free radical polymerisation method using APS as a free radical generator and HCl as dopant. The synthesized Nanocomposites were subjected for spectroscopic and structural characterization using FTIR, UV-VIS, SEM and XRD respectively. Nanocomposites show high electrical conductivity compared to pure CdO. The conductivity of Nanocomposites increases with increasing of CdO content because of the new conductivity passageways formed by embedded nanoparticles of CdO.

CS/P/34

PREPARATION AND STUDY OF RELEASE PROFILE OF ANTIHYPERTENSIVE DRUG RAMIPRIL THROUGH POLY-D, L-LACTIDE-CO-GLYCOLIDE POLYMER NANOPARTICLES

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The present study was done to sustain the action of antihypertensive drug ramipril for longer period of time, decrease in dose and reduce in side effects. Biodegradable polymer like PLGA was used to prepare polymeric nanoparticles for delivery of ramipril as an antihypertensive agent. Ramipril loaded polymeric nanoparticles were prepared by nanoprecipitation method using tribloere stabilizer kolliphore P-188 (K P-188). The synthesized particles were characterized for particle size, drug content and particle morphology. The average size of particles measured by DLS ranged from 120-156 nm having polydispersity in the range of 0.032-0.119 for different formulations. FT-IR for compatibility studies of polymer and drug was carried out. The nanoparticle morphology was observed by SEM and TEM and it was observed that maximum particles were nearly spherical in shape. The drug content and entrapment efficiency of the formulations obtained were up to 94% and 84% respectively. The in-vitro release study conducted for the formulations showed an initial burst release followed by sustained release up to 75% in phosphate buffer solution (PBS) at pH 7.3 for 24 hours.

CS/P/35

ROLE OF MORPHOLOGY AND SURFACTANTS ON THE DISPERSION STABILITY AND THERMAL CONDUCTIVITY OF WO₃ NANOSTRUCTURES BASED NANOFLUIDS

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With increasing thermal loads due to smaller features of microelectronic devices and higher power outputs, thermal management of such devices to maintain their desired performance and durability is one of the most important technical issues in many high-technology industries such as microelectronics, transportation, manufacturing and biomedical. A suspension of nanoparticles (Nanofluids) in a base liquids, have been found to provide a considerable heat-transfer enhancement compared to conventional fluids such as water and ethylene glycol¹. The efficiency of a nanofluid is highly dependent on minimum sedimentation of the nanoparticles and maximum flow that does not result in clogging of the device². Therefore, it is very significant to perform stability and dispersion studies of these fluids. This work presents the preparation of different shapes of WO₃ nanoparticles and investigates their effect on thermal conductivity of de-ionized. Experimental results showed that thermal conductivity increases (7-15%) with the increase in volume fraction (0.01-1%). The results also showed that choice of stabilizer for improved thermal conductivity and dispersion stability depend upon the nature of stabilizers and nanoparticles interaction with

fluids, Sodium dodecyl sulfate was found to be best stabilizer for WO_3 -de-ionized suspension as compare to other stabilizers (CTAB, Triton-x-100, PVP, PVA and Oleic acid).

CS/P/36

**FUROSEMIDE- CETYLTRIMETHYLAMMONIUM BROMIDE INTERACTIONS
IN AQUEOUS METHANOL SOLUTION CONTAINING FUROSEMIDE: A
PHYSICO-CHEMICAL APPROACH**

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The present study aims for the interaction of a cardiovascular drug, Furosemide with cetyltrimethylammonium bromide (CTAB) in aqueous solution of methanol (MeOH) by using density, speed of sound and conductivity measurements over a range of temperatures 20 – 40 °C at an interval of 5 °C. From these experimental measurements critical micelle concentration (cmc), standard Gibbs energy (ΔG_m^o), enthalpy (ΔH_m^o), entropy (ΔS_m^o) of micellization, apparent molar volume (\square_v) and apparent molar adiabatic compressibility (\square_k) have been calculated. The micellization of CTAB in these water-methanol-drug media have been found to be dependent on nature as well as the concentration of Furosemide. Moreover the CMC values shift toward lower concentration with increase in Furosemide content because of increase in hydrophobic hydration which is a characteristic of the Furosemide. The effects viz. solvent modifying tendency of alcohols and their tendency of penetration into the micelles have been used to interpret their effect on micellization of CTAB.

Key words: Furosemide, CTAB, Methanol, Conductance, Apparent molar volume, Apparent molar adiabatic compressibility

CS/P/37

**CHEMICAL, MECHANICAL AND ELECTRICAL PROPERTIES OF GLASS FIBER
REINFORCED COMPOSITES OF VINYL ESTER RESIN**

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Vinyl ester resins are one of the most common thermosets used as composite matrices and widely used materials in fabricating industrial equipment and structures such as absorption towers, process vessels, storage tanks, pipes, hoods, ducts and exhaust stacks . In the present paper studies on novel vinyl ester resin and their glass reinforced composites have been made. Vinyl ester resin was prepared by the reaction between synthesized epoxy resin with N-substituted phenyl amino maleamic acid. The synthesized resin was characterized by their elemental analysis and FT-IR studies. The curing study of prepared resin was monitored by Differential Scanning Calorimeter (DSC) and their kinetic parameters have been evaluated. Glass fiber reinforced composites have been laminated and characterized by chemical,

mechanical and electrical properties .The results shows that composites have good chemical resistant property, good mechanical and electrical strength .The unreinforced cured resins were subjected to thermogravimetric analysis (TGA). The resin show good thermal stability property.

Key words: Vinyl ester resins (VE), composites, TGA, DSC.

ORAL PRESENTATIONS

SECTION: B



ECOLOGICAL AND ECONOMICAL DEVELOPMENT OF COLD DESERTS OF HIMACHAL PRADESH THROUGH SEABUCKTHORN

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The cold deserts in India cover 74,809 sq km. These are characterized by subzero winter temperatures, high summer temperatures and precipitation in the form of snow. These are located in Leh and Kargil districts of Jammu and Kashmir and Lahaul and Spiti district with some parts of Chamba and Kinnaur in Himachal Pradesh. The economic growth of these areas is hampered due to a variety of biotic, abiotic, ecophysiological and social-political factors. The inaccessibility, harsh and inhospitable climatic conditions further jeopardize the pace of economic development. Cold desert areas have to be looked upon as ecologically varied and biologically diverse systems, unique in their own manner. Unfortunately, this ecologically fragile region is at the brink of environmental degradation due to a complex web of social, technological and environmental factors. There is a need to reinforce the traditional ethos and to build up a conservation society living in harmony with nature and making frugal and efficient use of resources guided by the best available scientific knowledge.

Choice of forest trees and species for agroforestry is very limited in cold deserts. Seabuckthorn (*Hippophae rhamnoides* L.) which taxonomically comes under the family Elaeagnaceae, is an ideal tree, well adapted to the local conditions. This versatile plant can be managed as a bush or a tree and possesses many qualities like Nitrogen fixing, fodder, fuel, timber, biofence, fruit, medicinal etc. At present, its use in agroforestry is limited. Seabuckthorn is only option and best choice in transforming the ecology and economy of the cold deserts suggesting new production systems for integrating this plant in the local agricultural practices. Seabuckthorn is one of the nutritious fruit among temperate fruits and it has worldwide distribution. It is widely distributed throughout the Indian himalayan region such as Himachal Pradesh, Uttar Pradesh and Jammu and Kashmir. It is being widely grown in China, Russia, Britain, Germany, Finland, Romania, France, Nepal, Bhutan and Pakistan at an high altitude of 2500-4300 meters. Of the total four species and nine subspecies reported so far throughout the world, three species and two sub species are found in cold deserts of Himachal Pradesh between an altitude of 1500-5500 meters above mean sea level.

The main aim of this paper is to highlight the harnessing potentials of the fruit in food and health security, because seabuckthorn berry contains enormous amount of vitamin –C and other nutritional components. The fruit is reported to be utilized in the preparation of beer, syrup, jam, squash, juice and ready to serve beverages, besides its use in pharmaceutical industry to prepare medicinal and cosmetic preparations University has undertaken extensive research work on seabuckthorn at Regional Horticultural, Research Station Tabo (Spiti) Himachal Pradesh by the authors under different adhoc funded projects on seabuckthorn during last 19 years on various researchable issues and presently work on genetic improvement of seabuckthorn is in progress.

**POTENTIALS OF BAMBOO RESOURCES FOR SOCIO –ECO - ECONOMIC
DEVELOPMENT OF HIMACHAL PRADESH**

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Bamboo is a precious gift of nature to human kind. It is woody grass belonging to sub-family *Bambusoideae* of family *Poaceae*. In most bamboo-growing regions of the world, bamboo provide ecological, economical and livelihood security to a large number of rural people, in particular tribals. There are about 1250 species of bamboos all over the world and only 130 species are found in India with more than half occurring in North East region. Bamboo resource base extends over 11.32 m ha under forests and private lands including homesteads which accounts for 16.7 percent of total forest area of country. Bamboo has been the traditional source of construction material, furniture, utensils, fodder, fuel wood, carbines, musical instruments as well as food and medicines for the rural poor, hence known as ‘poor man’s timber’. Bamboo is a versatile, renewable and sustainable resource. It grows very fast and reports growth of up to 10 cm per day. Such growth has never been surpassed by timber-yielding species. Bamboo extremely retains carbon and it has strong natural fibers which allow to develop industrialized products such as laminates, floors, panels, matting, pulp and paper, i.e. high quality products to be offered in local and international markets.

Bamboos are most useful in Agroforestry systems being fastest growing woody plant, more cellulose than average wood and wide adaptability. It is suitable for intercropping, wind break, planting in homestead and field bunds etc. It provides timber, forages, edible shoots, fiber craft wood and yields value added products. It also provides fodder during lean period. Bamboo has fibrous root system. Therefore, bamboo checks the soil erosion effectively. Bamboos are, thus planted along the stream bank and on eroded soil for stabilizing the soil.

The local genetic resources of the bamboos are not very rich. There is need to introduce and test species from tropical and sub-tropical areas of the country. The aim should be to introduce such species which will encourage cottage industry bases opportunities at the rural level. There is also urgent need to undertake genetic improvement programme as practically very little efforts has been made in this direction up till now. There is need to select and test fast growing genotypes of different types of lands. The planting stock improvement programme should be started to make superior planting material available to farmers as well as State Forest Department to improve the ecology of land in Himachal Pradesh through bamboo based agroforestry. The manuscript highlights the above all the aspects in detail for development and conservation of bamboo resources for environmental sustainability agricultural growth and food security.

LS/O/03

FISH BIODIVERSITY CONSERVATION ISSUES IN HIMACHAL PRADESH: AN OVERVIEW

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Himachal Pradesh is rich in water resources hence it is also rich in fish biodiversity. Himachal Pradesh has rivers like Sutlej, Beas, Ravi, Chandrabhaga etc., reservoirs and many streams. Catching the fish is allowed by the licensees only. Close season is being observed every year in the state, during this season no fishing is allowed. Conservation measures are being taken regularly by the state fisheries department. Catching a fish with a size, less than the legally fixed size is not allowed. Minimum water level should be maintained continuously, downstream to protect the fish species and other aquatic life. Essential record keeping is being done at all levels where fisheries co-operative societies are operating. State fisheries department is taking strict action against the persons involved in the illegal fishing or illegal trade of fish. Use of net with mesh size less than the fixed size is not allowed and such nets are confiscated by the fisheries department officials. Fisheries department also educate the fishermen about the fish conservation measures. There are different schemes for the welfare of fishermen which further helps in the fish conservation. Protection of habitat is essential for the conservation of fish biodiversity.

LS/O/04

BIODIVERSITY OF INSECTS FAUNA IN NORTH EASTERN HIMALAYA, INDIA: AN OVERVIEW

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The North Eastern (NE) India is transitional zone between the Indian, Indo-Burma-Malaysian and Indo-Chinese region and it comprises the Indian states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. The NE region is one of the bio-diversity hotspots; it is gifted with immense potential of natural resources and harbours the largest number of endemics and species than anywhere in the India. The climatic conditions of the region are favourable for the occurrence and multiplication of insects. The Biodiversity Strategy and Action Plan for North Eastern Eco-region of India suggested that 3,624 species of insects and 50 molluscs are recorded from this region. Despite of this fact, basic and fundamental research on bio-diversity of insects in this region is still lacking. Therefore, in order to map the bio-diversity, extensive surveys were undertaken in all the eight states of NE Himalaya to study the bio-diversity of insects. In this endeavour, more than 46,882 insect specimens from different agro-ecosystems of NE states were collected during 2003-2014 by applying various methods such as hand picking, net- swiping, light traps, attractants etc. and about 1300 species belonging to different orders were identified reliably with the help of standard taxonomic keys and preserved in the museum. The

identified insect species belongs to order Coleoptera (300), Lepidoptera (470), Hemiptera (65), Hymenoptera (50), Orthoptera (45), Diptera (35), Homoptera (43), Dictyoptera (4), Neuroptera (5) and other orders (283). Besides, rare moth species like Atlas moth (*Attacus atlas*) and Malaysian moon moth (*Actias maenas*) were also observed from this region. The identification and distribution maps for butterflies of this region were also developed for field level identification. Many species of agriculturally important insects as well as their host plants were recorded for the first time from the country. The information generated by this study would certainly provide foundation for further detailed studies on the diversity of insects in different ecosystems of NE Himalaya.

LS/O/05

STUDIES ON LASIOCAMPID MOTHS (LEPIDOPTERA) FROM NORTH-WEST INDIA (INDIA)

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The family Lasiocampidae is characterized by the absence of proboscis and maxillary palpi, labial palpi small to large, porrect or upturned, antennae bipectinate to apex in both sexes, sometimes reduced over the distal portion in case of male, those of the female usually less so, forewing with R_5 usually stalked with M_1 , M_2 stalked with M_3 or arises near its base, hindwing with Sc and Rs separate at base, sometimes meet again to form a humeral cell, vein M_2 arises from base of M_3 , frenulum absent, humeral lobe present, male genitalia with uncus and gnathos reduced, sometimes valva is also reduced, female with a terminal tuft on abdomen. Hampson (1892) reported twenty genera of the family Lasiocampidae from various localities of British India. Out of these, sixteen genera have been listed from North-West Himalaya. During the course of present systematic surveys from North-West India, a large number of tours were undertaken which result to the four genera belonging to this family were collected. Five species i.e., *Trabala vishnou* Lefebvre (Lasiocampinae), *Suana concolor* Walker, *Euthrix laeta* Walker, *Euthrix pyriformis* (Moore) and *Gastropacha pardalis* (Walker) (Gastropachinae) were collected from North-West India, out of which, the species *Euthrix pyriformis* (Moore) and *Gastropacha pardalis* (Walker) are described as new combinations. Besides giving morphological details, an illustrated account of the genitalia, keys to their subfamilies, genera and species is also provided.

LS/O/06

DEVELOPMENT OF POLLEN SUBSTITUTES & SUPPLEMENTS THAT MEET NUTRITIONAL REQUIREMENTS OF HONEYBEES

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Beekeeping is a scientific area in the field of Economic Zoology which comprises keeping and rearing of bees, management of their colonies for production of various bee products and

for its augmenting role in agriculture and horticulture. The beekeeping management essentially includes the objectives of enhancing or improving upon various factors necessary for honey bee colony growth and development, all round the year, in general and during dearth period, in particular. The provision of feeding artificial diet in form of sugar and pollen substitutes & supplements to honey bees is well known but it is not a common practice among beekeepers in India. A number of different feed substitutes have been tried with varying degrees of success by many researchers and beekeepers, looking at many factors like attractiveness to bees, palatability, nutritional value, digestibility (Haydak, 1936, 1967; Standifer *et al.*, 1960; Chhuneja *et al.*, 1993; Saffari *et al.*, 2004, 2010, Kumar *et al.*, 2014). Looking to the importance of pollen substitute for prosperous beekeeping and its commercial prospects, research work for development of various pollen substitutes and supplements to be fed during dearth periods was carried out in two different apiaries maintained at Panchkula & Gwalior. Locally available ingredients like defatted soy flour, parched gram, spirulina, sugar powder, protein powder & natural pollen were used to formulate the diets. Encouraging results have been obtained with a diet (defatted soy flour, parched gram, protein powder & sugar) with respect to the various colony parameters like brood rearing, egg laying, population and growth etc. Though, some more investigations are required to make this formulation commercially promising, it can be recommended to be used by beekeepers during dearth period.

LS/O/07

EFFECT OF STIMULANT FEED ON STRENGTH AND HONEY YIELD OF *APIS MELLIFERA* COLONIES

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Stimulation feed is necessary under Punjab conditions from mid Dec. to mid Jan. to make the colonies stronger and collect more honey from *Brassica* crops, however it is not compulsory to artificially feed a colony in agroecosystem, where there is abundant bee flora round the year. A study was conducted to test various types of stimulating feeds on *Apis mellifera* colonies. Different types of feeds were given to experimental colonies one month before honey flow season. Colonies which were fed with only pollen and honey with 50 per cent pollen, gave significantly excellent results as far as colony strength and honey yield was concerned followed by those fed with honey having 25 per cent pollen, honey only, honey water mixture (50 per cent) and sugar syrup (50 per cent). These results might be due to the fact that sugar syrup atrophies the hypopharyngeal glands of worker bees while amino acids present in pollen activate the above said glands so it is recommended on the basis of study that only pollen or pollen mixed with 50 per cent honey should be used as stimulant feed.

LS/O/08

ROLE OF GENITALIA IN THE IDENTIFICATION OF *CALLEREBIA* BUTLER SPECIES (LEPIDOPTERA : NYMPHALIDAE : SATYRINAE)

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The genus *Callerebia* Butler is represented by about 70 species from all over the world and 5 species from Indian Himalaya. The species of the genus are commonly known as The Arguses. The species are of moderate size, dark velvet-brown that are easily recognized by their hopping flight and rounded wings. The costa of the forewing is strongly arched, the apex of the upper forewing bears a prominent double-pupilled, tawny-ringed, apical ocellus and the upper hindwing with small one in interspace 2. There is at least one ocellus on the under hindwing, usually two near the tornus, and in one species sometimes a complete row. They fly at moderate elevations in the Himalayas, some preferring open country and others forest.

Identification of certain species and population complexes is, in fact, an intricate problem. The species of the genus *Callerebia* Butler have been incorrectly placed under the genus *Erebia* Dalman by previous workers. Owing to a lot of variations, different species/cryptic species of the genus *Callerebia* Butler were difficult to identify/separate. The males admit of ready identification from the characteristic forms of their genitalia. Though earlier authors have given interspecific keys but none has used the genitalic characters which are otherwise quite consistent in different biological species. Accordingly, besides updated key, and illustrated account of the genitalia and new distributional localities are discussed in present communication. The male and female genitalia of four species of the genus *Callerebia* Butler have been studied from Western Himalaya. The characters such as, the uncus, tegumen, aedeagus and the valva in the male genitalia and the corpus bursae, ductus bursae and genital plate in the female genitalia, play an important role in the discrimination of variable species of the genus *Callerebia* Butler.

LS/O/09

STATUS OF ORTHOPTERAN DIVERSITY IN REWALSAR LAKE AND ITS VICINITY DISTRICT MANDI OF HIMACHAL PRADESH

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Rewalsar Lake and its vicinity primarily symbolize one of most fragile ecosystem and supports rich and diversified faunal and floral diversity. It situated at 31°63' North latitude and 76°83' East longitude and at an altitude of 1360m, in district Mandi of Himachal Pradesh. The lake is shaped like a square with the circumference of about 735 m. It is held as a sacred spot for Hindus, Sikhs and Buddhists alike. There are islands of floating reed on Rewalsar lake and the spirit of Padmasambhava is said to reside in them. It is here that the sage Lomas

did penance in devotion to Lord Shiva, and the Sikh Guru Gobind Singh the tenth Guru of Sikhism, also resided here for one month. With water, woodland and high hills, it presents a variety of natural beauty. Various natural ecosystems/habitats were selected to explore the presence of orthopteran in studied area. Present bio-ecological studies on fauna of Rewalsar Lake and its vicinity revealed the presence of 46 species of insects belonging to 39 genera, 9 families and 4 superfamilies. During the course of present studies it was observed that Acrididae, represented by 20 species, spread over 18 genera and 10 subfamilies was the largest family of the orthopterans. Further, it was revealed that family Acrididae was followed by Gryllidae (8 species), Phaneropteridae (5), Pyrgomorphidae, Tetrigidae and Trigonidiidae (3 each), and Tridactyllidae (2). Moreover, it was interesting to note that four families of orthopterans viz., Conocephalidae and Eneopteridae were represented by a single species each.

Analysis of percent composition of different families of Orthoptera in different biogeographical zones showed that Acrididae in Rewalsar Lake constituted around (43%) of the total fauna, followed by Gryllidae (17%), Phaneropteridae (11%), Pyrgomorphidae, Trigonidiidae and Tetrigidae (7% each), Tridactyllidae (4% each), and Conocephalidae & Eneopteridae (2% each). Present investigations revealed that, there were 18 such species of orthopterans namely *Acrida exaltata*, *Phlaeoba infumata*, *Gastrimargus africanus africanus*, *Oedaleus abruptus*, *Spathosternum pr. prasiniferum*, *Atractomorpha cr. Crenulata*, *Chrotogonus (Chr.) tr. trachypterus*, *Ergatettix dorsiferus*, *Hedotettix costatus*, *Gryllus bimaculatus*, *Ducetia japonica* and *Letana despecta* etc., whose distribution ranged widely in the study area. The number of species in Rewalsar Lake and its vicinity showed a decreasing trend with increase in altitude.

The representatives of this group of insects have immense scientific, climatic, economic and ecological value. They can also be excellent bio-control agents and bio-indicators, as they can be recognised in the canopy at night without having resort to any trapping or landscape disturbance.

LS/O/10

**CURRENT UNDERSTANDING ON TUBER DEVELOPMENT, AND RECENT
ADVANCES ON SOME STRONG TUBER-EXPRESSED GENES IN POTATO
(*SOLANUM TUBEROSUM* L.)**

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Potato (*Solanum tuberosum* L.) is the most important non-grain food crop which comes only after wheat and rice in terms of total global food production. A potato plant tuberizes under short-day photoperiod and cool night temperature. Tuberization is a complex and highly coordinated morpho-physiological process which comprises the induction, initiation and growth of stolon, cessation of longitudinal growth of the stolon followed by its sub-apical swelling that leads to tuber formation. This entire process is influenced by the multitude of both extrinsic and intrinsic factors. Tuber development distinctly involves a large number of highly upregulated gene functions that lead to the accumulation of storage starch and a set of relatively abundant proteins namely proteinase inhibitors and patatin (a major ~40 kD glycoprotein). All these biological processes are being addressed prudently by many laboratories mostly at cellular, biochemical, genetic and molecular levels. Granule-bound

starch synthase (GBSS), an isoform of starch synthase, catalyzes amylose synthesis in all starch containing plant tissues including potato. Along with studying GBSSI allelic composition, we carried out isolation, sequence analyses and functionality of a few strong, tuber-expressed promoters corresponding to GBSSI and class I patatin genes from some commercially important Indian potato cultivars. These promoters would be useful in both basic and applied research.

LS/O/11

GAMMA GLOBIN GENE TRANSCRIPTIONAL STATUS NOT A RELIABLE INDICATOR OF HbF LEVEL IN HbE/ BETA THALASSEMIA PATIENTS

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β -thalassemia results in hemolytic anemia, ineffective erythropoiesis, and widespread complications. Higher fetal globin expression within genotypes reduces globin imbalance and ameliorates anemia. In the present study, genetic factors determining the difference in severity of anemia in beta-thalassemia/HbE disease have been studied. ARMS-PCR analysis revealed codon 26 (G>A) (HbE) mutation in 10.86 % patients of the Gwalior Chambal region of central India. The patients were seen to be compound heterozygotes for codon 26 (G>A) and a beta thalassemia allele. These HbE/Beta thalassemia patients presented with a variable thalassemia phenotype, which could be attributed to the other beta globin gene allele, the co-inheritance of alpha thalassemia, the level of AHSP or the fetal hemoglobin level. Although 60% patients presented with either XmnI and/or ApaI polymorphisms (both associated with elevated HbF), only ten percent of the patients showed slightly raised HbF, as revealed by HPLC and real time RT PCR analyses. Results suggest that since despite genotypes favouring raised HbF , most patients present with normal level of fetal hemoglobin, the gamma transcriptional status is not a reliable indicator of HbF level.

LS/O/12

HISTOPATHOLOGICAL CHANGES IN LIVER OF MICE EXPOSED TO DIFFERENT DOSES OF DICLOFENAC

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Non-steroidal anti-inflammatory drugs are the most frequently prescribed therapeutic agents used for the treatment of rheumatic diseases, because of having analgesic, antipyretic and anti-inflammatory actions. Diclofenac sodium is one of the most common non-steroidal compounds having inhibitory effect on prostaglandin biosynthesis. More research was

focussed on the toxicity of this drug due to its drastic effects on vultures which resulted in dwindling population of bird in the subcontinent. In the present study many deleterious effects were observed on the liver of mice, since it is the chief site of detoxification of drug. Diclofenac was administered at the dose rate of 4mg/kg body weight and 14mg/kg body weight and effects were observed after 7,14,21 and 28 days. The drug administration resulted in distorted hepatic architecture due to hepatic degeneration and formation of wide areas in the form of gaps. There was hepatic necrosis and periportal inflammation which indicated acute hepatitis.

LS/O/13

BIODIVERSITY: IMPORTANCE AND CLIMATE CHANGE IMPACTS

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Biodiversity is the variability among living organisms, including genetic and structural difference between individual and within and between individual and within and between species. Biodiversity plays a direct role in climate regulation. Biodiversity conservation will lead to strengthening of ecosystem resilience and will improve the ability of ecosystem to provide important services during increasing climate pressures. This review basically focuses on the importance of biodiversity, the consequences faced by the plants, animals, humans and ecosystem owing to the global warming and climate change and the possible mitigation and adaptation strategies in terms of biodiversity conservation which can protect the planet from the consequences of climate change.

LS/O/14

APICULTURAL STUDIES IN SHIMLA HILLS

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Apiculture is one of the integral components of mountain farming system that offers specific advantage for developing sustainable agriculture. Bee keeping products provide cash income and nutritive food items to the household besides pollinating agricultural crops. Pollination activity of honey bee is an important integration function as they contribute to the sustainability and diversity of agricultural and botanical resources in general and thereby contribute to increased productivity. Most of the fruit growers in Shimla Hills felt that lack of proper floral pollination was an important factor affecting apple productivity. The possible reason for pollination failure may be lack of appropriate ratio of pollinizer, scarcity of natural insect pollinators and unfavorable climatic factors. Most of the surveyed farmers knew that insecticides could kill honey bees and other useful insect polinators. Now many farmers have reduced the insecticide applications from 9-10 to 4-5 in a season. Most of the fruit growers in Shimla Hills were aware that the introduction of honey bee colonies in orchards at the time of flowering helped in fruit set and yeild. The fruit growers are using both native *A.cerana* and

exotic *A.mellifera* for polination purposes. But most of them have a preference for native *Apis cerana*. They are either maintaining honey bee colonies or hiding them during flowering period from govt. agencies or private bee keepers for pollination purposes. Despite the overall success in promoting honey bees as pollinator the survey indicared that some of the farmers still donot accept the potential role of honey bee pollination in enhancing fruit yeild.

LS/O/15

BENZENE EXPOSURE AND ITS TOXIC EFFECTS: A REVIEW OF EVIDENCE

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Benzene is a solvent of major industrial importance. It is generally used in laboratories, agriculture, Hospitals, textile industries, home products, in motor fuels; in inks, paints, plastics, and rubber; in manufacture of detergents, explosives, and pharmaceuticals. It also present in unleaded gasoline and cigarette smoke. Consumers may be exposed unknowingly in the home through the use of commercial products, which may contain benzene in concentrations of 10 to 100%. Benzene was found to be absorbed via ingestion, inhalation, and skin application. The metabolites responsible for its toxicity included muconaldehyde, quinines and free radicals. It is also enlisted as industrial chemical carcinogen showing genotoxic effects, a high incidence of chromatid aberrations, numerical autosomal chromosome aberrations in sperms and other chromosomal aberrations. This review attempts to summarize recent and well established advances in research regarding benzene toxicity and its clinical implications. Since exposure of consumers and general public to benzene and its subsequent toxicity, leading to the initiation and progression of several chronic and acute diseases cannot be prevented, this review represents a practical tool for early prevention of toxicity. However, further research is needed to explore the precise mechanism of action for benzene toxicity in physiological systems at the molecular level. A better understanding of its mechanisms of action is of major importance in order to devise therapeutic methods for benzene toxicity.

LS/O/16

ALIEN PLANT INVASION- A SERIOUS ISSUE

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Plant invasion refers to establishment and proliferation, in a particular geographical region, of species from different geographical regions, which spreads to an extent causing threats to biodiversity and ecological integrity of native ecosystem. The current review work discusses pathways, process and impact of plant invasion. Invasive species possess attributes like rapid growth, high reproductive capacity, efficient dispersal mechanism, wide ecological amplitude

and physiological adaptations which contribute to their ecological success and capability to invade new areas. Invasive species have enormous impact on our society affecting economic, social, and ecological aspects. They also negatively affect ecological integrity and poses threat to the native species. Of all invasive species *Ageratum conyzoides*, *Parthenium hysterophorus*, *Lantana camara* are among the most notorious alien invasive species posing a serious threat. Few neo invasive alien plant species are in the process of establishing and require immediate attention. Management and control of alien invaders is a challenge to the scientists, environmentalists as well as society. There is urgent need to make coordinated efforts to improve the understanding and assessment of invasive species impacts.

POSTER PRESENTATIONS

SECTION: B



LS/P/01

SCANNING ELECTRON MICROSCOPE STUDIES ON SOME IMPORTANT HONEY PLANT RESOURCES OF HIMACHAL PRADESH

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Scanning Electron Microscope (SEM) studies of about 34 important morphotypes belonging to 15 different families were conducted in order to determine the shape, size, aperture, surface pattern and exine complexity of pollen grains. The study of pollen grains using a scanning electron microscope (SEM) gave greater details and depth of focus than the ordinary light microscope. The pollen morphology varies among different plant species; occur in varying shapes and forms. They also show variation in symmetry, exine structure and sculpture. The study revealed that the species which belonged to family Asteraceae has echinate/spinolous pollen type; Fabaceae pollen types were prolate spheroidal or prolate and tricolporate; Lamiaceae pollens were hexacolporate and reticulate; Meliaceae were subprolate; Myrtaceae were parasyncoplate, tricolporate and have bilateral symmetry, whereas, Rosaceae and Spindaceae were 3- colporate pollens types. However, there is variability in the pollen type of the species belonging to families Cucurbitaceae and Lytheraceae.

LS/P/02

MELISSOPALYNOLOGY AND BEE BOTANICAL INVESTIGATIONS ON HONEY PLANT RESOURCES OF MANDI AND KULLU HILLS OF HIMACHAL PRADESH

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Melissopalynological studies were conducted on 59 honey samples collected from Indian hive bee, *Apis cerana* F. colonies located in 31 different localities of Mandi and Kullu hills of Himachal Pradesh with different altitudes and climatic conditions. Of these, 36 honey samples were analysed comprising of 19 summer and 17 autumn, from 18 different localities of Mandi hills of Himachal Pradesh. While, a total of 23 honey samples were analysed comprising of 12 summer and 11 autumn from 13 different localities from Kullu hills of Himachal Pradesh. Melissopalynological and bee botanical investigations revealed that *Helianthus annuus*, *Centaurea cyanus*, *Impatiens balsamina*, *Taraxacum officinale*, *Brassica campestris*, *Brassica* spp., *Prinsepia utilis*, *Raphanus sativus*, *Cucurbita* spp., *Cucumis sativus*, *Dalbergia sissoo*, *Trifolium* spp., *Acacia catechu*, *Aesculus indica*, *Woodfordia fruticosa*, *Robinia pseudoacacia*, *Moringa oleifera*, *Callistemon citrinus*, *Eucalyptus* sp., *Solidago* sp., *Mangifera indica*, *Syzygium cumini*, *Grevillea robusta*, *Salvia* spp., *Wendlandia heynei*, *Malus domestica*, *Eriobotrya japonica*, *Ehretia acuminata*, *Wendlandia* sp., *Prunus cerasoides*, *Prunus* spp., *Pyrus* spp., *Citrus* spp., *Salix* spp., *Grewia optiva*, *Psidium guajava*, *Litchi chinensis*, *Litsea polyantha* and *Sapindus mukorosii* were major sources of pollen and nectar to honey bees in Mandi and Kullu hills of Himachal Pradesh. Whereas, *Adhatoda vasica*, *Carissa caranda*, *Asclepias curassavica*, *Sesamum indicum*, *Dahlia pinnata*, *Cedrela toona*, *Ocimum* sp., *Zinnia elegans*, *Berberis* spp., *Gaillardia* sp., *Opuntia* spp., *Eruca*

sativa, *Cassia fistula*, *Albizia* spp., *Delonix regia*, *Rhododendron arboreum*, *Benincasa* spp., *Embilica officinalis*, *Acacia* sp., *Bombax ceiba*, *Erythrina suberosa*, *Elaeagnus* sp., *Campis grandiflora*, *Indigofera* spp., *Lagerstroemia indica*, *Abelmoschus esculentum*, *Chenopodium* sp., *Rumex* spp., *Althea rosea*, *Eupatorium* sp., *Butea monosperma*, *Hibiscus rosa-sinensis*, *Malvaviscus arboreus*, *Fragaria vesca*, *Pyrus pashia*, *Flacourtia indica*, *Mallotus philippensis*, *Rubus ellipticus*, *Murraya koenigii* and *Cannabis sativa* were the medium honey plant resources. Besides the above major and medium sources, 62 plant species in Mandi hills and 39 plant species in Kullu hills were identified as minor sources.

LS/P/03

PATHOLOGICAL INFESTATION OF APPLE DISEASES IN GRAM PANCHAYT PANJAIN (SERAJ –II) MANDI, H.P.

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Apple production is the mainstay of the economy of Himachal Pradesh. Apple is the oldest known fruit. In gram Panchayt Panjain cultivation of apple started before 40 years ago as a economical point of view. Narrow terraces and terrains, unique locational and climatic advantages favour farmers of gram panchayt to choose apple cultivation. Apple tree like other living organism are susceptible to wide variety of insects and diseases collectively called as pests. Several infectious diseases agents (biotic pathogens such as fungi, bacteria, viruses nematodes and mycoplasma) and non infectious factors (Abiotic factor such as temperature, moisture, nutrients, soil conditions and chemicals) can cause diseases on apple trees. Extent of diseases and insects in orchards depends on two main factors i.e. The environmental and Cultural Practices. Total 9 disease are identified in this study which affect various parts of apple plant. Study mainly based on collection of data from primary as well as secondary resources. The investment on apple orchards is profitable and it also provides more employment not only for people of this gram panchayt but also for the people of other area. Apple crop improves the economic condition of the people of this gram panchayt.

LS/P/04

ISOLATION AND OPTIMIZATION OF AMYLASE PRODUCING MICROORGANISMS FROM SOIL SAMPLES OF MANDI TOWN

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Amylases are the most widely used enzymes in industries as well as on commercial basis. Amylase production from the bacteria is economical as the enzyme production rate is higher in bacteria than other microorganisms. The present investigation was done by collecting 2-3cm deep soil from potato fields of Balh Valley of Mandi District of H.P. Isolation of

bacteria was done with enrichment technique followed by serial dilution of soil sample. Total sixteen bacterial colonies were isolated from the collected samples and were screened for amylolytic activity by starch agar plate method. Among 16 bacterial isolates, only 6 isolates showed amylolytic activity out of which one isolate was selected on the basis of maximum hydrolysis. The bacteria was identified as *Bacillus sps.* on the basis of morphology and biochemical tests. Maximum growth of the isolated bacteria was recorded at pH 7 and temperature 30°C.

LS/P/05

DIFFERENTIAL FREQUENCY OF BLOOD GROUPS IN DIFFERENT AGE GROUPS OF MANDI TOWN

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The Rh positive blood group comprised 91.9% and Rh-negative 8.1% of the overall study population. Blood group B Rhesus positive is the most frequent blood group in the entire population, while A, B, O and AB Rhesus – negative are least frequent blood group. This study provides information on the basis of different age groups (0-18 years, 19-45 years and above 45 years) distribution of ABO and Rhesus (Rh) phenotypes and alleles in the Mandi town population. In the study population in age group 0-18 B positive is dominant (38.33%). Same data is observed in age group 19-45 years i.e. B⁺ (40%). But in age group above 45 years the dominant blood is O⁺ (26%) as compared to B⁺ (23%). As the rarely occurring blood group according to above data, the collection of these blood units could be directed particularly toward people of that blood group. The predominance of the B phenotype is common in the majority of Mandi Town population, but there are some slight differences in the distribution of phenotypes A and B. To improve blood supply in Mandi town, according to WHO recommendation that in all there should be a National Blood Transfusion Centre aiming at implementing a coordinated blood supply across the country. As this data is population based and captures the full diversity of the population, it could greatly contribute to achieve the goal of the WHO recommendation in Mandi and as well as in Himachal Pradesh, specifically, to strategize donor recruitment policies to assure the availability at all the time of the low frequency blood groups. Knowledge of frequencies of the different blood groups is very important for blood banks and transfusion service policies that could contribute significantly to the National Health System.

LS/P/06

MORPHOLOGICAL AND BIOCHEMICAL CHARACTERIZATION OF ARSENIC AND CADMIUM RESISTANCE BACTERIAL ISOLATES

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In the present study, two bacterial strains ASIII and CDIII were isolated from soil samples collected from waste of heavy metal utilizing industries, Baddi. Based upon the morphological and biochemical characterization both the isolates were found to be non-motile, gram positive *bacilli* and motile, gram negative *cocci* respectively. Studies based upon MIC and MTC, SDS PAGE Analysis and Optimization of temperature and pH, strain ASIII tolerated maximum concentration of 8mM of arsenic whereas strain CDIII showed maximum tolerance of cadmium upto 0.5mM only, both the strains were mesophilic in nature having optimum temperature 37⁰C and pH 7 respectively. A band of approx. 80KDa was observed in CDIII strain in presence of cadmium which shows that a protein of about 80KDa was responsible for showing resistance to cadmium metal.

LS/P/07

HABITAT USE PATTERN AND IMPACTS OF OVERGRAZING IN KHOKHAN AND NARGU WILDLIFE SANCTUARIES, HIMACHAL PRADESH, INDIA

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Khokhan and Nargu wildlife sanctuaries (wls) are protected areas (14.94Km² and 278 Km²) adjacently located in Kullu and Mandi districts of Himachal Pradesh respectively at altitudes varying from 1700m to 4400m. The study area consists of Eastern part of both of these sanctuaries having three meadows Baggi, Munjhak and Nakalu, out of which Munjhak is located in Khokhan wls while other two are in Nargu wls. These meadows have nearby villages on lower slopes at 1600m to 2200m and villagers keep their cattle in this part of wildlife sanctuary. The main occupation of the local inhabitants is cattle rearing. The pastorals of Nargu wls area have grazing permits while for Khokhan wls has no grazing permits. The actual number of grazing animals is found to be three times the permitted number. They keep their livestock in these meadows during most part of the year except mid-December to February. Migrating shepherds also camp here for days during April-May and October-November months. These sanctuaries were visited four times in a year for observing habitat use patterns, biodiversity richness in terms of density, soil quality support for flora and fauna. Overgrazing was observed as a major threat to green cover and floral and faunal biodiversity along with soil erosion, loss in water holding capacity of soil, and water contamination. Prolonged grazing has led to the disappearance of many palatable plant species and subsequent dominance by less palatable species, herbaceous plants and bushes.

LS/P/08

ECOLOGY AND NESTING BEHAVIOUR OF *APIS FLOREA*

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A study was conducted on habitat selection and nesting behaviour of *Apis florea*. Combs were found in shrubs, trees, piles of dry twings and on man made structures. The colonies under experiment migrated seasonally. Comb size was recorded from 30 cm² to 900 cm². During month of Feb. and Sept. most of Combs had three to four layers of adult bees (strong colonies), in June and Dec. there was only one layer of bees and edge of Comb remained uncovered (weak colonies) and during remaining months colonies had moderate population (having two layers of worker bees). Colonies which were away from agriculture land were relatively strong. This might be due to excessive use of pesticides, weedicides and fungicides. Periphery of twings having combs varied from 3 to 23 cm. Combs were round, oval, semicircular in shape but most of them were asymmetrical. Only 25 colonies were directly exposed to Sun. Height of Combs varied from ground level to 15 feet but most of colonies (70 per cent) were found from ground level to height of 5 feet. Number of queen cells formed per colony varied from 5-7 while drone cell number was found between 50-90.

LS/P/09

ISOLATION AND OPTIMIZATION OF PROTEASE ENZYME FROM SOIL SAMPLES OF BALH VALLEY MANDI, H.P.

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One of the largest group of enzymes having vast variety of applications in detergents, leather, food and Pharmaceutical industry include proteases enzymes. In the present study various proteolytic bacteria have been isolated from soil samples collected from wastes of different butchery shops of different places from Balh Valley. Soil were taken from 2-3cm depth and kept in sterile plastic bags. Isolation was done by serial dilution of soil samples. A total of 19 bacterial colonies were isolated from the samples and then screening of proteolytic activity by casein supplemented nutrient agar plating method was done. Out of these 12 isolates only seven isolates have shown proteolytic activity. Proteolysis process was confirmed by the formation of clear zones of bacterial growth. Four proteolytic bacteria viz: *Bacillus stearothermophilus* and *Bacillus Flavobacterium* were isolated and identified on basis of the morphological and biochemical tests.

LS/P/10

PROTEASES ISOLATION AND SCREENING OF SOIL SAMPLES FROM MANDI TOWN, H.P.

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Proteases are the single class of enzymes that occupy a pivotal position with respect to their applications in both physiological and commercial fields. The aim of the present study was to isolate protease producing bacteria from soil samples collected from wastes of different butchery shops of different places from nearby Mandiand kotli town .Soil were taken from 2-3cm depth and kept in sterile plastic bags. Isolation was done by serial dilution of soil samples .A total of Fifteen bacterial colonies were isolated from the samples and then screening of proteolytic activity by casein supplemented nutrient agar plating method was done. Out of these fifteen isolates only seven isolates have shown proteolytic activity. Proteolysis process was confirmed by the formation of clear zones of bacterial growth. Two proteolytic bacteria *Bacillus coagulans* and *Bacillus subtilis* were isolated and identified on basis of the morphological and biochemical tests .The maximum optimal growth of the isolated bacteria was observed at 40⁰C ,after that there was a decline in growth at 50⁰C and 60⁰ C respectively.

LS/P/11

PREDATORY MITES (ACARI: PHYTOSEIIDAE) ASSOCIATED WITH SOME MOUNTAIN FRUIT CROPS OF HIMACHAL PRADESH

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Studies on Phytoseiid mites have been undertaken in different fruit growing areas of Himachal Pradesh during 2007-09. 15 species of Phytoseiid mites were found associated with some economically important fruit crops viz. Apple, Cherry, Guava, Kiwi, Peach, Pear and Plum. Out of which 10 species *Amblyseius(Amblyseius)herbicolus* Chant, *Amblyseius(Amblyseius)indirae* Gupta, *Amblyseius(Amblyseius)neorykei* Gupta, *Amblyseius(Amblyseius)paraarialis* Muma, *Amblyseius(Eusius)delhiensis* Narayanan and Kaur, *Amblyseius(Eusius)eucalypti* Ghai and Menon, *Amblyseius(Neoseiulus)indicus* Narayanan and Kaur, *Phytoseius(Phytoseius)neocorniger* Gupta, *Typhlodromus(Orientiseius)pruni* Gupta and *Typhlodromus(Orientiseius)rickeri* Chant were reported first time from Himachal Pradesh. 13 species were found associated with apple crop and most widely distributed species were *Amblyseius (Eusius) finlandicus* and *Amblyseius (Eusius) pruni*.

LS/P/12

PHYTOHORMONES INDUCED MORPHOLOGICAL CHANGES IN *FAGOPYRUM ESCULENTUM* MOENCH OF INDIAN HIMALAYAN REGION

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Fagopyrum esculentum Moench (buckwheat) is the most important and nutritious staple food crop of mountain regions having high nutritive and pharmaceutical value. It is major dietary source of rutin as well as a minor source of other flavonoids such as quercetin, myricetin, hyperoside (quercetin 3-O- β -D-galactoside), quercitrin (quercetin 3-O- α -L-rhamnoside, epicatechin and flavones C-glucosides. It is known for its medicinal uses like antioedema effect, reduces the risk of arteriosclerosis, antioxidant activity, gluten-free diets for people suffering from coeliac disease etc. A pot experiment was conducted in the natural conditions of net house of the Department of Botany, Shoolini University, Solan (HP), India, to evaluate the effect of exogenous application of plant Growth regulators on morphological parameters and biomass and productivity of plant. Four major hormones IAA, BAP, ABA and GA was used solely as well as in combination in concentration of 25, 50 and 100 ppm through foliar spray. The study revealed that that IAA+BAP combination was effective in generation of multiple branches, leaf number, inflorescence number, root length, leaf surface area and shoot dry weight. IAA+GA was effective in root fresh weight, root dry weight, shoot fresh weight, shoot dry weight, inflorescence no, stem diameter, leaf surface area, shoot length, root length, no of branches and internodal length. BAP alone significantly increased leaf no and no of branches. BAP+GA combination resulted highest value of internodal length, root fresh weight, shoot fresh weight and shoot length of plant. Combination of ABA+BAP and BAP+GA showed maximum no of nodes. Maximum leaf relative water content was found in plants treated with ABA+GA and IAA+BAP.

LS/P/13

ALTITUDINAL VARIATION OF SECONDARY METABOLITE PROFILE IN RHIZOMES OF *HEDYCHIUM SPICATUM*

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Hedychium spicatum Buch.-Ham. belongs to family Zingiberaceae, commonly known as spiked ginger lily, is found in the entire Himalayan region. The rhizomes of *Hedychium spicatum* are reported to have great medicinal value such as carminative, spasmolytic, hepatoprotective, anti-inflammatory, antidiarrhoeal, analgesic, expectorant, antiasthmatic, emmenagogue, hypoglycaemic, hypotensive, antimicrobial, anthelmintic, insect repellent etc. Secondary metabolites are responsible for medicinal activity of plants. Altitudinal variations which lead to various environmental stresses exert an outstanding influence on the biosynthesis of several secondary metabolites in medicinal plants. The levels and activities of a number of plant secondary metabolites are known to increase in response to increase in stress. In the present study the rhizomes were collected from three districts of Himachal

Pradesh namely Solan, Chamba and Shimla altitude ranging from 1000 -2600 mt. Further three sampling stations were selected in each district viz. Joana ji, Chail, Kasauli in Solan district, Silla, Gharmani, Tadgaon in Chambadistt. and Shimla, Narkanda and Taradevi in Shimla distt. The volatile essential oil from, rhizomes of *Hedychium spicatum* collected from three districts of Himachal Pradesh at different altitudes were analysed by gas chromatography (GC) and mass spectrometry (MS). The essential oils of the roots and rhizomes were marked by the presence of high amount of oxygenated monoterpenoids. The most abundant components of these oils were Eucalyptol, α -pinene, terpeniol and caryophyllene which were present in essential oils of rhizomes from all sampling sites. The maximum variation was seen in the oils collected from sampling sites with maximum altitudinal difference i.e. Narkanda (2600mt.) and Tadgaon (1100mt.). The geometric, gravimetric and frictional properties, of rhizomes of *Hedychium spicatum* obtained from three districts of Himachal Pradesh were studied and the rhizome from an altitude of 2000mt.(Chail) Solan distt. showed the best physical properties. These properties are useful for grading of rhizomes and the design of processing machineries. The moisture content of the rhizomes was determined before physical analysis of properties. The physical and biochemical properties of soils from which these rhizomes were collected were also studied to see the altitudinal variations in nutrients of soils which are essential for growth of a plant. Observing the medicinal and economical importance of the plant the aim of the present study was to determine the altitudinal variation of secondary metabolites in rhizomes of *Hedychium spicatum*.

LS/P/14

IMPACT OF ANTHROPOGENIC ACTIVITIES ON A WESTERN HIMALAYAN STREAM IN HIMACHAL PRADESH

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A fresh water perennial stream flowing in the vicinity of Solan town of Himachal Pradesh presents a unique opportunity to study the effects of urbanization on benthic macroinvertebrates as the stream originates in undisturbed catchment and then courses through areas with different population densities and inputs of pollutants from several sources before discharging into the river Giri which is tributary of river Yamuna of the Gangetic drainage system. Six months sampling at three stations was done from the month of August 2014 to February 2015. Five replicates were taken at each sampling station. The first sampling station is 300 metres from Barog railway station near Solan and is considered to be a pristine natural resource. The second sampling station is at Talheri Khad located about 14 kilometres from Solan town on Oachghat-Kumarhatti state highway near Shoolini University. The third sampling station is at Deothal which is 20 kilometres from Solan. Maximum surface temperature (21 degree Celsius) was observed in the month of August 2014 at station 2 and 3 and minimum (4 degree Celsius) at station 3 in the month of December 2014. Maximum dissolved oxygen (6.24ppm) was seen during the month of November 2014 at station 1 and minimum (1.43 ppm) at station 2 in the month of August 2014. The depth was maximum (16cm) at station 3 in the month of October 2014 and minimum (6.2 cm) was at station 1 in January 2015. Maximum flow was observed at station 3 in the month of October 2014 and minimum at station 2 in the month of December 2014. Maximum pH (8.41) at

station 2 in November 2014 and minimum pH (6.9) at station 1 in October 2014 and at station 2 in December 2014. Maximum salinity(3.4 μ S/cm)at station 2 in August 2014 and minimum (1.4 μ S/cm)at station 3 in January 2015. Calcium being maximum (92mg/l) at station 1 in January 2015 and minimum(58.06mg/l) at station 1 in August 2014. Hardness was maximum (407.5mg/l) at station 2 in January 2015 and minimum (230mg/l) at station 1 and station 3 in August 2014. Biochemical oxygen demand increased in December 2014 to 20mg/l at station 3 and was minimum (0.65 mg/l) at station 1 in August 2014. Phosphate being maximum (7.6mgP/l) at station 2 in December 2014 and minimum (.02mgP/l) at station 1 in August and September 2014. Total dissolved solids (58 mg/l) and conductivity (0.71 mhos/cm) was found to be maximum at station 2 in September 2014 and minimum(29mg/l, 0.35 0.71 mhos/cm) at station 3 in January 2015. Sodium being maximum (14mg/l) at station 2 in November 2014 and minimum(1mg/l) at station 3 in August and September 2014 and at station 1 in September 2014 while potassium was observed to be maximum (31 mg/l) at station 2 in August 2014 minimum (1mg/l) at station 1 in December 2014. Alkalinity was observed to be maximum (208 ppm) at station 2 in January 2015 and minimum (59 ppm) at station 1 in August 2014. Free carbon dioxide (36 ppm) was seen at station 2 in December 2014 and 6 ppm at station 3 in January 2015. No free carbon dioxide was observed at other stations. The results hence infer maximum anthropogenic activities at station 2 in December 2014 according to the level of phosphate and at station 3 in December 2014 according to Biochemical oxygen demand. The various physicochemical parameters interpret station 1 to be minimally impacted and hence continues to be a natural pristine resource.

LS/P/15

SOIL CARBON STORAGE IN TREE PLANTATIONS ON MODERATELY ALKALI SOILS IN NORTH-WESTERN INDIA

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Seasonally dry forests cover more than 42% of the total area of tropical forests worldwide. These forests are considered to be highly threatened and are attracting the attention of workers for their sustainable management and conservation. Large scale deforestation is the major causes for increasing CO₂ in the atmosphere. Plantations are good sink of carbon to facilitate carbon store in the soil as well as in biomass, therefore, increase in the carbon as CO₂ in the atmosphere can be stabilized. The objective of the study was to analyze the spatial variations in carbon pools in the tree plantations, carbon storage in soil aggregates and the role of clay mineralogy in soil carbon stability. The study was carried out on tree plantations of *Eucalyptus tereticornis*, *Prosopis juliflora* and Natural forest located at Saraswati Reserve Forest, Kurukshetra (29⁰59'N, 76⁰31'E, 247m above msl) in north-western India. The climate of the study area is tropical monsoonal and semiarid. Tree density was 468.75 to 581.25 trees ha⁻¹ in the tree plantations (*Eucalyptus tereticornis* and *Prosopis juliflora*) and the natural forest. Total biomass carbon stock ranged from 153.36 to 235.08 Mg ha⁻¹. The soil carbon stock upto 60cm soil depth (Mg C ha⁻¹) was: organic carbon 34.58 to 41.95, inorganic carbon 12.48 to 20.51. The microaggregates (250 μ m, 53 μ m and <53 μ m) formed a large fraction of soil aggregates and protected most of the soil organic carbon in the soil. The XRD pattern of soil clay showed the predominance of Illite, Montmorillonite, and Kaolinite, which play an important role in soil carbon stability. The tree plantations showed large potential for carbon

storage in the soil-plant system, which could lead to considerable mitigation, adaptation and development benefits.

LS/P/16

AN OVERVIEW OF TRADITIONAL MEDICINAL PLANTS AS ANTICANCER AGENTS FROM HIMACHAL PRADESH, INDIA

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An attempt has been made to review some medicinal plants used for the prevention and treatment of cancer in Himachal Pradesh. Information on the name of plants, family, parts used and method of preparation has been collected from Ethnobotanical literatures. Many bioactive components in the plants are responsible for their anticancer activity. These active compounds are still a matter of thorough research. In today's world, where cancer disease is so much prevalent, medicinal plants have become the need of the hour so as to bypass costly treatment and so many side effects of chemotherapy and radiotherapy. Over the years, advancement in clinical research has been seen for use of these medicinal plants and a number of anticancer drugs have come out of these as a result. The main problem with these drugs is the toxicity and side effects associated with them due to their lack of specificity, as these drugs also kill healthy cells. The apt study of these medicinal plants would develop in introducing a site specific and safe anticancer drug with higher therapeutic values to eliminate cancer. In addition this review forms a good basis for selection of the plant for further phytochemical and pharmacological investigation. Though a good number of anticancer drugs have been developed from plants or their derived active compounds, development of a safe, economic and site-specific anticancer drug is still a challenge.

LS/P/17

ISOLATION AND CHARACTERIZATION OF MYCORRHIZAL ENDOPHYTE IN A MEDICINAL ORCHID, *CREPIDIUM ACUMINATUM* (D. DON) SZLACH

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Crepidium acuminatum (D. Don) Szlach is an orchid of high medicinal value which is known as 'Rishbak' in Sanskrit. Its pseudobulbs are used in many Ayurvedic formulations including 'Chyavanprash'. Till date, no detailed report is available on its fungal endophyte. Therefore, present study was undertaken to isolate and characterize mycorrhizal associate of this taxon. For this, sterilized root segments (1.0-1.5 cm) were cultured on Oat Meal Agar (OMA) medium under dark conditions at 25±2°C temperature. Initial emergence of fungus from

these segments was observed after one week of incubating; it later on appeared all along the root surface, spread on nutrient medium, gradually covered the glass petri-dish, and developed several aerial branches. Pure cultures of the isolated fungus were then raised on separate medium. Morphological studies showed that the fungal colonies were woolly and become compact with time. Under microscope, hyphae were septate and hyaline; conidiophores hyaline and branched; conidia one-celled, round or ellipsoidal, and smooth- or rough-walled. On the basis of morphological characteristics it was identified as *Trichoderma* sp. With a view to confirm the identity further, a molecular analysis was done by amplifying and sequencing of ITS region (ITS1 & ITS4). Based on molecular analysis, the mycorrhizal endophyte was identified as a species belonging to genus *Trichoderma*; it showed 97% similarity with *Trichoderma* spp. (AB872440) of NCBI Data Bank.

LS/P/18

**CONSERVATION OF *SPIRANTHES SINENSIS* (PERS.) AMES., A THREATENED
MEDICINAL ORCHID, IN HIMACHAL PRADESH**

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Spiranthes sinensis is well known for its very beautiful, pink-coloured spirally arranged and long lasting flowers. In the Ayurvedic system of medicine, the roots are used as aphrodisiac and to cure various ailments like headache, haemoptysis, chronic dysentery and meningitis. From the aerial parts of plant, sinensols A-F (derivatives of dihydrophenanthrene) has been isolated which has antimicrobial properties. Only a small population of this important taxa has been reported from Himachal Pradesh which is decreasing with an alarming rate and facing the threats of extinction. The main factor responsible for this depletion is grazing. Other factors include human interference and unawareness. An important project is in for its conservation. In the *in situ* mode, plants have been protected through fencing, covered with the hard bushes during the complete life cycle of plant to save the flowering plants and maturing seeds from the animals to get maximum number of seeds. In the *ex situ* conservation, plants will be multiply using the tissue culture technique by culturing immature seeds and different explants. Plants produced through the clonal propagation will be introduced in the nature.

LS/P/19

**INFLUENCE OF DICLOFENAC SODIUM ON BONE METABOLISM IN BALB/C
MOUSE MODEL: MORPHOMETRIC, BIOCHEMICAL AND
ULTRASTRUCTURAL ANALYSIS**

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Non-steroidal anti-inflammatory drugs interfere with certain metabolic pathways which are involved in prostaglandin synthesis. The prostaglandins play various important physiological

roles including bone metabolism. Diclofenac is a common non steroidal drug given to treat different type of bone ailments such as fractures or various kinds of arthritis. A study was designed to find out toxicological effects of the drug, if any, on healthy bone/bones. We exposed adult male balb/c mice to diclofenac sodium at dose rate of 10 mg/kg/day from 10-30 days. Protein and acid phosphatase content of tibia was analyzed. For morphometric study, H/E stained slides and slides stained for acid phosphatase histochemical analysis of mice tibia were used. Further, transmission electron microscopy of decalcified tibia was performed to learn any histopathological threats of the drug. Our results demonstrated that diclofenac caused increase in protein content of tibia from 10-30 days which was significant after 10 days ($p<0.01$). Acid phosphatase content decreased throughout the investigation period significantly ($p<0.05$). There was significant decrease in osteoblast number after 20 days and in osteoclasts number after 30 days of diclofenac treatment ($p<0.05$). A decrease in trabecular bone volume during early phases and in surface density throughout the investigation period after diclofenac treatment indicated reduced bone strength. Further, biochemical and histomorphometric results were also corroborated by ultrastructural analysis. These results suggest that diclofenac treatment has detrimental effects on health status of bone.

LS/P/20

PREDATORY MITE FAUNA ASSOCIATED WITH CUCUMBER (*CUCUMIS SATIVA*: CUCURBITACEAE) IN HIMACHAL PRADESH

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Himachal Pradesh is situated in North West Himalayan region of India. Conditions of the state are suitable for growing different horticultural crops viz. fruits, vegetables and ornamentals. Different vegetables are grown in the state, cucumber is one of them and grown in polyhouse and in open field condition. This vegetable crop is attacked by many pests, mites especially spider mites are one of them. Mites are the tiny creature belongs to class Arachnida and sub-class acari. They assume pest status due to indiscriminate use of pesticides in field and polyhouse. Polyhouses provide them a favourable place to thrive and reproduce throughout the year on a wide range of crops and weeds. These pests are controlled in nature to some extent by different natural enemies. Predatory mites are one of them which feed on different stages of spider mites and keep their population in check to some extent. Predatory mites are successfully used as bio control agent especially for spider mites and soft bodied insects in different parts of the world. In the present study a survey was conducted in different parts of the state in cucumber ecosystem which is an important vegetable used in raw form to harness the predatory mite fauna. Total, ten species of four genera i.e. *Amblyseius*, *Euseius*, *Neoseiulus* and *Agistemus* were observed. Species were *Amblyseius largoensis* (Muma), *Amblyseius herbicolus* (Chant), *Amblyseius* sp. (close to *herbicolus*), *A. guajavae* Gupta, *Amblyseius* sp., *Euseius finlandicus* (Oudemans), *Euseius neococcineae* Gupta, *Euseius prasadi* (Chant & McMurty), *Neoseiulus neoghani* Gupta and *Agistemus fleschneri* Summers. Among these *Amblyseius* (5 species) was the dominant genus followed by *Euseius* (3 species). Predatory mites are biological agents of different soft bodied arthropods and prevent the economic loss to some extent in different crops. There is need to

mass rear these predatory mites in future to suppress the pest population and improve the crop health by checking the use of synthetic chemicals which are hazardous in many ways.

LS/P/21

**AVIFAUNA OF RAKCHHAM- CHHITKUL WILDLIFE SANCTUARY
DISTRICT KINNAUR, HIMACHAL PRADESH, INDIA**

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Present investigations have been conducted in Rakchham- Chhitkul Wildlife Sanctuary located in the Baspa valley (Sangla valley) with geo-coordinates of latitude $31^{\circ}14'22''$ N - $31^{\circ}28'37''$ N and longitudes $78^{\circ}17'31''$ E - $78^{\circ}31'30''$ E covering an area of about 304 Km^2 , in the northeast corner of the Kinnaur district of Himachal Pradesh, India. The altitude of Baspa valley ranges from 3,200masl to 5,486masl. The temperature varying from -15°C to 18°C , mean rainfall is 463 mm and annual snowfall 1130 mm. Present study area of the wildlife sanctuary has been explored during 2012-2014 in various habitat types. Stratified random sampling technique (Snedecore and Cochran, 1993) has been followed for the study of birds which involved the division of sites into different strata, based on vegetation type and habitat. Piecewise linear line transects have been laid in different habitat types for counting the number of individuals of birds. The exploration of Rakchham- Chhitkul Wildlife Sanctuary present in the Baspa valley (Sangla valley) situated in remote tribal district of Kinnaur in Himachal Pradesh, India revealed the presence of a diverse population of birds consisting of 73 species, belonging to 52 genera, spread over 24 families and 9 orders. The 8.2% species of birds in the area were resident while a large percentage i.e. 91.8% being local or long range migrants. 23.2% birds were local migrants and 49.3% summer visitors. The population of around 19.1% species augmented during summers because of influx of more individuals during summer. Analysis of data revealed that of the 73 species recorded, 23 (31.5%) were very common, 34 (46.6%) common, 14 (19.1%) uncommon and 2 (2.8%) rare to the sanctuary.

LS/P/22

GENDER DISPARITY IN SUSCEPTIBILITY TO CANCER

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Cancer is the second most common cause of death in the developed world. Most common cancers in the United States are those of breast, prostate, lung, colon rectum, blood and pancreatic cancer. These different types of cancer develop in different organs in male and female. Genetic epidemiological studies show that genders do not have equal susceptibility to diseases such as cancer. Because a specific gender appears to be more susceptible to certain type of cancer, gender is also a genetic predisposition in cancer development. Males are more prone to develop cancer, and particularly hematologic malignancies. Even in early childhood,

there are differences in cancer incidence between males and females. In childhood, few cancers are more common in females, but overall, males have higher susceptibility. Besides immune surveillance, genome surveillance mechanisms also differ in efficiency between males and females. Several factors may contribute to the development of gender disparity in general disease susceptibility, including sex hormones, genetic differences and environmental causes such as variation in environmental and occupational exposures, including smoking, diet, and sunlight exposure. Environmental exposures indeed dominate overall cancer risk, but genetic factors are also responsible for differential in male and female. Many of the genes that were identified have been implicated in various common diseases in which disease susceptibility is sex-biased. The gender differential in susceptibility to cancer and all genetic and non-genetic association studies give important clues for the etiology of cancers. So by identifying the subpopulations in male and female at higher risk we can implement preventive measures, as well as therapeutic interventions. Further more research is needed for this purpose.

LS/P/23

APPLE VARIETIES AND PREVALENCE OF DISEASES IN JAROL AREA (SERAJ-1) MANDI, H.P.

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Geographically Jarol (Janjehli) is situated 80 kilometer north-east of Mandi town H.P. About 7815 bighaland of Jarol area is under apple cultivation. Every year 10,000 apples boxes are produced. People are mostly dependent on apple production for their economy. Twenty different varieties of apples were observed in the present investigation. Out of which Red delicious, Royal delicious and Golden delicious are most commonly cultivars. Many abiotic and biotic factors contribute to the production loss, especially hail, wind, ice and insect- pests viz: San Jose Scale, White Scale, Woolly Apple Aphid, Blossom thrips, Leafroller and Fruit Scraper, Apple Fruit Moth, Root and Stem Borers. Among diseases Hairy Root, Pink Canker, European Canker, Powdery Mildew, Apple Scab are observed. Among different varieties Black Ben Davis and Red chief have shown resistance to different pathological infestations in the present study report.

LS/P/24

HEREDITARY VERSUS SPORADIC CANCER: A CASE STUDY FOR DISTRICT SHIMLA, HIMACHAL PRADESH

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Classifying the family history helps in determining whether relatives have an increased chance of developing specific types of cancer, how great the risk of cancer might be, and

whether genetic testing might be helpful in further evaluating cancer risks in the family. Despite the utility of information about family history of cancer to primary care providers, there is a dearth of published estimates of the population based prevalence of family history of cancer by age categories. Also there is enormous data to link cancer with environmental factors including socio-cultural practices, notably chronic exposure to smoking, alcohol drinking and the habit of tobacco and betel-nut chewing. The other factors include use of contraceptives, working in night shifts, applying pesticides consuming red meat. The change in life style and habits in this district is increasing the rate of cancer. The genetic predisposition to develop cancer as an inherited trait is very rare. So reducing the risk factors can reduce the prevalence of cancer in the future. The present research deals with the pedigree analysis of 100 patients, upto three generations and to find out whether it is sporadic or hereditary.

LS/P/25

DIVERSITY OF GYMNOSPERMS IN SHIMLA: AN OVERVIEW

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Biodiversity is defined as the variety of all life forms-the different plants, animals and microorganisms; the genes they contain and the ecosystem of which they form a part. Biodiversity is the result of 3.5 billion years of evolution. India is one of the megadiverse countries out of 12 megadiverse countries identified by Conservation International. These countries are located in tropical and subtropical regions. In India 46000 species of plants have been recorded by Botanical Survey of India which accounts for 7-8% of recorded species of the world. In Himachal Pradesh as many as 3295 species are reported. Shimla is situated on the lower Himalayas, its elevation is about 7500 feet above the sea level ,its latitude is 31 degrees 6'N and 77 degrees 13'E. Shimla comes under Western Himalayan Subalpine Conifer Forest ,this forest covers the Himalayas at different altitudes. In Shimla, mainly four species of conifers are found. The forest here extends in the parts close to Mount Jako. *Pinus longifolia* is found towards the western side of hill at elevations from 2000 ft to 7000 ft. *Pinus excelsa* is found on the southern face of Mount Jako. A few trees of *Abies smithiana* occur towards the west. *Cedrus deodara* is common on the southern and western slopes of Mount Jako. A few trees of *Cupressus torulosa* ,*Juniperus*, *Taxus baccata* are also spotted at different locations in Shimla. This research study has utilized information from books ,journals, records and internet. This work is an attempt to give an account of gymnospermic flora of Shimla as inventory of biodiversity of any area is prerequisite for conservation.

LS/P/26

ESTIMATION OF PHYSIO-CHEMICAL PARAMETER OF DOMESTIC WATER IN MUMBAI REGIONS

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Nowadays are varying the environmental condition due to the industrialization and urbanization. Human life is change and developing the system for high quality of life style. Therefore, life style are artificial the environmental condition and health also. At present time our day to day life are sound effects on the water system for using in different purpose in our life. Therefore, it is needs for assessment of present study of the Physio-chemical characteristics of domestic water in Mumbai, District area, India. The sample were collected from the supply water, tank water, ground water, pond water; selected for survey of status of water bodies in development city. Study are doing some related parameters with the pH, conductivity, BOD (biological oxygen demand), Total Alkalinity, Turbidity, Total Dissolved solids, Total Hardness, Ca, Mg, Chlorides, Nitrate, Dissolved Oxygen, Phosphate. Important parameter shows correlations with other parameter hence serve as good domestic water quality & according to CPCB water quality index.

Key words: Domestic water, Sewage, Effluent, Urbanization, Water quality Index, Water analysis, Physio-chemical characteristics.

LS/P/27

DEVELOPMENT AND EVALUATION OF PLANT BASED PESTICIDE FORMULATIONS

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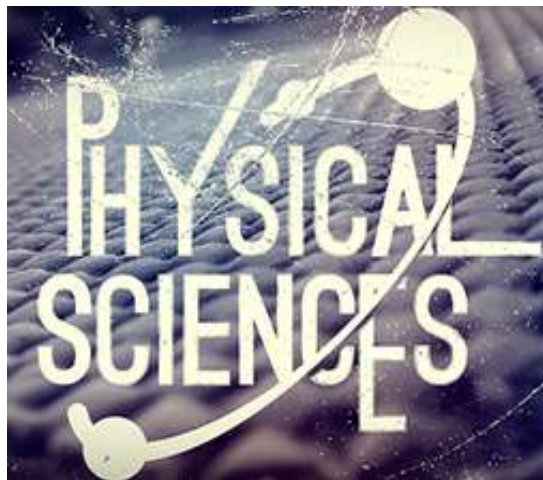
Plant-based botanical pesticides offer an effective, low toxicity and environmentally friendly alternative to conventional pesticides. Until recently the availability of plant-based pesticides was limited to a few products like neem oil and pyrethrum. While these products are effective and exhibit very low environmental impact and they have a limited range of uses. For becoming truly effective alternative to conventional pesticides, botanicals must be available in a range of formulations that can be used in a variety of pest control situations. A variety of formulations are now available including dusts, aerosols and wettable powders from these botanicals.

The choice of an pesticide formulation is mainly based on its biological performance, development convenience and cost. But as agriculture has become more sophisticated, considerations to the needs of user of pesticide in addition to the biological requirements of crop and pest has also gained considerable significance. Further, the current trend in replacing older persistent pesticides like wettable powder (WP), emulsifiable concentrates (EC) etc. has paved way for development of new, less toxic, short lived, reduced application rate and safe handling formulations.

Microemulsion system is very attractive alternative for the formulation of agrochemicals which is thermodynamically stable, optically isotropic, less viscous dispersion of oil and water stabilized by a surfactant and in some cases, also a co surfactant. In the present study, extraction from *Capparis decidua* was done using different solvents. The plant is reported to have anti-microbial & insecticidal properties along with medicinal properties. 2.5 & 5.0 % (w/w) water based micro emulsions (ME) were developed from the extract using biodegradable surfactants. Studies of their physico-chemical parameters are in progress.

Key words: *Capparis decidua*, microemulsion, botanicals, wettable powder, emulsifiable concentrate, pyrethrum.

SECTION: C



PS/O/01

**CORONAL MASS EJECTION SIGNATURE ON GEOMAGNETIC FIELD AT
INDIAN STATIONS**

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Space weather activity CMEs, and solar energetic particles from the Sun are carried out into space along with the solar wind. The wind speed sweeps toward the Earth at super sonic speed ranging from 300-1000 km/sec and distorts the Earth's magnetic field. CMEs are the main cause of major geomagnetic storms. Geomagnetic storms are identified by using indices like Kp, Dst. According to the Richardson the most intense storms at both solar minimum and solar maximum are almost associated with CMEs. They occur when a sufficiently strong negative southward vertical component of the interplanetary magnetic field (IMF) Bz interacts with the Earth's magnetosphere, when the dynamic pressure of solar wind is enhanced. The solar flare, CMEs and predominately large magnitude of the IMF are the dominant phenomena during the high solar activity conditions. We have taken only 5 CME events out of 28 in year 2002- 2003 and all these events are Halo CMEs events. To study the effects of these CME events on geomagnetic field we have selected two stations, Alibag and Pondicherry with Geomagnetic Latitude and longitude (18.64N, 72.87E); (11.92N, 79.92E) respectively. The CME events were considered on 29 October 2003, 16 June 2003, 23 July 2002, 01 Nov.2003, and 28 October 2003. The data has been taken from Alibag and Pondicherry Geophysical Observatory. Three days have been taken during each event, one day before the event and one day after the event with the help of geomagnetic field Variations we can enlighten the effect of the CME on Earth. The severe event or epoch event of 29 october 2003 has IMF, Bz \approx -58nT which is very high value and produce large effect on the geomagnetic storm occur when solar wind long duration southward IMF impact Earth's magnetosphere. During the geomagnetic storms southward IMF reconnect with Earth's geomagnetic field at the dayside magnetopause, resulting a chain of events leading to the dramatic increase of ring current westward. The high speed CME affects more the geomagnetic field than the lesser one. According to the latitudinal variation the variation at Pondicherry is high as compare to the Alibag station with respect to their declination angle. As higher the declination angle lesser will be the variation.

Key words: Solar flare, CME, plasma density and geomagnetic field.

PS/O/02

FIGHTING THE PULL OF GRAVITY

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Currently rocketry is the successful methodology for accessing space. For fighting the pull of gravity using structural technology, very strong and massive steel-reinforced concrete columns are created to build large structures on Earth. The utilization of analytical tools and specialized designs are based upon Earth-bound experience and over the years, there has been an intuitive feeling, for how tall structures on Earth should be constructed. Most of the

existing tools, designs and methods obstruct the construction mechanism rather than helping space adventure missions. To build or erect large structures in space or on Earth, a new expanded intuition is needed – an intuition based on inflatable structures that have only just been imagined during the last 20 to 30 years. Indeed, unless such inflatable structures are developed, important scientific, engineering or even cultural space projects will not be realized. The conventional technology creates heavy, complex, cumbersome, unreliable, and extremely expensive structures making the projects too costly for a variety of space missions. The major advantages of using inflatable structures in space are their extremely low weight, on-orbit deployability, and minimal stowage volume for launching. Eye is focused on construction and operation of Space Elevator Tower structure and other large space structure systems, in the 21st century for its utilization in a variety of space missions for the welfare of humanity.

Key words: Gravity, inflatable, space, structures, tower.

PS/O/03

**EFFECT OF ANNEALING TEMPERATURE ON THE MAGNETIC PROPERTIES
OF Co-DOPED SnO₂**

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Annealing temperature plays a very crucial role in the surface morphology and magnetic properties of Co doped SnO₂. In this paper, we present a systematic investigation of the effect of annealing temperature on the magnetic properties of Co doped SnO₂. Sn_{1-x}Co_xO₂ samples have been chemically synthesized with low Co concentration ($\leq 1\%$). The X-ray diffraction (XRD), and scanning electron microscopy (SEM), are used to characterize these samples. The XRD pattern shows the tetragonal rutile structure. The crystallite size and the average particle size increases with increase in annealing temperature. The samples sintered at 350°C, 450°C and 550°C show ferromagnetism at room temperature while those sintered at $\geq 600^\circ\text{C}$ show paramagnetism. With the increase of annealing temperature, the ferromagnetism observed at room temperature in the low temperature sintered samples is gradually suppressed and finally completely removed. This destruction of ferromagnetism at higher annealing temperatures can be understood by considering a metastable ferromagnetic phase and its stability under varying temperature and atmosphere. Also the ferromagnetic properties depend not only on the surface diffusion of Co ions and the distribution of defects such as oxygen vacancies or vacancy clusters but also on the nanometric size of the materials and their surface conditions.

Key words: Co-doped SnO₂, Diluted Magnetic Semiconductor, Sol-Gel method, Room temperature ferromagnetism.

PS/O/04

ENERGY NEEDS, GEOTHERMAL ENERGY AND ENVIRONMENT ISSUES

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At present the world is facing a huge energy crisis; given an enormous increase in the global demand for energy in recent years as a result of industrial development and population growth. Since the beginning of 21st century the demand for energy, especially from liquid fuels, and limits on the rate of fuel production has created such a bottleneck leading to the current energy crisis. In view of the environmental issues a great amount of funds, work and R & D is being diverted into the alternative sources of energy such as geothermal, hydropower, solar and wind etc... Geothermal energy is an immense store of heat ($\sim 10^{13}$ J), which alone would take over 10^9 years to exhaust. This source of energy is an extremely large and self sustained natural gift. There are selected sites worldwide where the energy is utilized both for electric power generation and direct domestic uses. In this work, the environmental issues pertaining to all the energy sources and advantage of geothermal source over other conventional and non-conventional energy sources and various methods of harnessing and technologies are discussed. The current status of energy sources in India and Himachal is also presented. In the light of various studies it has been concluded that India has a great potential of geothermal power, which must be harnessed on priority to produce electricity and fulfill her growing power need.

PS/O/05

THERMAL EXPANSION BEHAVIOR OF A COMPOSITE OF CARBON NANOTUBES AND SILVER

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Metal matrix nanocomposites reinforced with carbon nanotubes (CNTs) have become popular in industrial applications. Due to their excellent thermophysical and mechanical properties, CNTs are considered as attractive filler for the improvement in properties of metals. Carbon nanotube reinforced silver matrix (CNT/Ag) nanocomposite is fabricated by physical mixing method. Composites are prepared with different volume percent content of functionalized multiwall nanotubes. The micro-structure of synthesized nanocomposite is analyzed by x-ray diffraction, electron diffraction spectroscopy and scanning electron microscopy. Micro-structural characterizations reveal good distribution of CNTs in the silver matrix. Thermal expansion behavior of composite is studied in references to variation of CNT volume content in the silver matrix. It is observed that coefficient of thermal expansion (CTE) decreases with increase in CNT volume percentages. The thermal expansion of CNT reinforced silver composite reduces to half of pure silver on introduction of six volume

percentages of CNTs into the silver matrix. CNT/Ag composites may be a promising contact and thermal management material in electronic devices.

PS/O/06

THERMAL BEHAVIOR OF CARBON NANOTUBE REINFORCED AL/FE₂O₃ ENERGETIC NANOCOMPOSITES

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Nanothermites are a class of energetic materials which consists of a fuel component and an oxidizer component that are mixed and at least one of the components must have dimensions in the nanometer range. Thermite reaction is diffusion controlled process and at nanoscale, due to small particle size and large surface area, mass transport and contact between fuel and oxidizer increases. The thermite reaction between nanocrystalline aluminum powder (nano Al) and iron oxide (Fe₂O₃) has explosive and high exothermic properties and Carbon nanotubes (CNTs) by virtue of their structure, high thermal conductivity and very large exothermic energy have been prompted their use in energetic materials. In this report, CNT reinforced nano Al/Fe₂O₃ nanoenergetic thermites were prepared by physical mixing method combined with ultrasonication. The microstructure and phase of the fabricated samples were identified using various techniques which revealed that CNTs were homogeneously dispersed within the Al/Fe₂O₃ thermite mixture and all the phases were intact in the nanocomposites. The exothermic enthalpy of the thermite reaction analyzed by differential scanning calorimetry (DSC) was increased for 2 wt% CNT reinforcement with decrease in the peak temperature of the observed thermite reaction.

Key words: Carbon nanotube; electron microscopy; thermite reaction; exothermic enthalpy

PS/O/07

ANNULAR RING ANTENNA ON A FERRITE BASE

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Microstrip antennas are widely used because they are light weight, conformal and easy to fabricate. In this investigation an annular ring antenna is designed using ferrites as the material medium. The ferrite used is LiTi. It is seen that the size of patch is reduced considerably and other parameters such as directivity, gain and bandwidth are also enhanced when designed on Quartz substrate. This reduction would certainly have a wide use in creating a miniaturization of an antenna system which has a potential application in space and cellular communication. The simulations are done on IE3D software.

Keywords: Ferrites, Microstrip Antenna, Gain, Bandwidth, Space communication

PS/O/08

EFFECT OF DOPING ON THE THERMOPHYSICAL PROPERTIES OF PEROVSKITES

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The effect of doping on the thermophysical properties as a function of the composition and temperature of perovskites have been reported for the first time. These materials have been synthesized via solid state reaction route and the effect of doping has been investigated due to their extraordinary properties: colossal magnetoresistance (CMR), strong electron-phonon interaction, spin-ordering, charge ordering and orbital-ordering. These materials have been of significant research interest due to their promising scientific and technological applications in information technology, next generation electronics i.e. spintronics, reading head devices, magnetic sensors, magnetic refrigeration, bolometers, etc. On increasing the doping level, a linear variation in unit cell volume and lattice parameters is observed. The samples show a systematic variation in metal to insulator transition temperature and a large magnetoresistance is also observed with maxima at TMI. The highest value of Temperature Coefficient of Resistance % has been observed by us for the first time. The thermophysical properties such as cohesive energy, Reststrahlen frequency, Debye temperature, Grüneisen parameter and specific heat of perovskites are discussed in detail in the present work by applying extended rigid ion model (ERIM) developed by the author. The present results show closer agreement with the corresponding available data.

Key words: Thermophysical properties, Perovskites, Specific heat, TCR, Orthorhombic structure.

PS/O/09

INTRODUCTION TO EXFOR FORMAT AND DIGITIZATION SOFTWARE GSYS2.4.7

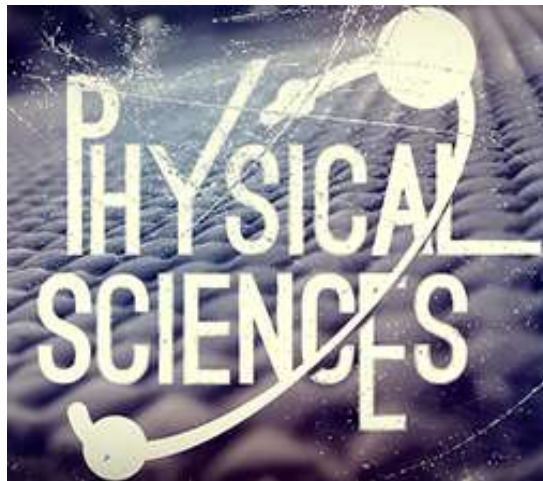
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Nuclear reaction data are necessary and applicable for many application fields. The nuclear reaction data must be compiled into a database for convenient availability. One such database is the EXFOR database maintained by the International Network of Nuclear Reaction Data Centres (NRDC). This abstract gives the description of Exchange format for the transmission of experimental nuclear reaction data between National and International Nuclear data Centres for the benefit of nuclear users in all countries. Maintained by the International Network of Nuclear Reaction Data Centres (NRDC) coordinated by IAEA Nuclear Data Section. It also includes the compilation status by using EXFOR editor in India and the introduction of the digitization software Gsys2.4.7 used by EXFOR compiler and other researcher in Japan and other countries.

SECTION: C



PS/P/01

NUMERICAL ANALYSIS OF THE IMPEDANCE OF CIRCULAR MICROSTRIP ANTENNA

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Microstrip antenna can be use in different applications due to their some advantages such as low profile, light weight and easily matched with microwave integrated circuits. For acquiring the good result from the microstrip antenna our first step is the impedance matching. In general, the input impedance includes both resonant and non resonant part which is reactive. The imaginary and real parts of the impedance change as function of frequency. In this paper we present a theoretical model based on analytical techniques for computing the impedance of circular patch antenna around the resonance for the probe fed and the results are comparing with the previous results. The antenna has been analysed and fabricated on the substrate with dielectric constant 2.2 and thickness 0.9mm.

PS/P/02

ALGORITHM FOR IMAGE COMPRESSION USING PCA

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Image compression is reducing the size in bytes of a graphics file without degrading the quality of the image to an unacceptable level. The reduction in file size allows more images to be stored in a given amount of disk or memory space. In this paper we use PCA technique which uses sophisticated underlying mathematical principles to transforms a number of possibly correlated variables into a smaller number of variables called principal components. The first principal component taken into account for as much of the variance in the data as possible and each succeeding component taken for as much of the remaining variance as possible and component is taken to be along the direction with the maximum variance. The second principal component is constrained to lie in the subspace perpendicular of the first. Within this Subspace, this component points the direction of maximum variance. The origins of PCA lie in multivariate data analysis however; it has a wide range of other applications. PCA has been called one of the most important results from applied linear algebra and perhaps its most common use is as the first step in trying to analyse large data sets.

PS/P/03

**PREPARATION AND CHARACTERIZATION OF ZINC OXIDE (ZNO)
COMPOSITE FILMS AT ROOM TEMPERATURE**

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Novel composite films of Zinc Oxide (ZnO) and Polymethylmetacrylate (PMMA) have been prepared by using simple solution caste methods. Different wt. % compositions have been prepared to find out the best optimization conditions for further experiments. The structural and thermal properties have been carried out using XRD, FE-SEM and DSC respectively. The 50-50 wt. % composite film indicates the quantum dots at equilateral distance using Scanning Electron Microscopy.

Key words: ZnO, Polymethyl methacrylate, Solvent caste, SEM.

PS/P/04

**IMPROVED STRUCTURAL, MAGNETIC AND MICROWAVE PROPERTIES OF
SUBSTITUTED M-TYPE BARIUM NANOHEXAFERRITES**

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Sol-gel synthesized $BaHo_xFe_{12-x}O_{19}$, ($x = 0.1, 0.2, 0.3, 0.4$) nanohexaferrites, have been explored for magnetic and microwave properties. X-ray diffraction studies revealed the hexagonal structure of the synthesized ferrites. The particle size was observed to be in the range 44.34–51.24 nm. The dc resistivity was found to be increasing with an increase in Gd^{3+} content and the variation of dc resistivity with temperature confirmed the semiconducting behavior of all nanohexaferrites. The observed values of saturation magnetization and coercivity, at room temperature, are 66.68 emu/g and 4599.523 Oe respectively which are very high as compared to the values ever reported till date for these holonium doped nanohexaferrites. Additionally, we observed ultra-low magnetic loss (0.004 to 0.01) and dielectric loss (0.004 to 0.06) over the GHz frequency region. The obtained results make these nanohexaferrites a competent material for antenna applications.

Key words: Nanostructures; Sol-gel process; Electric, dielectric and magnetic properties.

PS/P/05

MAGNETITE NANOPARTICLES COATING ON SAND SURFACE FOR ARSENIC (III) REMOVAL FROM DRINKING WATER: EFFECT OF ADSORBENT DOSE AND pH

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Magnetite nanoparticles as an adsorbent were coated on sand surface by co-precipitation method under argon gas flow. The magnetite nanoparticles coated sand was characterized by scanning electron microscopy (SEM). The potential of thus magnetite coated sand was investigated for arsenic(III) removal from drinking water. Batch experiments were performed to study the effect of solution pH and adsorbent dose on arsenic(III) removal efficiency by varying the solution pH from 2.0 to 12.0 and adsorbent dose from 5g/L to 30g/L respectively. All experiments were performed at room temperature in an incubator shaker for fixed contact time of 420 minutes. The treated samples were analyzed by inductively coupled plasma mass spectrometer (ICP-MS) for residual arsenic concentration. ICP-MS results showed that at optimum conditions adsorbent removed arsenic(III) significantly below 10 μ g/L (MCL value set by WHO) at pH 7 when initial arsenic(III) concentration taken was 1000 μ g/L. Thus magnetite nanoparticles coated sand can be used to get rid of arsenic contaminated drinking water.

Key words: Arsenic(III), adsorbent dose, ICP-MS, magnetite nanoparticles, SEM

PS/P/06

ELECTRIC AND DIELECTRIC PROPERTIES OF Sm³⁺ DOPED Mg FERRITE FOR HIGH FREQUENCY APPLICATIONS

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The excellent combination of electric resistivity, relative loss factor and dielectric loss factor of Sm-Mg ferrites can be used to fulfill the future demand for high-frequency applications. Micro structural properties of Sm doped Mg ferrite has been studied with XRD and SEM. All the samples can be indexed as the single-phase cubic spinel structure. The morphology and the size of particles were checked by SEM. The dc electrical resistivity has been increased as compared to MgFe₂O₄ ferrite. Sm-Mg ferrite has been investigated for micro structural, electric and dielectric properties. The microstructural, electric resistivity, loss factor and dielectric loss factor have been studied as a function of Sm³⁺ ions concentration and frequency. The value of dielectric loss factor has been increased due to the replacement of Fe³⁺ ions by Sm³⁺ ions in Mg ferrite. Higher value of dc resistivity (10⁷ Ω -cm) and low values of the relative loss factor of the order of 10⁻⁵ in the frequency range 0.1–30 MHz are also the cardinal achievements of the present investigation.

Key words: Ferrite, dc resistivity, loss factor, XRD.

PS/P/07

STRUCTURAL AND OPTICAL CHARACTERIZATION OF THE ZNO NANOPARTICLES PREPARED BY SIMPLE SOL GEL METHOD

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In the present study, zinc oxide nanoparticles are synthesized by simple sol gel method. The sol gel method has been gained much attention for its low cost, cheap operation, and compositional control. Detailed structural characterizations are carried-out using X-ray diffraction, Fourier transform infrared and Raman spectroscopy. The well resolved peaks present in the x-ray diffraction patterns conforms the presence of hexagonal wurtzite phase belonging to the space group $P6_3mc$ and indexed using the standard JCPDS file for ZnO (JCPDS 36-1451). In the Raman scattering investigation, the peak observed at $\approx 437 \text{ cm}^{-1}$ (E_2^{high}) is attributed to the nonpolar E_2 vibrational modes due to the vibration of the oxygen in ZnO. E_2^{high} is representing of wurtzite structure of good crystalline quality. Furthermore, Fourier Transform Infrared spectroscopy (FTIR) analysis confirm the presence of Zn-O stretching, apart from that the residual organic groups at the surface of the nanoparticles are also observed. Optical properties are investigated using Ultraviolet-visible spectroscopy, spectra show transitions in the UV-Vis region, which is ascribed to the band gap of the ZnO nanoparticles.

PS/P/08

STRUCTURAL AND MÖSSBAUER PROPERTIES OF NANOCRYSTALLINE In^{3+} IONS SUBSTITUTED FERRITES

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Nanocrystalline $\text{Mg}_{0.2}\text{Mn}_{0.5}\text{Ni}_{0.3}\text{In}_x\text{Fe}_{2-x}\text{O}_4$ ferrites were synthesized by citrate precursor technique sintered at 1473K. X-ray diffraction confirmed formation of single phase cubic spinel lattice. XRD studies shows decrease in particle size and increase in porosity with increasing In^{3+} content. The Mössbauer spectroscopy results confirm that In^{3+} ions substituted ferrites, shows superparamagnetism. All the substituted ions samples shows paramagnetic doublet due to the quadrupole interaction and very small size of the particles. Mössbauer results confirm the formation of nanoparticles. The intensities of the paramagnetic doublet in In^{3+} ions substituted ferrites increases with increasing concentration of substituted ions or with the decreasing particle size. The isomer shift corresponding to Fe^{3+} ions do not show any significant variation with substitution of In^{3+} ions, which indicates that replacement of Fe^{3+} ions in $\text{Mg}_{0.2}\text{Mn}_{0.5}\text{Ni}_{0.3}\text{In}_x\text{Fe}_{2-x}\text{O}_4$ ferrites do not affect significantly the d-electrons density which in turn affects the s-electrons density around Fe^{3+} nuclei. The nuclear hyperfine magnetic fields have been found to decrease at A-site and B-site with increasing substitution In^{3+} ions in Mg-Mn-Ni ferrite. Decrease in the hyperfine magnetic field has been explained

on the basis of various exchange interaction due to the supertransferred hyperfine interaction between the different ions and modified ionic distributions.

Key words: X-rays diffraction, Particle size, Mössbauer spectroscopy

PS/P/09

STATISTICAL STUDY OF CNO WITH GPS AND GNSS

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Scintillations are fluctuations of amplitude and phase of radio waves from satellites passing through the irregularities in electron density distribution in the ionosphere. Due to the relative motion between the satellites, the ionosphere and the receiver on the ground, the spatial pattern of amplitude and phase variations sweeps across the antenna and temporal variations of phase and amplitude are recorded by the receiver. Ionospheric scintillation directly affects the carrier to noise ratio (CNO) of all the satellites of GNSS. The nominal CNO for the L1 signal 45db-Hz and tracking may be lost if the CNO signal drops below ~25db-Hz., dependent on the receiver-specific tracking loop. Although the signal power on the GPS L2 frequency is significantly low (~6db-Hz).CNO are functions of the transmitted power, frequency, system noise and separation distance.

CNO is an absolute indicator primarily of antenna-plus-front-end performance. CNO is the ratio of carrier power to the noise power mixed with the signal, in a 1Hz bandwidth. This ratio defines a limit for the sensitivity of a given GPS receiver. If the value of CNO is diminished for any cause, be it bandwidth limitations, or increased LNA noise figure, GPS sensitivity will be reduced by the same amount.

The median value of CNO deviation and S_4 are plotted at each 3 minutes frequency interval during each one hour duration. The x-axis is time and median values of S_4 and CNO deviation is plotted along y-axis. Analyzing the CNO and scintillation over the whole month of march 2014, it is found that during 14-15 UT maximum value up to which fluctuation in CNO for GPS is 1.35 units, which is greater than the peak values of GLONASS, 1.065 units for the same hour . Except 15-16 UT during hours 13-14, 14-15 and 17-18 UT peak value of fluctuation of CNO deviation from GPS is always greater than that of CNO deviation from GLONASS. So it can be concluded that fluctuation in CNO is more in GPS than for GLONASS as calculated from septentrio receiver during March, 2014 data of Calcutta Station.

Key words: CNO, GPS and GNSS

PS/P/10

SCINTILLATION AT STATION BEYOND THE EQUATORIAL IONIZATION ANOMALY

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In the equatorial region, due to the presence of intense irregularities in electron density and its variability with geophysical conditions, the occurrence of scintillation is more. The equatorial

scintillation region can encompass nearly 50% of the earth, but fortunately, the time of strong scintillation effects observed in the near - equatorial regions are generally limited to approximately 1 hour after sunset to local midnight. The occurrence pattern of scintillation at this region is maximum at pre-midnight hours and it goes on decreasing at post midnight hours due to the decrease in the ionization density of electrons.

For this study the station used is Sri Sai University, Palampur (32.11° N, 76.53° E Geographic, Geomagnetic: 30.25° N, Magnetic Dip: 49.4° N) Himachal Pradesh. A dual frequency GPS receiver (NOVATEL mark) is used and the data period is taken April 2014. A station like Palampur which is located beyond the northern crest of EIA the scintillation occurrence found is low. The results presented highlight the pattern of occurrence of scintillation at this region which shows that rate of occurrence is more at post midnight hours than the pre - midnight hours (reverse in case). The cause of this pattern observed here is Propagation Geometry Effect with respect to the magnetic field direction. That means the scintillation pattern observed depends more upon propagation geometry effect than ionization density irregularities. In the late night hours the intense scintillation are observed on GPS links which are at low elevation angles towards the south i.e., the satellite which are viewed end-on through the field- aligned plasma bubbles, traversing a greater distance through the bubble. Therefore during this local time period moderate to intense amplitude scintillation s are observed on GPS links.

Key words: Equatorial Ionization Anomaly, scintillation and Propagation Geometry Effect

PS/P/11

EFFECT OF ZINC SUBSTITUTION ON STRUCTURAL AND ELECTRICAL PROPERTIES OF COBALT FERRITE

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We present the structural and electrical study of Zn substituted cobalt ferrite system. $\text{Co}_{1-x}\text{Zn}_x\text{Fe}_2\text{O}_4$ (where $x = 0, 0.4, 0.6$ and 0.8) powder samples have been synthesized by chemical solution method using metallo-organic decomposition (MOD) precursors. The precursor solutions have been dried at $\sim 300^\circ\text{C}$ and finally sintered at 1000°C for 2h. The crystal structure and phase purity of powder samples has been studied by X-ray diffraction. The X-ray diffraction patterns of $\text{Co}_{1-x}\text{Zn}_x\text{Fe}_2\text{O}_4$ ($x = 0, 0.4, 0.6$ and 0.8) powder samples shows the formation of cubic spinel structure for all the compositions with minor secondary phase Fe_2O_3 appears in the samples with Zn concentration 60 and 80%. The lattice parameters are found to increase with zinc concentration. AC conductivity σ_{ac} and dielectric properties are studied over frequency range 1kHz to 1MHz at room temperature. The room temperature ac conductivity of $\text{Co}_{1-x}\text{Zn}_x\text{Fe}_2\text{O}_4$ ($x = 0, 0.4, 0.6$ and 0.8) samples shows linear behavior with frequency which confirms the presence of polaron hopping type conduction. The dielectric constant and loss tangent are found to decrease with increase in frequency. Dielectric dispersion with frequency can be attributed to Maxwell-Wagner polarization and Koop's phenomenological theory.

Key words: Ferrites, MOD, XRD, Ac conductivity, Dielectric constant.

PS/P/12

CONNOTATIONS OF THE STRANGE QUARK ON MINUSCULAR AND LARGE SCALES

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In this contribution, peculiarities in the nature of strange quarks in relevance to astrophysics are investigated. The absolute stability of strange quark matter is a viable possibility and immensely affects physics at the astrophysical scale. Relativistic heavy-ion reactions offer a stage to produce this exotic state of matter and we have discussed the enhanced production of strange particles during these reactions within the framework of quark-gluon plasma (QGP) along with its observable implications. The role of strangeness for compact star phenomenology is explored. Emphasis is laid upon the possibility of existence of a third family of strange quark stars and its study helps in revealing a number of unexplored features of the cosmos. Bag model parameters have been used to determine some integral parameters for a sequence of strange stars with crust and strange dwarfs. A comparative analysis is performed between the strange and neutron stars and the strange and white dwarfs based upon these intrinsic parameters and paramount differences are observed.

PS/P/13

NANOPARTICLE STABILIZED BLUE PHASE IN CHIRAL NEMATIC LIQUID CRYSTAL

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Blue phase in chiral nematic liquid crystals have created ample research interest due to its exotic optical properties like absence of alignment layer, fast switching and optically isotropic voltage off state.¹⁻³ These properties make them ideal for applications in fast switching displays, mirror-less lasers and tunable photonic crystals.⁴⁻⁷ In the present study, blue phase was realized in a binary mixture of liquid crystals and stabilized by nanoparticles doping. Polarizing optical microscopic studies revealed the enhanced thermal stability of the nanoparticle doped composites.

Keywords: blue phase; composite; nanoparticle; liquid crystal

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MS/O/01

A NEW METHOD OF MEASURING SIMILARITY BETWEEN NEUTROSOPHIC SOFT SETS AND ITS APPLICATION IN PATTERN RECOGNITION PROBLEMS

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F. Smarandache in 1995 introduced the concept of neutrosophic set and in 2013 P. K. Maji introduced the notion of neutrosophic soft set, which is a generalization of neutrosophic sets. After its introduction neutrosophic soft sets become most efficient tools to deals with problems that contain uncertainty such as problem in social, economic system, medical diagnosis, pattern recognition, game theory, coding theory and so on. In this work a new method of measuring similarity measure and weighted similarity measure between two neutrosophic soft sets (NSS) are proposed. A comparative study with existing similarity measures for neutrosophic soft sets also studied. A decision making method is established for neutrosophic soft set setting using similarity measures. Lastly a numerical example is given to demonstrate the possible application of similarity measures in pattern recognition problems.

MS/O/02

FREE MECHANICAL VIBRATION OF NON-HOMOGENOUS VISCO-ELASTIC SQUARE PLATE WITH VARYING THICKNESS AND THERMAL EFFECT

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In this present day and age, the study of vibration of orthotropic plates are extensively used as structural components in almost all engineering applications such as aircraft, space shuttle, satellites, earthquake resistant newly designed structures, printed circuit boards in electronics etc., where high strength, stiffness and light weight materials are highly needed. Plates of variable thickness are frequently used in order to economize the plate material or to lighten the plates, especially when it is used in the wings of high-speed and high performance aircrafts. Thus knowledge of their natural frequencies is of considerable importance at the design stage in order to avoid resonances excited by internal or external forces. The goal of present investigation is to study the mechanical vibrations of non- homogenous square plate whose thermal gradient and thickness varies along x-axis and y-axis. Frequency equation is derived by using Rayleigh–Ritz technique with a two-term deflection function. Here it is important to note that all the numerical calculations have been made using the material constants of ‘Duralium’ an alloy of Aluminum, Copper and traces of Magnesium and Manganese. All results are illustrated with Graphs.

MS/O/03

INFLUENCE OF STAGGERED POSITION OF AN UPSTREAM RECTANGULAR CYLINDER ON THE WAKE OF A SQUARE CYLINDER UNDER COUETTE-POISEUILLE FLOW

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A numerical study on two-dimensional flow over two cylinders in staggered arrangement at lower Reynolds number is made. The simulation are performed under Couette-Poiseuille flow past a square cylinder (of height A^*) near a plane wall (at a gap height $0.5A^*$) in presence of upstream rectangular cylinders (of different heights a^* and widths b^*) placed at a different gap heights $L(=H^*/A^*)$ from wall and different spacings $S(=D^*/A^*)$ from the downstream square cylinder. The effect of position (S, L) and shape (a^*, b^*) of the upstream cylinder on the flow and aerodynamic forces of the downstream square cylinder are investigated. Seven different flow patterns are identified based on the gap height L and aspect ratio $r_1(=b^*/a^*)$ for the upstream cylinder of height A^* . The governing equations are solved numerically through a pressure-correction-based iterative algorithm (SIMPLE) with the QUICK scheme for convective terms. For Couette-Poiseuille flow unsteadiness is generated from both the cylinders in tandem cylinders at lower $L = 0.1$ for large $P = 5$. It indicates that the pressure gradient (P) and gap height (L) have an appreciable effect on the dependence on the flow around the cylinders. Unlike the Couette flow, the elongation of vortices decreases and stronger vortices are generated from the downstream cylinder in the Couette-Poiseuille flow.

MS/O/04

STABILITY AND HOPF-BIFURCATION IN A GAUSS TYPE TWO-PREY AND ONE-PREDATOR SYSTEM

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Dubey and Upadhyay [2004] and Rai and Upadhyay [2004] studied the dynamics of a food chain model which depends on the behavior of the top-predator. Here a Gauss type general prey-predator mathematical model is proposed and analyzed to study the effect of predation on two competing prey species. The growth rate and functional responses are taken to be general non-linear functions. The local and global stability of the system have been discussed. For the purpose of numerical simulation, growth rates of both prey species are taken to be logistic and the predator's functional response on the prey species are taken as Holling type-II. Taking death rate of the predator as a bifurcation parameter, we observe Hopf-bifurcation of the system. We also observed that intra-specific interference factor is also an important parameter in governing the dynamics of the system.

MS/O/05

A STUDY ON INTUITIONISTIC FUZZY CLUSTERING

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Intuitionistic fuzzy set (IFS) is a set of 2-tuple arguments, each of which is characterized by a membership degree and a non membership degree. The membership value indicates the degree of belongingness, whereas the non membership value indicates the degree of non-belongingness of an element to that set. IFSs have been found to be very useful to describe vagueness and uncertainty and hesitancy. The aim of this paper is to introduce a Intuitionistic Fuzzy clustering method for non numeric data such as sequences of activities. The Intuitionistic fuzzy approach is suitable as there is a certain amount of hesitancy degree in numeric as well as non numeric data which cannot be considered in fuzzy clustering. For numeric data to measure the distance between pairs of data we can make use of the Hamming distance, the weighted Hamming distance, the normalized Hamming distance, the Euclidean distance, the weighted Euclidean distance, the normalized Euclidean distance [9]. But for non numeric data to measure the distance between the pair we make use of the Levenshtein distance. Here we introduced Levenshtein distance-based Intuitionistic Fuzzy C-medoids (L-IFCMd) clustering model. We also introduced a noise version of the L-IFCMd for noisy clusters.

MS/O/06

PIEZOTHERMOELASTIC CONTINUUM SUBJECTED TO CONTINUOUS POINT MECHANICAL LOAD

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The two-dimensional problem of piezothermoelasticity has been considered to investigate the disturbance in homogeneous, transversely isotropic (6mm class) generalized cylindrical continua subjected to continuous point mechanical load. Mechanical load is acting on isothermal and electrically shorted surface. The Laplace and Hankel transforms technique have been employed to express the boundary conditions in the transformed domain. The formal solution is employed to obtain the system of simultaneous linear algebraic equations to the boundary conditions. This system of equations is solved by using Gauss elimination process for the unknowns. These values of unknowns are used in the formal solutions to find the expressions of displacements, temperature change, electric potential, stresses and electric displacement in the transformed domain. The inverse transform integrals are evaluated by using numerical technique. Non-dimensional Temperature change, normal stress and shear stress so obtained in the physical domain are computed numerically from the relevant expressions and relations code for PZT-5A material. Finally, the illustration of the results for classical and non-classical models of thermoelasticity has been presented graphically.

MS/O/07

ANALYSIS OF CIRCULAR PLATE IN CONTACT WITH LIQUID ON BOTH SIDES

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In this paper the analysis of circular waves in contact with liquid on both sides at varying temperature has been carried out. The model has been simplified by using Helmholtz decomposition technique and the resulting equations have been solved by using separation of variable method to obtain the secular equations for symmetric and skew symmetric wave motion of the circular plate in complex form. The results for coupled and uncoupled theories of thermoelasticity have been obtained as particular cases from the derived secular equations. The closed form solutions are also obtained under different situations and conditions. The computer simulated results in respect of dispersion curves for symmetric and skew symmetric wave modes are presented in order to illustrate and compare the theoretical results. The theory and numerical computations are found to be in close agreement.

MS/O/08

**PERFORMANCE STANDARD AND COMMUNICATION FLOW ON JOB
SATISFACTION OF TEACHERS OF SELF-FINANCING ENGINEERING
COLLEGES, USING MATHEMATICAL MODELING.**

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In early days, the higher education system of India was well supported by the Government. The salary and 'non salary' expenditures of the institutions were borne by the Government. But soon, Government realized that it is beyond their capacity to provide higher education to everyone. So, a scheme of 'self financing' institutions was proposed by various State Governments of India. Since then, many new colleges have come up with no financial support from Governments. Particularly, professional higher education colleges such as Engineering, Medical, Management, Computer and Information Technology colleges have come up in large numbers.

Some parameters related to job satisfaction and organization climate discussed in the paper with the help of standardized tools. Results are discussed with the help of descriptive statistics and influential statistics.

MS/O/09

VARIOUS UTILITY OF GRAPH COLOURING IN THE FIELD OF COMPUTER SCIENCE

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The main aim of this paper is to present the Utility of graph coloring concept in various fields of computer science for researches that they can use graph coloring concepts for the research. In this paper we review several utility of graph coloring such as image segmentation, clustering, image capturing, networking etc. This papers mainly persistent the applications such as Physical layout segmentation, Biprocessor tasks, Frequency assignment, Final Exam Timetabling as a Grouping Problem and Student Time Table. Graph coloring is very useful in our daily life or in other words we can say that it is helpful to overcome many real time applications in computer science.

MS/O/10

SOME BOUNDS FOR RATIO OF MOMENTS FOR A DISCRETE FREQUENCY DISTRIBUTION

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In this paper we shall find the Minimum value for the ratio of second order moment μ'_2 about origin to the square of the first order moment μ'_1 about the origin of a discrete

frequency distribution $\left(\frac{\mu'_2}{\mu'^2_1} \right)$. Here we try to find the best possible lower bound for the

above ratio when range is prescribed and total frequency $N = f_1 + f_2 + \dots + f_n$ of the values of the variate is also prescribed. Also when inequality reduces to equality also discussed in this paper.

MS/O/11

GRÜSS INEQUALITY FOR UNITARILY INVARIANT NORMS

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The Grüss inequality, as a complement of Chebyshev's inequality, states that if f and g are integrable real functions on $[a,b]$ and there exist real constants $\alpha, \beta, \gamma, \delta$ such that $\alpha \leq f(x) \leq \beta$ and $\gamma \leq g(x) \leq \delta$ hold for all $x \in [a,b]$, then

$$\frac{1}{b-a} \int_a^b f(x)g(x)dx \leq \frac{1}{(b-a)^2} \int_a^b f(x)dx \int_a^b g(x)dx \leq \frac{1}{4}(\|f\|)(\|g\|).$$

This inequality has been investigated, applied and generalized by many mathematicians in different areas of mathematics. Renaud (2001) gave matrix analogue of Grüss inequality by replacing integrable functions by normal matrices and the integration by a trace function. We present a general Grüss inequality for unitarily invariant norms on matrices.

We show that if A is a C^* -algebra of finite dimension k and $\phi: A \rightarrow M_n$ is a unital completely positive map, then

$$\|\phi(AB) - \phi(A)\phi(B)\| \leq \frac{1}{4} \|I_n\| \|I_{kn}\| d_A d_B$$

for any unitarily invariant norm $\|\cdot\|$ on M_{kn} and any $A, B \in A$, where d_X denotes the diameter of the unitary orbit of X and I_m stands for the identity.

MS/O/12

OPERATORS ON HILBERT SPACES

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The aim of this paper is to study the convolution operators on hilbert Space. The bounded, hermiton, compact convolution operators are characterized in this paper.

MS/O/13

REVIEW OF VARIOUS ASPECTS OF CAD

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Coronary Artery Disease (CAD) is being treated as one of the most challenging disease in today's era. Almost seventy million Indians have CAD and thirty million have had a Myocardial Infraction (MI). CAD happens because of atherosclerotic occlusion of the coronary arteries. Half of all deaths basically are due to Cardio Vascular Disease (CVD).

The coronary blood flow highly relies on perfusion pressure and vessel resistance .The mathematical representation of Coronary Blood Flow (CBF) can be represented as follows:-

$$CBF \propto \text{Perfusion Pressure (PP)} \quad \dots \text{(i)}$$

$$CBF \propto 1/\text{Vessel Resistance (VR)} \quad \dots \text{(ii)}$$

Coronary Perfusion (CP) is directly linked with diastole, so diastolic pressure is important. Coronary artery loses the power to release the vascular materials which allow the growing of CP as the demand increases.

As the number of patients with heart disease increases very rapidly, so there is a great need to develop radiologic tools for non-invasive imaging of the coronary arteries. Today, MRI, computed tomographic (CT) techniques are available with high speed and spatial resolution with sophisticated electrocardiographic (ECG) synchronization and robustness of use. According to the various authors, this technique gives very good result in coronary artery stenosis but cannot be used for routine diagnostic. For this reason, some sophisticated techniques are required for precise diagnosis of CAD.

In this paper the review of various aspects of CAD has been discussed.

SECTION: E



ES/O/01

NANOCEMENT ADDITIVES-A CARBON NEUTRAL STRENGTH ENHANCING MATERIAL

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Due to Rapid Growth in Construction Industry, the use of Cement is tremendously increasing for the development of advance building materials, some problem related to the sustainability for cement and concrete production still existing in the cement industries. For example, most of the concrete with local high volume fly ash/slag replacement cement, experienced constraint to attain the required early strength and ultimate strength limited in the range of 60MPa to 70MPa at 28days age. Higher than 98MPa concrete only can be produced by binary or ternary blended cement and limited to use together with silica fume in that case the Nanocement type material plays a important role, In this study the palm oil fuel ash (POFA) and rice husk ash (RHA) are used to produce the Nano Cement Additives (NCA) for carbon neutral cement (CNC). NCA can be produced by mechano-chemical activation in wet milling and precipitation method. NCA performance can be evaluated in OPC mortar by replace the OPC at dosage 0.5%, 1.0% and 1.5%, respectively.

Key words: Ash, mortar, concrete, precipitation, nanocement.

ES/O/02

MANAGEMENT OF ORGANIC WASTE GENERATED IN UNIVERSITY CAMPUS THROUGH VERMICOMPOSTING

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The major problems in our country are population explosion, rapid industrialization, environmental pollution and massive migration of people from rural to urban areas. In the present scenario, the human life has become more comfortable and healthy than ever. Now it has been pointed out that human activities are becoming the main cause of exploitation of nature. With the modernization and comfortable life style, more waste is getting generated. Generation of organic wastes has been increased in an unprecedented rate in India leading to disposal problems. Approximately 50 million tons of municipal waste is getting generated every year as by product of industrialization, mining, municipal, agricultural and other processes in various cities of India (CPCB, 2000; Sharholy *et al.*, 2008; Kumar *et al.*, 2009; Saha *et al.*, 2010). Safe, eco-friendly disposal and management of waste is one of the major global problems. Unscientific disposal of waste can adversely affect the environment by causing offensive odor, ground water contamination and soil pollution posing a risk to human health (Sharholy *et al.*, 2005; Garg *et al.*, 2006; Sharholy *et al.*, 2008).

There are various physical, chemical and microbiological methods of disposal of waste but they are time consuming and need very high cost and input. A sustainable approach to handle

problem of waste management is vermicomposting. Vermicompost which provides macro and micro nutrients to the plants also reduces pollution by providing a valuable substitute for chemical fertilizers. The present study deals with vermicomposting of organic wastes available in Arni University campus. Various types of organic waste viz. agriculture, kitchen/mess, paper & pea was recycled by mixing them with cow dung by making use of African earthworms. A mixture of agricultural waste & Dung (AW+D) in the ratio 2:3 proved to be best additive for the preparation of vermicompost and biomass production.

Key words: Organic wastes, Waste management, Vermicomposting, Earthworms.

ES/O/03

SORPTION STUDIES ON AZARDIRACHTA INDICA (NEEM) AND FICUS RELIGIOSA (PIPAL) SAWDUST CHARCOALS FOR THE ORGANIC POLLUTANT (PHENOL) REMEDIATION IN AQUEOUS ENVIRONMENT - A COMPARATIVE STUDY

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The adsorption of Phenol was examined in aqueous solution into plant based adsorbents charcoals viz. Azadirachta indica (Neem sawdust) and Ficus religiosa (Pipal sawdust). Effects of various process parameters such as contact time, adsorbent dosage, pH and phenol concentration were investigated. The adsorption capacities of the charcoals were found dependent on the pH of phenol solution with pH 7.0 being optimal. Azadirachta indica charcoal was found better sorbent compared to Ficus religiosa charcoal. The adsorption capacities were found to be 66.7 mg/g and 28.32 mg/g for Azadirachta indica saw dust charcoal and Ficus religiosa saw dust charcoal. The equilibrium data were fitted to Langmuir isotherms. The desorption studies showed to recover the absorbed phenol from charcoal were performed with NaOH, HCL solution, distilled water.

Key words: Phenol, Plant based adsorbents charcoals, isotherms, adsorption and aqueous solution.

ES/O/04

ENERGY NEEDS, GEOTHERMAL ENERGY AND ENVIRONMENT ISSUES

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At present the world is facing a huge energy crisis; given an enormous increase in the global demand for energy in recent years as a result of industrial development and population growth. Since the beginning of 21st century the demand for energy, especially from liquid fuels, and limits on the rate of fuel production has created such a bottleneck leading to the current energy crisis. In view of the environmental issues a great amount of funds, work and

R & D is being diverted into the alternative sources of energy such as geothermal, hydropower, solar and wind etc... Geothermal energy is an immense store of heat ($\sim 10^{13}$ J), which alone would take over 10^9 years to exhaust. This source of energy is an extremely large and self sustained natural gift. There are selected sites worldwide where the energy is utilized both for electric power generation and direct domestic uses. In this work, the environmental issues pertaining to all the energy sources and advantage of geothermal source over other conventional and non-conventional energy sources and various methods of harnessing and technologies are discussed. The current status of energy sources in India and Himachal is also presented. In the light of various studies it has been concluded that India has a great potential of geothermal power, which must be harnessed on priority to produce electricity and fulfill her growing power needs.

ES/O/05

MICRO-WAVE ASSISTED SYNTHESIS OF *GUM XANTHAN-PSYLLIUM-G-POLY(AA)-ZN[FE(CN)₆]* BASED NANO-SUPERABSORBENT FOR THE EFFICIENT REMOVAL OF MALACHITE GREEN FROM INDUSTRIAL EFFLUENTS

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Present work deals with the synthesis of *Gum xanthan-Psyllium-g-poly(AA)-Zn[Fe(CN)₆]* based hybrid nano-superabsorbent using free radical polymerization technique under the influence of microwave radiations. Fourier transform infrared spectroscopy, X-ray diffraction, and scanning electron microscopy techniques were used for characterization of nanocomposite. Malachite green adsorption capacity of the device was investigated at different conditions such as adsorbent dose, initial concentration, pH and contact time. The results indicated that nano-composite is the potential candidate for the malachite green removal from waste water and proved to be boon for textile sector.

ES/O/06

REMOVAL OF CHROMIUM FROM LEATHER INDUSTRY WASTE BY USE OF ORGANIC CHELATES

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One of the major solid wastes produced from leather industry is Chrome-Tanned Leather Shavings (CTLSSs). These CTLSSs contain Cr in +3 oxidation state which is non-toxic but there is growing concern that Cr (III) could possibly be converted to Cr (VI), a toxic state

which is carcinogenic & mutagenic to living organisms. Several methods for Cr removal from solid waste are alkaline hydrolysis, acidic hydrolysis, enzymatic hydrolysis etc.

In the present investigation, we made use of a novel method which allows the decontamination of the Cr - containing leather shavings. Chelating agents such as sodium oxalate, potassium tartarate and EDTA were tested for their efficiency to separate Cr from leather shavings. The principle is based on the reversibility of the tanning process, in order to decontaminate the waste without its previous digestion. Firstly, the solid leather waste technically called "wet blue" was tested for its initial Cr content by ALCA D10 that was found to be 4.4%. Samples were treated with different alkalies as well as chelating agents for Cr extraction. Results obtained indicated that their Cr extraction yield in case of alkalies is low, whereas it was significantly enhanced (3.9%) with use of chelating agents. The effect of several parameters such as bath temperature, pH of solution, time duration and concentration of chelating agents on the treatment process was also studied. The optimal yield of Cr extraction obtained was about 90%.

Key words: Leather industry, CTLs, pollution, organic chelates, decontamination

ES/O/07

**DISTRIBUTION AND ABUNDANCE OF GANGES RIVER DOLPHIN
(*PLATANISTA GANGETICA GANGETICA*) IN GERUWA RIVER (UTTAR
PRADESH)-INDIA**

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The Geruwa River is one of the best habitats for dolphins in India. A survey in the 18 km of the Geruwa River in Katerniaghat Sanctuary was conducted during the year 2013. The survey methods and the conditions, under which it was undertaken, have been described in detail to facilitate unbiased interpretation and comparison of the survey results. Adequate search effort for dolphins was consistently maintained throughout the survey. Dolphins were encountered along most of the river by boat transect method. Low-best-high figures of 26-39-42 dolphins were estimated, with an encounter rate of 1.56 dolphins/km. based on the best estimate. Although the presence of dolphins was reported in almost every section of the river, their presence was recorded for the areas with particular physical parameters. The result indicates the preferences of dolphins for such habitat that could be the critical habitat for the species, may be seasonal or temporal. It is therefore important to maintain the stretches that could serve as feeding areas for the dolphins for the long term survival of the species. Alteration in water level should be tried to maintain, to make the natural deep and shallow pools available for the species.

Key words: Geruwa River, river dolphin, conservation, distribution, abundance

ES/O/08

SORPTION INVESTIGATION ON THE REMOVAL OF METAL IONS FROM AQUEOUS SOLUTIONS USING CHELATING COPOLYMER RESIN

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A copolymer resin was synthesized from 2-hydroxy 4-methoxyacetophenone and dithiooxamide with formaldehyde (2-H4-MADOF) by an eco-friendly technique in dimethyl formamide medium. The resin was characterized by elemental analysis, UV-Visible, FTIR, ¹H NMR, ¹³C-NMR and viscometric measurement. The surface morphology of the copolymer resin was established by scanning Electron Microscopy. The number average molecular weight was determined by non-aqueous conductometric titration. One of the important applications of these types of polymer is their capability to act as chelating ion-exchanger. The chelation ion-exchange properties of the copolymer showed a powerful adsorption towards specific metal ions like Fe³⁺, Cu²⁺, Ni²⁺, Co²⁺ and Zn²⁺. A batch equilibrium method was adopted to study the selectivity of the metal ion uptake involving the measurement of the distribution of the given metal ion between the polymer sample and a solution containing the metal ion over a wide range of concentrations and pH of different electrolytes.

ES/O/09

MANAGING SANITARY LANDFILLS IN HIGH DENSITY URBAN AREAS

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Landfilling is an unavoidable component in municipal solid waste (MSW) management and its planning and design, construction, operation & maintenance involves technical skills and safety measures in terms of health and environmental protection. With the rapid increase in the population in urban areas, the volume of MSW has increased considerably, posing a big challenge in its disposal. Urbanization, uncontrolled production, poor consumption patterns, lack of adequate resources to manage waste and poor planning has made it necessary to adopt more proactive methods of solid waste disposal (advanced and sustainable sanitary landfills). Within the landfill biological, physical and chemical processes transform the disposed waste not only in physical form, but also generate secondary hazardous compounds (toxic leachate) that further penetrate the environment causing a substantial hazard to the aquifers, surface waters, and the soil. Poorly constructed and mismanaged sanitary landfills are associated with risks like instability of the ground, soil and groundwater contamination, generation of landfill gas (including greenhouse gases) with odors and finally leading to adverse health effects associated with hazardous waste. Sustainable technologies for managing sanitary landfills include recovery of possible materials for recycling, control and treatment of toxic leachate,

landfill gas utilization for energy recovery, regular monitoring of ground water and successful remediation of closed sites.

Key words: Anaerobic, aquifer, global warming, leachate, passive vents, bioreactor, drainage trenches.

ES/O/10

ROLE OF SPACE TECHNOLOGY MEDIA IN ENVIRONMENT AND DISASTERS INSIDE HIMALAYA

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With the tropical climate and unstable landforms, coupled with high population density, poverty, illiteracy and lack of adequate infrastructure, India is one of the most vulnerable developing countries to suffer from various natural disasters, namely drought, flood, cyclone, earth quake, landslide, forest fire, hail storm, locust, cloud burst and volcanic eruption etc. which strike causing a devastating impact on human life, economy and environment. Though it is almost impossible to fully recoup the damage caused by the disasters, it is possible to (i) Minimize the potential risks by developing early warning strategies (ii) prepare and implement developmental plans to provide resilience to such disasters (iii) mobilize resources including communication and tele-medicinal services and (iv) to help in rehabilitation and post-disaster reconstruction. Space Technology plays a crucial role in efficient mitigation of disasters. While communication satellites help in disaster warning, relief mobilization and tele-medicinal support, earth observation satellite provide required database for pre-disaster preparedness programmes, disaster response, monitoring activities and post-disaster damage assessment and reconstruction, and rehabilitation. Himalaya ecosystem is harbor of natural resources and play critical role in the ecological and economic processes of the region. Deforestation, Landslides, land degradation, desertification and Glacier Lake Outbursts Flooding (GLOF) are the common environmental issues in the mountain regions. The major challenge currently faced by the mountain environment is the escalation of these issues through atmospheric as well as man induced changes.

Key words: Himalaya, Disaster, Space Technology, Management, Communication satellite.

ES/O/11

ENERGY CONSUMPTION FORECASTING IN AN EDUCATIONAL BUILDING

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Energy efficiency applied to all kinds of buildings represents one of the major aspects in today's international energy scenario. Achievements of the targets fixed by the Kyoto Protocol are becoming elementary apprehension in the work of people involved in the energy

field. Emissions reduction and optimal energy management practices are the need of the time with uncertainties in generation and demand; hence the development of consistent energy forecasting methods is important priority area of research in energy fields. This paper presents an energy consumption forecasting model and the way it was applied to a real case study, to forecast the energy consumption of the "Administrative Building" of Shoolini University in Himachal Pradesh, India. The forecasting is performed through the execution of an artificial neural network (ANN). Loads, data concerning the type of day, time of the day and weather data were taken as inputs for the proposed multi-layer perceptron ANN, based on a back propagation training algorithm model. In particular, this work focuses on comprehensive analysis and an innovative formal procedure for the selection of all the ANN parameters.

Key words: Load Forecasting; Neural Networks; Electrical Consumption; Energy Management Systems; Building Management Systems

ES/O/12

PHYLOGENETIC STUDY ON NOCTUID SPECIES (LEPIDOPTERA) OF HIMACHAL PRADESH

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Insect species that directly feed on plants play important functional roles in agricultural ecosystems, as they contribute to nutrient recycling. Moreover, most species can be serious pests and vectors of crop diseases, having economically important consequences for the agricultural industries. Due to their ecological and economical importance, research on systematic, phylogenetics, ecological genetics and molecular methods for detection and control of vector transmitted diseases of insect species are needed. This study aimed at elucidating the genetic variations among different Noctuidae moth species and estimating the genetic relatedness among these species. Four Noctuidae moth species namely *Chryodeixis acuta*, *Asata cariae*, *Pseudaletia separta* and *Cerura litura* subjected to analysis to find phylogenetic relationship among them. RAPD PCR molecular biological tool applied to these species to find the genetic difference between these species. Primers namely OPA-9, OPA-13 applied and score a total 18 and 13 band respectively. A significant difference between these species implicated the importance of RAPD PCR as a powerfull tool for biodiversity analysis of species. Phylogenetic tree constructed with NJ statistical analysis with showed that *Asata cariae* and *Chryodeixis acuta* are more closely related then *Cerura litura* and *Pseudaletia separta*. *Pseudaletia separta* is distinctly related with *Asata cariae*. There is significant difference in the branching of molecular data which signifies the importance of RAPD-PCR for taxonomic classification and understanding the evolution of the different species.

Key words: Primer, moth, molecular, classification

SECTION: E



ES/P/01

VERMIWASH: A WONDERFUL LIQUID BIOFERTILIZER

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Our nation has entered into an era where under the changing world conditions, public is expressing increasing concern about protecting human health and preserving the quality of environment. One of the environmental issues plaguing the country is that of solid waste. Recycling of solid waste by using earthworms is the only solution to the problem. Vermicomposting practice is slowly becoming popular in India. It is the best method to recycle organic waste stuffs such as kitchen and vegetable waste, fruit market and food industrial wastes, poultry waste, garden and temple waste etc. One drawback of this technique is that complete decomposition & conversion of these wastes into manure may take 55-60 days. Vermiwash (liquid compost) can be prepared at much faster rate and in much easier manner. In the present study an effort was made to design a unit to prepare vermiwash using giant African night-crawler, *Eudrilus eugeniae* worms. A good quantity of compost was obtained within 15-20 days only. The NPK value of liquid compost obtained was almost similar to that of vermicompost.

Keywords: Earthworms, vermicompost, vermiwash, biofertilizer

ES/P/02

**ENVIRONMENTAL AWARENESS: A CASE STUDY OF GOVT. COLLEGE
NALAGARH**

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Awareness is the key to survival or lead a healthy life in more than one way. It is often stated that paranoia is ultimate awareness. Generally, while there is no need to be paranoid about environmental conservation, it is important to be aware of the various problems that the mother Earth is facing, the under lying causes and the various means by which the problems can be minimized and mitigated as well. Efforts to create environmental awareness Globally, are evident in the ways in which the environment is venerated. To celebrate different days i.e. World Environment Day, Earth Day, World Forestry Day, National Science Day, World Population Day and International Youth Day etc. are all occasions deliberately conceived and nurtured to create widespread awareness about the environmental concerns in the society. Creating worldwide awareness is aimed at large-scale environmental conservation goals. There may be quite difference among the local, regional and global environmental issues. It is imperative to 'think globally and act locally'. Initiatives taken at smaller geographical scales can contribute immensely to achieve large-scale conservation goals. Thinking globally can orient the individual to environmental science and policies which can then be adapted to suit local situations. The role of educated youths in spreading environmental awareness widely is awesome and noteworthy in the present scenario. The present case study shall be helpful in

analyzing the opinion of the students regarding environmental awareness, conservation and relating issues on one hand, whereas their own role in this regard on the other.

Key words: Environment, Conservation, widespread, Awareness, Youth.

ES/P/03

SYNTHESIS OF ACETYLATED SOY PROTEIN-POLY(MMA) BASED ENVIRONMENT FRIENDLY GRAFT COPOLYMER- ITS APPLICATIONS IN PROTECTION OF AQUATIC LIFE AGAINST OIL-SPILLS

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Biopolymers are the emerging field of investigation. The increasing environmental consciousness and demands of legislative authorities lead to the interest of researchers in the biopolymers. A large number of biodegradable polymers are under investigation all over the world. Scientists have made the attempts to solve the environmental issues by introducing biodegradability into polymers, through chemical or radiation induced modifications. Recent advancements in natural fiber development, genetic engineering and composite science have offered opportunities for improvement in materials obtained from renewable resources with enhanced support for global sustainability. The present work deals with the acetylation of soy protein and its further modification through graft copolymerization using methyl methacrylate. The graft copolymer obtained was found to have important application in the protection of aquatic life against oil-spills.

ES/P/04

PREPARATION OF ECO-FRIENDLY HYBRID BACKBONE-POLY(ACRYLAMIDE) BASED SEMI-IPN AND ITS APPLICATION IN THE REMOVAL OF HEAVY METAL IONS FROM INDUSTRIAL EFFLUENTS

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Super-absorbents are three-dimensional cross-linked networks of linear or branched chains with high efficiency for absorbing water and biological fluids. This ability is due to the presence of certain functional groups like $-NH_2$, $-COOH$ and $-OH$. Cross-linked materials based on natural materials because of their easy availability, low production cost, non-toxicity, biocompatibility and biodegradability have attracted attention of Scientists throughout the world. Such materials have lot of applications like controlled drug delivery devices, biosensors, tissue engineering, contact lenses, soil conditioning, removal of heavy metal ions and toxic dyes.

Present research work is focused on the preparation of eco-friendly super-absorbents by grafting and crosslinking poly(acrylamide) chains onto natural hybrid backbone. The device has been found to be effective in the removal of toxic heavy metal ions from industrial

effluents. Most significant feature of the device developed was its complete biodegradation both under soil-burial and composting conditions within 60-70 days.

ES/P/05

SYNTHESIS OF ECO- FRIENDLY GRA-CL-POLY(AAM)-ZTIP-UV CATION EXCHANGER - ITS APPLICATION IN TEXTILE INDUSTRY

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Ion-exchangers are the emerging field of investigation in the present time. The ion exchangers can be used in the removal of various industrial dyes and metal ions present in industrial effluents. During past few years the investigators concentrated on the eco-friendly bio-degradable ion-exchangers. The exchangers having biodegradable properties are highly appreciated because they do not have any adverse impact on the environment.

Present work deals with the preparation of eco- friendly GrA-cl-poly(AAm)-ZTIP-UV cation exchanger . The material prepared was characterised using FTIR, SEM, EDS, TGA/DTA/DTG and XRD techniques. The device prepared was used as an adsorbent for the removal of toxic dye malachite green (MG) and different toxic heavy metal ions. Equilibrium behaviour of the ion exchanger was investigated by performing batch adsorption experiments. The effects of MG concentration, pH, adsorbent dose and temperature were evaluated. More than 80% MG dye removal was observed with 500mg ion exchanger.

ES/P/06

SYNTHESIS OF GUM XANTHAN-PSYLLIUM BASED GREEN HYDRID SUPERABSORBENT: ITS APPLICATION IN REMOVAL OF TOXIC METHYLENE BLUE DYE

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A novel Gx-Psy-cl-poly(AA) hybrid hydrogel with *in-situ* incorporation of $\{Zn[Fe(CN)_6]\}$ nanoparticles was synthesized by free-radical copolymerization in aqueous medium under pre-optimized process parameters using glutaraldehyde as cross-linker and ammonium persulfate as an initiator system. The effect of several variables such as time, solvent, temperature, pH, crosslinker, initiator concentration and monomer concentration on the swelling capacity was explored. The morphological and structural properties of the candidate polymers were studied using scanning electron microscopy (SEM), X-ray diffraction (XRD), UV-Vis, thermogravimetric analysis (TGA) and Fourier transform infrared spectroscopy (FTIR). Finally, the synthesized crosslinked hybrid device was used for the removal of toxic methylene blue (MB) dye from waste water. The device developed had shown remarkable degree of dye removal from industrial effluent.

ES/P/07

NUCLEAR ENERGY: IS IT REALLY GREEN?

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Every nuclear plant will not succeed at some point from decay and material weakness so where will they put all the hot radioactive material? The same thing happen for hydraulic fracking for oil and gas, every well will fail since they use carbon steel well casings. Contamination from plant will leach into the water air and soil and the companies that franked will be long gone leaving the mess to the next generational land owner and our worldwide surroundings to deal with it. We need sustainable energy like our lives depend on it. Even if you design plants which last 40 or 50 years they will still fail after the certain duration leaving so many things behind which is not visible like cancer, thyorides and various species

ES/P/08

PHYSICO-CHEMICAL CHARACTERISTICS OF WATER FOR FISH PRODUCTION USING SMALL LAKE

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The physical–chemical characteristics of water in a lake were investigated with a view to optimize the conditions for fish productivity. Different sites were selected in different season in the study. The water samples were collected in each pond at a depth of 10-15 cm from the surface over a period of six months and analyzed for pH, temperature, DO, alkalinity and COD. The fish activity and growth rates were also assessed. The results indicated that the lake were slightly acidic to neutral (pH 6.68-7.56). The mean lowest and highest values of DO were 9.00 and 10.93 mg/L while the values for alkalinity were 69.86 and 95.57 mg/L, respectively. t was also observed that the fish activity increased as the temperature of the water varied from April to September. The lowest values were obtained in the months of April, May and June and highest values were in the months of July, August and September.

Key words: Lake, Physical, Chemical, Fish

ES/P/09

EFFICIENCY OF DIFFERENT YELLOW STICKY TRAP FOR SERPENTINE LEAFMINER *LIRIOMYZA TRIFOLLI* (BURGESS) IN TOMATO CROP

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The serpentine leafminer, *Liriomyza trifolli* (Burgess) is one of the important insect pests of tomato which causes damage to tomato by mining the leaf surface. Due to the excessive mining photosynthetic ability of plant is drastically reduced. Since this insect has been reported to be resistant to many insecticides, monitoring and mass trapping of the population of adult is one of the strategies for its management in tomato. In the present study, three different types of sticky yellow traps viz, paper traps, tin traps and transparency traps were assessed for their relative efficacy in capturing the adult of serpentine leafminer in two varieties of tomato (Solan Red Round and Yash) under polyhouse conditions. Maximum adult trap of 24 adults/ trap was observed in the paper sticky yellow trap during the 2nd week of July and the 3rd week of August, whereas the trap catch of adult in the tin yellow sticky trap and transparency yellow trap during the 2nd week of July was 5 adult/ trap and 6 adults/ trap, respectively. In the 3rd week of the August, the adult catch in these traps was 4 and 5 respectively indicating thereby superiority of paper yellow sticky traps act other traps

Key words: Yellow sticky traps, polyhouse, serpentine leafminer.

ES/P/10

TAXONOMY AND BIOLOGY OF SEED BORER, *PLODIA INTERPUNCTELLA* HÜBNER (LEPIDOPTERA: PYRALIDAE) INFESTING SEEDS OF CHILGOZAPINE (*PINUS GERARDIANA*)

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Chilgoza seeds which are produced by Chilgozapine (*Pinus gerardiana* Wall.) are economically important and are heavily attacked by both insect borers and pathogens. The seed borer identified as, the Indian meal moth, *Plodia interpunctella* Hübner (Indian meal moth) is reported for the first time infesting the seeds of Chilgozapine (*Pinus gerardiana* Wall.). It is a Pyralid moth belonging to the family Pyralidae (Lepidoptera). Its Larvae (caterpillar) are commonly known as 'waxworms'. During the present study genital and wing venation of this species has been studied to update the taxonomic characterization. Complete biology had been studied on the new host (seeds of Chilgozapine).

Key words: Chilgozapine, Seed borer, Pest, Species, Taxonomy.

ES/P/11

ENVIRONMENTAL CONSERVATION IN VEDIC LITERATURE AND MODERN ERA

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Conservation of Environment is an integral part of Vedic literature. All natural powers have been respected and worshipped as Gods and Goddesses. In modern context there is great need of conservation of nature. Habitat destruction is one of the reasons for extinction of fauna and flora. Awareness among the public near Hamirpur discussed.

ES/P/12

ASSESSMENT OF PHYSICO-CHEMICAL CHARACTERISTICS AND SUGGESTED RESTORATION MEASURES FOR LAKE KUNTBHYOG, HIMACHAL PRADESH, INDIA

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The present work was conducted on the Kuntbhyog Lake located at top hill in the historic holy town of Rewalsar; district Mandi, (H.P) India. This lake comes under the category of sacred lakes and is unique in terms of religious and ecological significance. Eutrophication, anthropogenic pressures, holy rituals and tourism have been contributed to its deterioration with a consequent adverse impact on the lake water quality. For the present research work four sampling sites were identified and the lake water quality was analysed for physico-chemical characteristics on a monthly basis over a period of six months in year 2011. Every water sample was analysed for physical and chemical parameters to check status of water quality. The study revealed that the lake water was slightly alkaline. The total dissolved solids, transparency values were high & BOD COD values were showing significant increase with decrease in O₂ level in water. Rest of parameters was at critical level of permissible limits. Thus lake is touching alarming conditions of water pollution due to massive anthropogenic pressure. The restoration may include canalization of rills-gullies, construction of check dams, de-weeding and dredging of slit. Public awareness regarding fresh water lake should be encouraged to revive its life.

Key words: Kuntbhyog lake, Water pollution, Restoration, Eutrophication

ES/P/13

STRATEGY FOR REDUCING ENERGY CONSUMPTION AND CO₂ EMISSION OF AN INSTITUTIONAL BUILDING BY IDENTIFYING VARIOUS SOLAR PASSIVE FEATURES AND ENERGY EFFICIENT TECHNOLOGIES

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A six storey administrative building of Shoolini University at Bhajol, Solan, Himachal Pradesh has been taken as the case study. It was found that the energy load of the building during the winter months was 165.27 MWh, whereas during summer months was 110.99 MWh, and thus annual load of the building under study was 276.26 MWh. The total energy load of the existing building is being met out by using conventional sources of energy. The emission of CO₂ by using fossil fuels has been estimated and worked out 1.11 tonne per annum. The strategy to reduce energy consumption of the building has also been presented in the study. It has been found that by adopting solar passive features viz. insulation to north wall and the roof, increasing glazing at south wall, double glazing at north wall and energy efficient feature like light emitting diode in the building, the energy consumption can be reduced by 36.61% besides resulting reduction in CO₂ emission by 36.94%. The fuel bill of the building will also be reduced by 36.67%. All the suggested energy efficient features require Rs 34.0 lac investments with a payback period of four years.

Key words: Heat load, CO₂ emission, solar passive features, Energy efficient technologies etc.

ES/P/14

IMPACT OF CLIMATE CHANGE IN HIMACHAL PRADESH: PRESENT STATUS AND FUTURE IMPLICATIONS

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In recent time, climate change has posed a serious threat to world. It has equally affected tropical as well as temperate areas of the world. The hilly Himalayan region, having fragile, sensitive ecosystems, has also been profoundly affected by this global phenomenon. The western Himalayan state of Himachal Pradesh has also felt the impact of this global menace. The present study is aimed at studying the impact of this global danger in Himachal Pradesh, action taken so far and further necessary steps to be taken to cope up with this danger to humanity.

ES/P/15

BIODIVERSITY: IMPORTANCE AND CLIMATE CHANGE IMPACTS

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Biodiversity is the variability among living organisms, including genetic and structural difference between individual and within and between individual and within and between species. Biodiversity plays a direct role in climate regulation. Biodiversity conservation will lead to strengthening of ecosystem resilience and will improve the ability of ecosystem to provide important services during increasing climate pressures. This review basically focuses on the importance of biodiversity, the consequences faced by the plants, animals, humans and ecosystem owing to the global warming and climate change and the possible mitigation and adaptation strategies in terms of biodiversity conservation which can protect the planet from the consequences of climate change.

Key Words: Biodiversity, climate change, mitigation and adaptation.

ES/P/16

SUSTAINABLE DEVELOPMENT AND RESOURCE MANAGEMENT

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Over the past few years, “Sustainable Development” has emerged as the latest development catchphrase. A wide range of nongovernmental as well as governmental organizations have embraced it as the new paradigm of development. A review of the literature that has sprung up around the concept of Sustainable Development indicates, however, a lack of consistency in its interpretation. More important, while the all-encompassing nature of the concept gives it political strength, its current formulation by the mainstream of Sustainable Development thinking contains significant weaknesses. These include an incomplete perception of the problems of poverty and environmental degradation, and confusion about the role of economic growth and about the concepts of sustainability and participation. How these weaknesses can lead to inadequacies and contradictions in policy making is demonstrated in the context of international trade, agriculture, and forestry. It is suggested that if Sustainable Development is to have a fundamental impact, politically expedient fuzziness will have to be given up in favour of intellectual clarity and rigor. The vagueness of the concept of sustainable development, coupled with its increasing importance in national, international and corporate policies, has led to a large political battle for influence over our future by linking interpretation to the concept. This has resulted in a wide variety of definitions and interpretations that are skewed towards institutional and group prerogatives rather than compounding the essence of the concept, which has been inherent in traditional beliefs and practices. A systematic analysis of representative definitions and interpretations presented in this article reveals that most of the contemporary definitions focus on specific elements while failing to capture the whole spectrum. Such a historical and conceptual analysis focusing on the analysis of the metaphorical and epistemological basis of the different definitions is

believed to be the first step towards developing a concrete body of theory on sustainability and sustainable development.