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National Seminar on

Solid Waste Disposal and Management to Protect Environment -Wealth from Waste

Sri Siddhartha Pharmacy College, Nuzvid *4 June, 2017*

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SEMINAR ABSRACTS

1. Key Note Address:

Solid Waste - Strategic Management and Handling of Various Wastes

G. Ramakrishna Naidu
Professor Emeritus
Department of Environmental Sciences, S.V. University,
Tirupati – 517 502, Andhra Pradesh, India
E-mail: naidugrk@gmail.com

The last few decades India's growth story showed a steady growth in its Gross Domestic Product (GDP) and at the same time on other hand has also resulted a rapid increase in both domestic and industrial waste. Rapid urbanization is the main driver for domestic waste and is slated to change India from a largely rural to a majority urban country by 2020. In contrast rural waste is largely agricultural in nature and is dispersed over half-a-million habitations making them 'manageable'. However, rural areas do suffer as 'pollution sinks' for the encroaching urban sprawl. At present, India produces more than 62 million tonnes of solid waste annually, of which 80 per cent is disposed of indiscriminately at dump yards in an unhygienic manner by the municipal authorities leading to problems of health and environmental degradation. The Indian industrial sector generates an estimated 100 million tons/year of non-hazardous solid wastes, with coal ash from thermal power stations accounting for more than 70 million tons/year. Waste is classified in to four main categories namely Urban, Industrial, Biomedical and E-waste. Waste has always been a perennial problem and its management remains a big dilemma up to this day, since the generation of solid waste increases as populations rise and economies develop. Managing waste in an environmentally sound, socially satisfactory and a techno-economically viable manner is Sustainable Waste Management. It is achieved through strategic planning, institutional capacity building, fiscal incentives, techno-economically viable technologies, public-private partnerships and community participation. Lack of financial resources, institutional weaknesses, improper choice of technology and public apathy towards waste has made the prevalent system of waste management far from satisfactory. Hence, there is a necessity to focus on the generation of solid waste from various sectors and the technologies being used so far for the handling and management of the solid wastes in terms of environmental protection and economical considerations.

Special Papers Abstracts

1. Recognition and attention to Waste

Prof. U.Muralikrishna, Retd.
Professor of Chemistry, Andhra University, Visakhapatnam.

Man's struggle for subsistence and sustenance is quite understandable and reasonable. But when once these accrue he develops avarice with the result he becomes more self-centered and selfish, the consequence of which leads to grab more and more. This culminates in stress on sustainability resulting in the disturbance of eco-balance and strain on sharing the resources. All this culminates in waste generation that requires attention to disposal or other methods of management. The World body pf Chemists recognized this and issued a slogan: "Waste recycled is wealth compensated' in the year 1993 at the Pittsburgh Conference of Analytical Scientists. It, is obvious that waste and wealth are inter linked and are inverse in their impact on the resources that man depends on.

Chemists have an important role to play in both identification and appropriate management of waste. The first part of is to identify the waste in our day to day activities including different process industries that cater to the needs of the man. To highlight that a chemist can tackle such problems I wish to mention two

representative examples (i) recovery of Silver form photographic and X-ray films (ii) removal of Mercury from the effluent of paper industry before letting out into the nearby river.

Reviewing about wastes, recognition, disposal/removal and recycling one should bear in mind that the remedy should not aggravate the malady.

2. Biomedical waste-chracterisation treatment and control...

Prof S M Khopkar
I.I.T,Bombay

With great advances in sciences especially in medicine in all metropolitan cities are witnessing the opening of several super specialty hospitals. No doubt it is great relief to have healthy life. However we have to consider occupational safety of the medical wastes it poses a serious problem of specialized need characterization transportation treatment and the safe disposal Although the environmental science has advanced greatly in last few decades due to hard work of human being the biomedical waste poses a peculiar problem to mankind with special attenuation of some problems of disposal of in atmosphere This is because the incineration is not the panacea for the mitigation of handling such waste The biomedical waste consist of human blood, culture and stocking agents ,pathological waste, contaminated sharps instruments, bedding sheets all kinds of biological waste ,such waste is rarely characterized Further Its transportation is a big problem in special containers during transportation to a site \The most important aspect is the treatment such treatment mainly consists of disinfection such process involves steam sterilization as, the incineration is the last option as we don't to have new problem of air pollution depending upon the kind of waste we need a special treatment with the ultimate goal of minimization and the time as well as the temperature of sterilization is most critical.

The situation is most alarming in our country We have serious problem of disposal of simple solid waste involving the easy job of segregation in to dry and wet waste for subsequent treatment of vermiculite r or power generation is just not possible even in accountability of big cities where we claim a city of most educated citizens Fortunately oaf better consecration of water chemistry the problem of liquid waste is fortunately solved in most of the industries with the awareness of hazardous waste the dilemma of biomedical waste came to forefront and we have really a challenge of controlling and disposal of medical waste within a reasonable time.

Invited talks

1. Solid Waste Management

Dr. Mannam Krishnamurthy
Varsity Education Management Limited, Ayyappa Society, Madapur, Hyderbad-500 081.
E-mail: varsitymkm@gmail.com, mannamkm@varsitymgmt.com

Solid or semi-solid materials which are non-soluble in nature are solid waste. Sources and types of solid waste are consolidated and composition of waste is analyzed. Solid waste management hierarchy is presented. Methods of waste disposal like incineration, recycling, plasma gasification, landfills and ocean dumping are discussed. Care towards protection of human health, maintaining better environment and wealth from waste are projected and presented.

2. Design and Synthetic Rationale of Dual DPP4-ACE Inhibitors for treatment of metabolic syndrome

Dr. Sreedhara R Voleti, PhD
Managing Director
INDRAS Private Limited, 44-347/6, Tirumalanagar, Moula Ali
Hyderabad - 500040, TS, INDIA. Phone: +91-9949153535
E-mail: sreedhara.voleti@indras.in & sreedhara.voleti@gmail.com

Designing drug candidates exhibiting polypharmacology is one of the strategies adopted by drug discovery researchers to address multifactorial diseases. Metabolic disease is one such multifactorial disorder characterized by hyperglycaemia (Diabetes), hypertension (Blood Pressure) and dyslipidemia (lipid enhancement) among others. Here, a new class of molecular framework combining the pharmacophoric features of DPP4 inhibitors with ACE inhibitors to present single potent dual inhibitors of coupled metabolic disorder. Extensive molecular modelling studies and rationalization is presented for observed pharmacological activity of the prioritized molecules from all conceptualized dual-inhibitors.

3. Bio Medical Waste Management

Dr. Sree Karuna Murthy. Kolli, MD, FAMS, FIPHA, FCGP
Hon.Gen. Secretary, IMA, AP State

Do not let the Waste of "the Sick" contaminate the lives of "the Healthy"

Estimated 1 million needle-stick injuries every year among 8.8 million workers & nearly 18,000 workers get infected & at least 250 used to die every year in the U.S.
Risk of infection from a deep needle-stick injury involving fresh blood from an infected patient
HIV: 1 in 250, Hepatitis C: 1 in 10 to 1 in 30, Hepatitis B: 1 in 3 to 1 in 5
Estimated Infections Worldwide Due to Unsterilized Needles (including needle-stick injuries)
HIV Infections: 80,000 to 160,000 per year, Hepatitis C Infections: 2.3 to 4.7 million & Hepatitis B Infections: 8 to 12 million per year
Kinds of medical personnel exposed to needle-stick- Staff & Student nurses-43.1%; Interns-15.7%, Residents-11.7%; Technical staff- 6.0%; Healthcare workers-19.0% and others- 4.5%.

1. *HOSPITAL WASTE means, all waste coming out of hospital*
2. *MEDICAL WASTE means any waste which is generated in the diagnosis treatment or immunization of human beings or animals.*
3. *INFECTIOUS WASTES include all kinds of wastes which may transmit viral, bacterial or parasitic diseases to human beings, in addition to infectious medical waste it includes infectious animal wastes from laboratories, slaughter houses, veterinary practices and so on.*
4. *PATHOLOGICAL WASTES include human tissues, organs, body parts and body fluids that are removed during surgery or autopsy or other medical procedures and specimens of body fluids and their containers.*
5. *BIOMEDICAL WASTE – Any waste which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto or in the production or testing of biologicals.*

Provision of law
Govt. of India Enacted The Environment (protection) Act in 1986
Notified the rules for The management and Handling of Biomedical waste on 20th July 1998
Bio Medical Waste Management Rules 2016
Rules apply to All those who generate, collect, receive, store, transport, treat, dispose or handle biomedical waste in any form.
As per the Rules, all biomedical waste should be collected & Segregated as per the category of waste.
Category – 1 *Yellow colour bag*

Human Anatomical Waste: Human tissues, Organs and Body Parts,
Animal Waste: Animal tissues, Organs, Body Parts, Bleeding Parts, Fluid, Blood and Experimental Animals Used in Research, Waste Generated by Veterinary Hospitals / Colleges , Microbiology, Biotech & Lab Waste, Wastes from Clinical Samples, Pathology, Bio-chemistry, Hematology, Blood Bank, Laboratory, Cultures, Stocks or Specimens of micro-organisms, live or attenuated Vaccines, Human & Animal Cell culture used in research & industrial Labs, wastes from production of Biological, Toxins, Dishes & Devices used for transfer of Cultures, Discarded Meds & Cytotoxic Drugs, Soiled Waste, Items Contaminated with Blood & Body Fluids including Cotton Dressings, Soiled Plaster casts, Linen, Beddings, etc.
Chemical Waste: Chemicals used in production of Biologicals, disinfection and as insecticides.
Category-2 *Red Bag- Red Colour Bag: Disposables including: Tubings Gloves Saline Bottles IV Tubes, Catheters, Broken glass etc.*
Category -3 *Puncture Proof White container- Waste Sharps: or Syringes with fixed needles, Scalpels, Blades, that may cause Puncture and Cuts,*
Category-4 *Blue colour carton box- Unbroken glass bottles, Vials etc., Body Implants etc.*
All general waste to be disposed in black coloured bags. No Biomedical waste in this black bag.

4. Micro-solvation
Part II: Third eye of Twenty first Century or another fading excitement /experiment

R Sambasiva Rao
School of Chemistry, Andhra University,
Visakhapatnam 530 003, India
Email: rsr.chem@gmail.com

Dedicated to Dr (Prof) Kaza Somasekhara Rao on 70th birth anniversary

Origin of chemical elements: The consequence of Big-bang was a hot (10^{32} K) soup energy inflated into space followed by formation of billions of photons, protons and neutrons. In the succeeding period of few seconds hydrogen era started with emergence of its isotopes (deuterium, tritium). Later, helium (^{4}He, ^{3}He, ^{4}He), lithium (^{7}Li), beryllium (^{7}Be) and so on formed setting stage for chemical elements. Mother Nature prepared most of chemical elements during its evolution.
Universe Visible (Materialistic): The simple chemical compounds, water, carbon dioxide, ammonia, oxides nitrogen/Sulphur not only the constituents of atmosphere around earth, they were building blocks of life (mono-cellar, dinosaurs, and human beings).
Water: Water, the basic component of life is omnipresent in the Universe. It is present to an extent of 70% on earth and nearly 60% in adult human being. The water is most extensively researched liquid by experimental, instrumental and computational procedures over a century with terabytes of information. But, it is the chemical compound which is not understood even at the level of tip of iceberg.
Chemical interactions: Chemical interactions are a subset (or small band) in the wide energy spectrum. Making and breaking of covalent bonds remains the core of chemical interactions in solid/liquid/gaseous and solution phases.
Alchemy: The alchemy, now a history, was around conversion of base metals (lead) into noble ones (gold).
Electron, H+ and OH- : The study of proton in water started with Grotthuss in 1806 with the proposition of water wire. Eigen-Zundel-Eigen mechanism is an outcome of molecular dynamic and photoelectron spectroscopy. The knowledge is of utmost relevance in biochemical research and fundamental perspective of solution processes. Hydroxyl ion forms a weaker H-acceptor bond and stronger H-donating bond. Although the interaction is weak, their presence in troposphere is of concern in solar absorption.
Salts in solvent: Over hundred years ago, making and breaking of water by ions in aqueous solution was introduced as Hofmeister series. The solutes now are classified as structure makers and structure breakers. The interest in hydrophobic solutes arose followed later.

Monovalent metal cations: The number of water molecules in first and second hydration spheres of monovalent cations (Li, Na, K, Cs), anions (Cl, I) in water from computational quantum chemistry (Molecular Dynamics, Monte Carlo) and spectroscopic studies during the last one decade will be dilated.
Ion pairs: The contact-ion-pairs and solvent-separated-ion-pairs formed with iodides of Li and Cs with explicit solvation will be discussed. The role of H-bond and other non-covalent interactions will be illustrated.
Protein machine: A protein is a heterogeneous polymer of amino-acids. It is the basic unit of protein machinery, the heart of life processes. Biologists call it a biomolecule and chemists a chemical compound. But, for a quantum chemist, it is multi-electron pool revolving relentlessly around encapsulated bundle of neurons and protons. The biological function in a cell, a macroscopic response is a culmination of several covalent and non-covalent intra-protein interactions and/or those with other small/ large life sustaining/ threating chemical species, bio-molecules, bio-active proteins, viruses, good/bad bacteria etc..
Protein-water and water-protein energetics: Protein-water interactions in bio-systems occur in biological cells, of course, of different kinds. The common feature is cell contain more than 60-70% water. Even an isolated cell (in thermodynamic sense) is crowded with diverse biomolecules.
In vitro research – limitations: Most of laboratory studies of interactions of proteins with water or small molecules has been carried out in dilute buffer solutions. These in vitro studies were stepping stones to probe into in vivo processes. But, most of the results are good knowledge bits in physics and chemistry of proteins. But, direct extrapolation to in vivo biological processes remained to be a failure. This unpalatable hard reality is the impetus for newer approaches in theoretical, experimental and computational fronts to understand micro-processes.
Future course of physico-chemical endeavors for bio-, environmental- and comfort/safety/defense: The 'True physical picture' of hydration spheres and bulk water are the first focus point of Tomorrow's Science. The static geometry of conformers, dynamic modeling of real life systems viz. cell, ocean, atmosphere, industry, and laboratory experiments follow faithfully. The ensemble approach of solution of Eigen, differential/ integral equations in quaternion, tensors or Clifford algebra notations using fast number crunchers (peta- exa-scale hardware/memory, cloud computing systems will output multiple solutions. The sparkles from machine learning techniques and abstract intelligence will not only filter low confidence solutions, but also advice newer data procuring means, data → parameter → information → knowledge procedures. They also put forward axioms for expert's introspection.

5. Ionic Liquids as Eco-Friendly Solvents for the Extraction, Absorption and Dissolution Processes

Ramesh L. Gardas
Department of Chemistry, Indian Institute of Technology Madras,
Chennai 600 036, India.
Phone: +91 44 2257 4248, E-mail: gardas@iitm.ac.in

Solvents are major contributors and high on the list of environmental damage chemicals, mainly because of their large usage and high volatility. The widespread use of volatile organic compounds (VOCs) in many industrial chemical processes is an issue of great environmental concern. It is an extremely important task to search of potentially green and environment friendly alternatives for VOCs. At least a partial solution to this problem may offer by a novel class of molten salts referred to as ionic liquids (having melting point, generally, below boiling point of water), as they possess unique combination of particular properties, unlike molecular liquids, namely negligible vapour pressure (~ 10^{-11} to 10^{-10} bar at room temperature), wide thermal window (~ -50 °C to +250 °C), wide electrochemical window (~ ±3 Volt vs. NHE), non-flammability, high ionic conductivity and a highly solvating capacity for organic, inorganic and organometallic compounds. This unique combination of particular properties leads them to be exploited as "green solvents" and giving them increasing attention in academic and industrial research. The research areas on ionic liquids are growing very rapidly and the potential application are numerous,

mainly due to the fact that simple changes in the cation and anion combinations or the nature of the moieties attached to each ion allow the physical properties of ionic liquids such as hydrophobicity, viscosity, density, coordinating ability, ion selectivity, and chemical and electrochemical stability to be tailored for specific applications. Proposed talk will include the introduction of green solvents, ionic liquids, general applications of ionic liquids and understanding unique thermophysical properties of novel ionic liquids for metal ion extraction, solar refrigeration system, dissolution of tank bottom sludge and dissolution and stability of biomolecules. Further, the effects of thermophysical properties of ionic liquids on these applications and current research trends on ionic liquids as green solvents for the pharmaceutical and medicinal applications will be discussed.

Paper Presentations

1. Impact of Solid Waste On Human Health And Environment – An Overview

B. Gangadhar [1], Y. Tharakeswar [2], V. Ravi [1] and G. Ramakrishna Naidu [1]
[1] Department of Environmental Sciences, S.V. University, Tirupati – 517502, A.P. India
[2] Sree Vidyanikethan Engineering College, Rangampet, Tirupati, A.P. India
E-mail: gangadhar.battala@gmail.com

Globalization, Urbanization and Population growth are the main reasons and sole responsible for the high increasing rate of solid waste worldwide. Proper management of solid wastes is a major problem of Municipal Corporation and Municipalities. Improper municipal solid waste (MSW) disposal and management causes all types of pollution: air, water and soil. Indiscriminate dumping of solid wastes contaminates surface and ground water supplies. Green house gases are generated from the decomposition of organic wastes in landfills. Uncontrolled burning of MSW and improper incineration contributes significantly to urban air pollution. The impact of solid wastes is not only confined to environment but also affects human health. Insect and rodent vectors are attracted to the waste and can spread diseases such as cholera and dengue fever. Using water polluted by MSW for bathing, food irrigation and drinking water can also expose individuals to disease organisms and other contaminants. Open dumping, open burning and un-engineered sanitary landfills are common practice in many of the countries in the world. Due to improper solid waste disposal and collection systems dwellers are facing serious negative environmental and health impacts in developing countries. This paper highlights the major impacts associated with MSW on human health and environment.

2. Biodegradable plastics from biological sources

D Lakshmi Kantha[1] K B S Gopal[2]
1. Research Assistant, Sir C R R College, Eluru 2.Lecturer in Physics, Sir C R R College, Eluru
Email: lakshmi.kamma@gmail.com

Bio plastic is a plastic that is made partly or wholly from polymers derived from biological sources such as sugarcane, potato starch and cellulose from trees and straws. Some bioplastics degrade in the open air. so that they compost in an industrial composting plant, aided by fungi, bacteria and enzymes and durability of conventional plastics such as polyethylene or PET. Bioplastics can also be processed in very similar ways to petrochemical plastics such as injection moulding, extrusion and thermoforming. Some of Biodegradable and durable products mobile phone cases, automotive interiors like seats, head rests or arm rests, shopping bags, compostable waste collection bags, Styrofoam replacement and shrink wraps, some of medical applications like Implants such as screws, pins or plates, Material for pills and capsules and baby products – Toys and tethers, Baby feeding bottles, Plastic films in sanitary napkins/diapers, micro beads from bio based and biodegradable plastics. Bioplastics are also used for disposable items, such as packaging. Crockery, cutlery, pots, bowls and straws. They are also often used for bags, trays, fruit and vegetable containers and blister foils, egg cartons, meat packaging, vegetables, and bottling for soft drinks and dairy products. New electro active bioplastics are being developed that can be used to carry electric current.

Biopolymers are available as coatings for paper rather than the more common petrochemical coatings estimates put global production capacity at 327,000 tones. In contrast, global consumption of all flexible packaging is estimated at around 12.3 million tonnes. COPA and COGEGA have made an assessment of the potential of bioplastics in different sectors of the European economy: Catering products: 450,000 tons per year, Organic waste bags: 100,000 tons per year, biodegradable mulch foils: 130,000 tons per year, Biodegradable foils for diapers 80,000 tons per year, Diapers, 100% biodegradable: 240,000 tons per year, Foil packaging: 400,000 tons per year, Vegetable packaging: 400,000 tons per year, Tyre components: 200,000 tons per year, Total: 2,000,000 tons per year, Currently bioplastics represent about one per cent of the about 300 million tones of plastic produced annually. According to the latest market data compiled by European Bioplastics, global production capacity of bioplastics is predicted to quadruple in the medium term, from around 1.7 million tons in 2014 to approximately 7.8 million tons in 2019.Biobased, non-biodegradable plastics, such as biobased PE and bio based PET, are the main drivers of this growth. More than 60 percent of the bioplastics production capacity worldwide in 2014 was bio based durable plastics. This share will increase to over 80 percent in 2019. Production capacities of biodegradable plastics, such as PLA, PHA, and starch blends, are also growing steadily, nearly doubling from 0.7 million tons in 2014 to well over 1.2 million tons in 2019. PHA production will double by 2019 compared to 2014, due to a ramp-up of old and new capacities in Asia and the USA.

3. Biomass Energy from Crop Waste and Plant Residues

K B S Gopal[1] D Lakshmi Kantha[2]
1. Dept of Physics, Sir C R R College, Eluru, 2. Research Assistant, Sir C R R College, Eluru
E-mail: bhanukamma@yahoo.com

Biomass has always been an important energy source for the country. It is renewable, widely available, carbon-neutral and has the potential to provide significant employment in the rural areas. Biomass is also capable of providing firm energy. About 32% of the total primary energy use in the country is still derived from biomass and more than 70% of the country's population depends upon it for its energy needs. Main sources of biomass energy are trees, crops and animal waste. India is the 7th largest country in the world spanning 328 million hectares. An estimated 22 percent of the residues might be utilized, providing a renewable source of high-grade energy. Biomass energy is the utilization of organic matter present and can be utilized for various applications. Biomass can be used to produce heat and electricity, or used in combined heat and power (CHP) plants. Biomass can also be used in combination with fossil fuels to improve efficiency and reduce the buildup of combustion residues. Biomass can also replace petroleum as a source for transportation fuels as Biodiesel. India produces about 450-500 million tones of biomass per year. EAI estimates that the potential in the short term for power from biomass in India varies about 18,000 MW. India has over 5,940 MW biomass based power plants comprising 4,946 MW grids connected and 994 MW off-grid power plants. Maharashtra producing 1112 Mw, followed by Uttar Pradesh 930 MW, Karnataka has a capacity of 737 MW producing power projects. Even though ample of material is available for generating power through crop waste and plant residues throughout the country, more number of biomass plants have to be commissioned for the future power requirement of the country.
Estimates have indicated that 15% - 50% of the world's primary energy use could come from biomass by the year 2050. Currently, about 11% of the world's primary energy is estimated to be met with biomass. Over 500 million tonnes of agricultural and agro-industrial residue alone is generated every year. This quantity, in terms of heat content, is equivalent to about 175 million tons of oil. A portion of these materials is used for fodder and fuel in the rural economy. However, studies have indicated that at least 150-200 million tonnes of this biomass material does not find much productive use, and can be made available for alternative uses at an economical cost. These materials include a variety of husks and straws. This quantity of biomass is sufficient to generate 15,000-25,000 MW$^{\#}$ of electrical power at typically prevalent plant.

4. A Survey on house-hold Solid Waste Management In the selected area of Eluru, West Godavari District

N.Gayatri Devi[1], N.V.N.B.SrinivasaRao[2], D.Ramachandran[1]
1. Acharya Nagarjuna University,Guntur
2. D.R.Goenka Govt.Degree College, Pentapadu
E-mail:balajivishy@yahoo.com

Solid waste management is a continually growing problem at global, regional and local levels. Solid wastes are those organic and inorganic waste materials produced by various activities of the society, which have lost their value to the first user. Improper disposal of solid wastes pollutes all the vital components of the living environment local and global levels. Urban society rejects and generates solid material regularly due to rapid increase in production and consumption. In the present study is pertaining to house hold survey on solid waste management in the area of Ramachandra Rao pet in Eluru, West Godavari District. The study mainly aims to reduce the solid waste and to bring out the positive change in the lives of the community of selected area. Improper management of solid waste causes hazards to the society. The study focused on the methods to reduce the volume of the solid waste through the implementation of waste reduction and recycling programs and create awareness on efficient and economical refuse collection, recycling and disposal services. Solid waste management is the process of estimating the waste produced in the living areas and to give fruit full suggestions which may be beneficial to encourage competent authorities and researchers to work towards further improvement of the suggested system.

5. Integrated Municipal Solid Waste Management in Holy City, Tirupati

C. Arunachalam, Y. Kalyan*, B. Gangadhar and G. Ramakrishan Naidu
Department of Environmental Sciences, S.V. University, Tirupati–517 502, A.P, India
E-mail: kalyan.yk@gmail.com

India is undergoing a new wave of urbanization, especially in the emerging developing cities. The rapid urbanization process resulted in a substantial increase in energy and material consumption as well as the amount of municipal solid waste (MSW) generation. The improper disposal of MSW causes adverse effects on environment as well as human health. Managing the problem of solid waste in an integrated and comprehensive manner makes it imperative for the state government to set a strategy in order to address the different aspects of sanitation management related tackling solid waste in a systematic process (collection, segregation, storage, transportation) with coordination in a time bound manner. Tirupati, a Hindu pilgrim centre in India is attracting a floating population of about one lakh everyday into the city is increasing with solid waste generation with many folds. Hence, in the present study an intensive survey on solid waste generation from Municipal Corporation, Tirupati was carried out. The reported waste generated per day in Tirupati is estimated to be around 155.5 tons per day, in which per capita waste generation is approximately 0.52 kg. The overall household and commercial waste generation is estimated to be around 101.5 and 54 tons per day respectively. However, the bio-degradable, recyclable and inert waste generation was found to be 58%, 16% and 26% respectively. The paper reveals the necessity of the effective implementation of the rules pertain to municipal solid waste management with a proper scientific approach in collection, transfer and transport, processing and disposal of solid waste.

6. Plastics: An Emerging Environmental Pollutant

Y. Tharakeswar [2], *B. Gangadhar [1],Y. kalyan [1], V. Ravi [1] and G. Ramakrishna Naidu [1]
[1] Department of Environmental Sciences, S.V. University, Tirupati – 517502, A.P. India
[2] Sree Vidyanikethan Engineering College, Rangampet, Tirupati, A.P. India
E-mail: gangadhar.battala@gmail.com

Plastic is less expensive when compared to other material, therefore it is one of the most widely available and overused item in the world today. We find Plastic everywhere, even on those items you may not expect it to be. Milk cartons are lined with plastic, water bottles are handed out everywhere, and some products may even contain tiny plastic beads. Every time one of these items gets thrown away or washed down a sink, the toxic pollutants have more of a chance to enter the environment and do harm. Trash dumps and landfills are unfortunate major problems, as they allow pollutants to enter the ground and affect wildlife and groundwater for years to come. Plastics, when disposed does not decompose easily and pollutes the land or air nearby when burned in the open air. Some plastics are designed to degrade quickly, such as Oxo-Degradables and while they may become less noticeable, they are still present in the environment. Burning of plastic is the main problem and is associated with many health and environmental effects. Burning of plastics can release dioxins, Dioxins are unintentionally but unavoidably produced during the manufacture of materials containing chlorine, including PVC and other chlorinated plastic feed-stocks, Dioxin is a known human carcinogen and the most potent synthetic carcinogen ever tested in the laboratory animals. Plastic burning can increase the risk of the heart diseases, the respiratory diseases such as the asthma and the emphysema and It causes the rashes, the nausea, or the headaches, It damages in the nervous system, the kidney or the liver in the reproductive and development system. This paper is focused on the plastic waste, environmental & health effects of plastics and problems associated with burning of plastics.

7. Physico-Chemical Analysis & GIS-Approach For Mapping of Ground Water Quality- A Case Study

K. Nirmala Jyothi, N. Gayatri Devi, Sd. Khasim Sharif, D. Ramachandran
Department of Chemistry, Acharya Nagarjuna University,
Nagarjuna Nagar, Guntur -522510

The state of Andhra Pradesh, India falls in water stress area. The primary objective of this study is to examine the spatial distribution of different chemical elements with respect to its contamination level of groundwater quality in Asakapalli rural Mandal, Andhra Pradesh, India. This has been determined by collecting 270 water samples in three seasons (summer, monsoon & winter) for period of the year 2013 and subjecting the samples to a comprehensive physico-chemical. The aim of the study is to present the data in GIS (Kriging method) environment for better understanding the spatial distribution of each chemical parameter and mapping of the current situation of groundwater quality of Asakapalli rural Mandal more than 20 chemical parameters of groundwater are selected and compared to the guideline values presented by world health organization (WHO). The water quality index was developed in order to present the overall water quality of the study area. The chemical Index such as SAR, RSC, and KI, % Na, PI and MR were calculated. The results indicated that PI and MR values revealed more than 50% groundwater samples quality is very poor for drinking as well as irrigation practices also.

Keywords: GIS, Groundwater quality parameters, Ordinary Kriging, Groundwater quality index.

8. Adsorption Studies of Carbonized *Sida Rhombifolia* Sample in Defluoridation of Potable Water

K. Nirmala Jyothi, M. Radha Sirija, P.Bharath, D.Ramachandran
Department of Chemistry, Acharya Nagarjuna University,
Nagarjuna Nagar, Guntur -522510.

The present study demonstrates the development and application of plant based carbon sample (oxidized with nitric acid) prepared from Sida Rhombifolia adsorbent for the removal of fluoride in aqueous media. Activated carbon characterized texturally and chemically before and after treatment, using surface area determination in the BET model, SEM-EDX and XPS techniques. The adsorption capacity and the kinetics of Fluoride ion removal was determined by batch adsorption technique. The study was carried out to analyze the defluoridation by contact time variation, adsorbate concentration and effect of pH. The analysis of the isotherm equilibrium data using the Langmuir and Freundlich equations by linear methods showed that the data fitted better with Langmuir model (R2 > 0.967) and Pseudo-second-order kinetic model best fit for the current adsorption study. Carbonized Sida Rhombifolia oxidized sample (SRC) showed a high affinity for fluoride ions compared with other conventional adsorbents, therefore, it can be considered as a potentially good and low-cost bio-adsorbent for removal of fluoride from water compared to other bio-adsorbent.

9. Agricultural Waste Conversion to Activated Carbon by Chemical Activation with Potassium Carbonate

T. V. Nagalakshmi*[1], K. A. Emmanuel[2]
[1]Department of chemistry, Laki Reddy Bali Reddy College of Engineering,
Mylavaram -521230, A.P., India.
[2]Department of Chemistry, Sir C.R.Reddy Autonomous College, Eluru-534 007, A.P., India.
Email: mannava_laxmi@yahoo.co.in

Agricultural waste materials can be converted into useful activated carbon adsorbents. If not managed properly, agricultural wastes become an environmental problem and a hazard for human and animal health. In the present study, the selected lignocellulosic Sugarcane Bagasse was activated by K_2CO_3 to prepare activated carbon with good surface area and to introduce different surface functional groups onto the prepared carbon. The prepared activated carbon is characterized by using different analytical techniques. The pore structures of the resulting carbon were analyzed using N_2 adsorption, X-ray diffraction (XRD) and scanning electron microscope (SEM). Surface area was calculated by Brunauer–Emmett–Teller (BET) equation. Thermal stability of carbon was analyzed by thermogravimetric analysis (TGA) and temperature programmed desorption (TPD) studies. The nature of functional groups present on surface of activated carbons was analyzed by FTIR and XPS techniques.

10. Plastic Carry Bags Thickness – An Overview

Haritha Potluri[1*], Sreenivasa Rao Battula[2] Sunandamma Yeturu[3]
[1*]Department of Chemistry, Gudlavalleru Engineering College, Gudlavalleru, A.P.
[2]Department of Chemistry, GITAM University, Visakhapatnam, A.P.
[3] Department of Chemistry, Acharya Nagarjuna University, Nagarjuna Nagar, A.P.
E-mail: haritha.potluri@gmail.com

In the present article, the effect of plastic carry bags basing on its thickness and the measures taken by the government of India has been discussed. Plastic carry bags are generally made out of polythene and are often used for the purpose of carrying or dispensing commodities. The option of plastic carry bags is attributed to its excellent barrier properties and water-proof characteristics, safety in handling due to non-breakability and light in weight. The main problem with carry bags lies with difficulty in degradation. In addition, it clogs drains and thus hit urban sewage systems. Choked carry bags in drains increases breeding grounds for mosquitoes, besides causing floods during the monsoon. The use of plastic carry

bags with less than 20 microns may be mistaken as food by animals and by the consumption of plastic carry bags by animal's cause lot of health problems. The central Government of India has notified the Plastic Waste Management Rules, 2016 according to which the minimum thickness of plastic carry bags has been increased from 40 microns to 50 microns. This will help in achieving facilitate collection and recycle of plastic waste. Also an emphasis has been laid by the government to promote use of plastic waste for road construction as per Indian Road Congress guidelines or energy recovery, or waste to oil etc. for gainful utilization of waste.

11. Solid wastes: Their recycling potential in India

Dr. Raju Katepogu* and Dr. Sujan Kumar Korivi
Department of humanities and Sciences, Sri Venkateswara College of Engineering,
Karakambadi Road, Tirupati – 517507

With the increasing population, municipal solid waste management (MSWM) in India has emerged as a challenge not only because of the environmental and aesthetic concerns, but also because of the huge quantities of municipal solid waste (MSW) generated every day. According to Central Pollution Control Board (CPCB), 1, 43,449 tonnes per day (TPD) of MSW was generated in India. To safeguard the environment, efforts are being made for recycling different wastes and utilise them in value added applications. Among 3R's, Recycling is one of the best process by which material that are otherwise destined for disposal are collected, processed, and remanufactured. Recycling diverts a significant fraction of municipal, institutional, and businesses wastes from disposal and, thereby, saves scarce natural resources and reduce environmental impacts and the burden on public authorities to manage waste. Every strategy for recycling should be based on a thorough waste analysis or characterization in the respective city. Based on the studies, a detailed estimation of the recycling potential of each material needs to be done and strategies and technologies for recycling need to be identified. The current status on generation and utilization of solid wastes in India, their recycling potentials are reported and discussed.

12. Medical Waste Management and Disposal

G. Kishore[1], M. Sravanthi[1] B.V. Durga Rao[2] and K .Pushapa latha[3]
1. Department of Biochemistry, Krishna University Dr.MRAR PG Centre, Nuzvid
2. Department of Chemistry, Krishna University Dr.MRAR PG Centre, Nuzvid
3. Sri Siddhardha PG College, Nuzvid

Solid waste material are producing every day by human beings at different level that is household level, hospitals , Industries, hotels where the human being are in the world, in these medical waste derived from healthcare and other such medical activities such as treatment, testing of biological, immunization of humans and animals, diagnosis. These wastes are usually generated in hospitals, clinics, blood banks, or other such health or medical related facilities. If they are not properly handled, they may ultimately run high risks of infections and may become hazards. Medical Waste is indeed a very broad heading and comprise of a number of distinct, which include sharps, cultures and stocks, pathological and anatomical waste, pharmaceutical products that is drugs, human blood/blood products or bodily fluids such as swabs or dressings, chemicals and other waste called 'regulated waste' and also include a variety of waste materials such as, diagnostic samples, discarded lancets, blood, blood-soaked bandages, culture dishes and other glassware, used needles and syringes and other medical devices. In order to ensure that people are not at risk of contracting any illnesses, hospital personnel, waste handlers and the general public must try to maintain proper storage and disposal techniques. Some cases syringes and needles, these materials should be placed into 'sharps' containers at all times. 'Sharps' containers are specifically created to handle and collect materials of such sort.

Medical Waste Management is the proper containment, storage, treatment and disposal of infectious waste generated at human health care facilities. Acceptable Treatment Methods of Medical Waste are techniques

or processes specially designed to alter the biological nature or structure/composition of medical waste. If this is done successfully, the wastes will no longer be infectious or biologically dangerous. The most effective and commonly used method of waste treatment is incineration. Medical Waste Incineration is the process whereby medical waste is treated thermally by heating methods at extreme temperatures, in a controlled environment. A Medical Incinerator is a furnace or other closed fire chamber used to dispose of wastes generated at medical facilities by burning.

13. Synthesis of Activated Carbon from Schima Wallichi Seed Coat for Removal of Fluoride from Water

Parimal Chandra Bhomick[1], Aola Supong[1], Chubaakum Pongener[1], Dipak Sinha[1*]
[1]Department of Chemistry, Nagaland University, Lumami-798627, India
E-mail id: dipaksinha@gmail.com

Activated Carbon is known to be versatile adsorbent for removal of various pollutants from water. And the use of locally available biomass for activated carbon biomass is gaining much attention in recent years due to environmental concern. In this work, activated carbon has been prepared using Schima wallichii seed coat by carbonization for 3 hours at 600° C which was further treated with $ZnCl_2$ for activation. The prepared carbon gives BET surface area of 878.07m^2/g corresponding to high surface area. The prepared carbon was used for removal of fluoride from aqueous solution. Fluoride ion selective electrode was used for the determination fluoride ion concentration during all batch experiments. To establish the optimal conditions like pH, dose of the adsorbent, and contact time batch adsorption experiments were performed which shows a removal percentage of ~95% at adsorbent dosage of 1g for initial concentration of 5mg/L. The experimental studies indicated that Zinc chloride activated Schima wallichii Active Carbon is suitable to be applied as an adsorbent material for the adsorption of fluoride from aqueous solution.

14. Preparation of surface modified activated carbon from bio-waste of sugar cane bagasse and its characterization

Mridushmita Baruah[1], Aola Supong[1], Parimal Chandra Bhomick[1], Dipak Sinha[1*]
[1]Department of chemistry, Nagaland University, Lumami.
E-mail: dipaksinha@gmail.com

In this study, activated carbon was prepared from sugar cane bagasse by chemical activation with phosphoric acid followed by carbonization at temperature ranging from 500^{0}C to 700^{o}C for one hour. Characterization of pH, moisture content, ash content, volatile matter, acid insoluble matter, water soluble matter, BET surface area, FT-IR analysis was conducted for the prepared activated carbon. The carbons presented Brunauer, Emmett and Teller (BET) surface areas between 718 - 1018 m^2 g^{-1}. The physio-chemical studies indicated that sugar cane bagasse is suitable for preparation of activated carbon which can be used for various purification and separation processes.

15. Enhanced removal of Phenol from aqueous solution using activated carbon obtained from elephant grass

Aola Supong[1*] and Parimal C Bhomick[1]
[1]Department of Chemistry, Nagaland University, Lumami-798627, Nagaland, India
E-mail ID: aolas@rediffmail.com

Biomass offers several advantages for synthesizing bio-adsorbents such as activated carbon due to its wide availability, cost effectiveness and renewability. This study reports the preparation of activated carbon from the leaves and stems of elephant grass (Pennisetum purpureum) chemical activation with $ZnCl_2$ at 600^{o}C and a dwell time of 2 hour giving the plant a commercial value. Characterisation of the activated carbon was done by several techniques viz. FTIR, SEM, EDX and BET to understand the physiochemical properties. The effect of variables represented by pH, contact time, adsorbent dose and initial

concentration on efficiency of the activated carbon for phenol removal was experimentally studied. Maximum removal efficiency of 98.8% was obtained at optimum conditions. The present study shows that elephant grass is a potential biomass for the synthesis of activated carbon and can serve as a promising adsorbent for phenol removal to substitute expensive commercial activated carbons.

16. Management of Solid Waste

K.A. Emmanuel[1*], A.Veerabhadra Rao[1], C.Ravi[2]
[*]Department of Chemistry, Sir C R Reddy Autonomous College, Eluru-534 007, A.P., India.
[1]Department of Physics, Sir C R Reddy Autonomous College, Eluru-534 007, A.P., India
[2]Department of Geology Sir C R Reddy Autonomous College, Eluru-534 007, A.P., India
Email: kaekola@gmail.com

The disposal of solid waste is a problem. This problem continues to grow with the growth of population and development of industries. Disposal of waste in open pits has become routine in majority of places. Semisolid or solid matters that are created by human or animal activities, and which are disposed because they are hazardous or useless are known as solid waste. When solid waste accumulate they pose a health threat to people, plus, decaying wastes also attract household pests and result in urban areas becoming unhealthy, dirty, and unsightly places to reside in. Moreover, it also causes damage to terrestrial organisms, while also reducing the uses of the land for other, more useful purposes. This paper is an attempt made to estimate the quantity solid waste that can be generated in the Eluru city, A.P, India per day. It is estimated that 59-65 tons of wet waste is generated in Eluru per day. The common methods of solid waste disposal are on-site disposal, composting, incineration, and sanitary landfill. Pulverisation of municipal solid waste is done and the pulverised solid waste is dressed to a bed and the bed is fed by vermi's which converts the bed into vermin compost which contains valuable micro nutrients. It is estimated that by combusting the solid waste in Eluru Municiapl Corporation it is possible to generate nearly 3 MW of power.