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Role of Analytical Sciences in Sustainable Development

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ORAL PRESENTATIONS

Cu (II) Removal From Waste Water by Bacillus subtilis

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The increase in environmental pollution caused by toxic heavy metals is of great concern because of their carcinogenic properties, non-biodegradability and bio-accumulation. In order to minimize this problem, biosorption of toxic metals by bacterial fungal or algal biomass (live or dead cells) and agricultural waste biomass can be part of the solution. For metal removal applications, the use of dead biomass or agricultural waste may be preferable as large quantities are readily and cheaply available as a byproduct of various industries. Therefore, it is proposed to use dead biomass of *Bacillus subtilis* for the removal of Cu (II) from wastewater, because it is cheap, easily available and mostly biodegradable.

The dead biomass of *Bacillus subtilis* has been used for the removal of Cu (II) from wastewater. The effects of different parameters such as contact time, adsorbate concentration, pH of the medium and temperature were examined. Optimum removal at 20^0C was found to be 98.6 % at pH 6.5, with an initial Cu (II) concentration of 100 mg L^{-1}. Dynamics of the sorption process and mass transfer of Cu (II) to dead biomass of *Bacillus subtilis* were investigated and the values of rate constant of adsorption, rate constant of intraparticle diffusion and the mass transfer coefficients were calculated. Different thermodynamic parameters viz., changes in standard free energy, enthalpy and entropy were evaluated and it was found that the reaction was spontaneous and exothermic in nature. The adsorption data fitted the Langmuir isotherm. The data were subjected to multiple regression analysis and a model was developed to predict the removal of Cu (II) from wastewater which is given as follows

$$Y = 6.5592 + 0.6389a_1 + 0.5169a_2 - 0.4691a_3 + 0.2830a_4 - 0.0972a_5$$

Where, Y is the predicted value of Cu (II) removal, a_1, concentration of adsorbate, a_2, contact time; a_3, temperature; a_4, pH; a_5, agitation rate of the system.

Preparation and Characterization of Biodegradable Nanoparticles for Oral Delivery of Epirubicin

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Oral delivery of EPI, which elicits poor bioavailability, is highly challenging as it is a substrate for both P-gp and CYP450 which are widely distributed in the intestine and liver [1-3]. Oral bioavailability of Epirubicin (EPI) is very poor and it is commercially available for intravenous administration only (Ellence, Pfizer). Intravenous administration of the drug leads to its sudden rise and rapid fall in blood, often lead to sub-therapeutic level hence prompting frequent dosing which is often associated with cumulative adverse effects. In this perspective, present investigation was aimed to develop biodegradable nanoparticles of EPI (EPI-NPs) that could enhance the absorption via endocytic uptake across enterocytes as well as M cells of intestinal epithelium thus evading the first pass metabolism and P-gp mediated efflux. The particle size zeta potential and drug content were found to be 235.3 ± 15.12 nm, −27.5 ± 0.7 mV and (39.12 ± 2.13g/mg) respectively. SEM study showed prepared nanoparticles exhibited

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spherical shape and smooth surface. studyIn vitro release profiles of EPI demonstrated a cumulativepercentage release of 96.23 ± 2.6% from EPI-S in first hour and80.94 ± 6.39% from EPI-NPs in 48 h. Cytotoxicity studies conducted on human breast adenocarcinoma cell lines (MCF-7) confirmed the superiority of epirubicin loaded poly-lactic-co-glycolic acid nanoparticles (EPI-NPs) over free epirubicin solution (EPI-S). Transport study accomplished on human colon adenocarcinoma cell line (Caco-2) showed 2.76 fold improvement in permeability for EPI-NPs as compared to EPI-S ($p < 0.001$).

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2. L.J. Goldstein, H. Galski, A. Fojo, M. Willingham, S.L. Lai, A. Gazdar, R. Pirker, A.Green, W. Crist, G.M. Brodeur, et al., J. Natl. Cancer Inst. 81 (1989) 116.
3. D.R. Nelson, Biochim. Biophys. Acta 1814 (2011) 14.

An Eco-friendly synthesis of 7-hydroxyflavones under solvent free conditions using grinding technique

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An efficient and eco-friendly procedure for the synthesis of 7-hydroxyflavones by cyclisation of corresponding 2',4'-dihydroxychalcones in the presence of molecular iodine moisted with water at room temperature under solvent free conditions using grinding technique has been described. The structures of these compounds were identified from their spectral data (FT IR, ^{1}H NMR). This protocol avoids the use of hazardous chemicals and organic solvents at any stage of the reaction.

Seasonal trend in composition of n-alkanes in ambient aerosols at a traffic site, Delhi

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Delhi is one of the most polluted cities in the world. The generation of aerosols in the lower atmosphere of the city is mainly due to large amount of natural dust advection and sizable anthropogenic activities. The compositions of organic compounds in aerosols are highly variable in this region, and need to be investigated thoroughly. Twenty four hours sampling to assess concentrations of n-alkanes (ng/m^3) in PM_{10} was carried out during January 2015 to June 2015 at IGDTUW, University Campus, Delhi; India with the help of Respirable Dust Sampler. Quantitative estimation of n-alkanes was done by using Thermal Deposition-Gas Chromatography/ Mass spectrometry (TD-GC/MS). The mean concentration of n-alkanes along with the diagnostic tools like Cmax (most abundant carbon number) and Carbon Preference Index (CPI) has been calculated. The values of the CPI: 1.00 and Cmax at C_{25} & C_{27} indicated the dominant inputs of n-alkanes to be from pathogenic emissions, with lower contribution of biogenic emissions. Significant seasonal variations were observed in average concentrations of n-alkanes; which is comparatively higher in winter than in the summer season.

Quantitative Estimation of Berberin using TLC and HPLC in *Tinospora cordifolia, T. sinensis* and *T. crispa*

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Tinospora belonging to family Menispermaceae is represented by three species namely *T. cordifolia*, *T. sinensis* and *T.crispa* in India. The species are unisexual bearing male and female flowers on separate, morphologically distinct plants.*T.cordifolia* commonly known as Giloy is medicinally very important and is used as an immunomodulator in all the AyurvedicRasayanas.*T. sinensis* and *T.crispa* are also used for the same purposes, many a times, as a replacement of *T. cordifolia.* The medicinal properties of *Tinospora*are due to the presence of alkaloids, glycosides, diterpenoids, lactones, lignans and other miscellaneous compounds largely in the stem of the plants. Among alkaloids, Berberin, Tinosporin andPalmatine are found to be most abundant. We have tried to quantitatively estimate Berberin content in male and female genotypes in the above 3 Tinospora species by TLC and HPLC using different solvents for extraction. The investigations have helped identify the genotypes with the highest concentration of 0.2 % Berberin in methanolic extracts of dried stems in the female plants of *T.cordifolia*. Further, the identified high alkaloid containing genotypes have been utilized in the induction of polyploidy using colchicine with an aim to increase the alkaloids content in this important medicinal plant species.

Micro plastic a risk to our Health & Environment

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Water being an universal solvent has prominence and great vitality associated with it. Day by day water available for human consumption is getting polluted due to tallying of various solid waste constituents like plastic, glass, metal, rubber and wood etc. Plastic being widely used and highly resistant to degradation ends up into water in the form of plastic debris.[1] This due to various external forces and photo degradation leads to development of micro and nano size plastic particles. Micro plastic (size < 5mm) [2] is ubiquitous and resembles food for aquatic organism and

further gets accumulated releasing toxic chemicals into the aqua-terrestrial environment. Globally research on micro plastic is subsequently increasing and already considered it as an alarming threat for the aquatic biota; but on national level there exist a knowledge gap which needs to be filled. So there is a necessity to reminisce the associated micro plastic sources either through identification, quantification, fate analysis or potential impact assessment on aquatic organisms.

1. Barnes, D. K. a, Galgani, F., Thompson, R. C., & Barlaz, M. (2009). Accumulation and fragmentation of plastic debris in global environments. Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences, 364(1526), 1985–1998. http://doi.org/10.1098/rstb.2008.0205
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Review on Municipal Waste Disposal and Management in India

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Rapid industrialization and population explosion in India has led to the migration of people from villages to cities, which generate thousands of tons of Municipal Solid Waste(MSW) daily. The MSW amount, which has become one of the major enviormental problems of Indian cities, is expected to increase significantly in the near future as the country strives to attain an industrialized nation status by the year 2020. With increasing urbanization and changing life styles, Indian cities now generate eight times more MSW than they did in 1947. Presently, about 90 million tons of solid wastes are generated annually as byproducts of industrial, mining, municipal, agricultural and other processes. The amount of MSW generated per capita is estimated to increase at a rate of 1–1.33% annually. Most of the MSW in India is dumped on land in an uncontrolled manner. Such inadequate disposal practices lead to problems that will impair human and animal health and result in economic, environmental and biological losses. The current regulations (MSW management rules, 2000) are very stringent. Norms have been developed to ensure a proper MSW management system. Unfortunately, clearly there is a large gap between policy and implementation. Improper management of MSW causes hazards to inhabitants. Various studies reveal that about 90% of MSW is disposed of unscientifically in open dumps and landfills, creating problems to public health and the environment. There is a need to provide a comprehensive review of the characteristics, generation, collection and transportation, disposal and treatment technologies of MSW practiced in India. This presentation focuses on MSW management for Indian cities, its status as described in scientific literatures and identify the major problems. Various adopted treatment technologies for MSW are critically reviewed, along with their advantages and limitations. The need to encourage the competent authorities/researchers to work towards further improvement of the present system is highlighted in this presentation work.

Eco-friendly Disposal and Recycling of Wastes and Green Chemistry

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With the rampant increase in environmental pollution, solid & radioactive wastes and various environmental hazards, especially in urban and sub-urban populations affecting almost every section of society, The Green Chemistry & Proper Disposal has become the need of the hour. Young children & new born babies are facing a lot of medical complications and birth defects due to fragile condition of air quality and polluted environment. Respiratory problems have become common in the young children too. The poor air quality and the inefficient machinery of proper disposal of Radioactive and solid wastes are posing a great threats to the nation's youth.

Here in this presentation we are going to discuss that how we can reduce the burden of solid and radioactive wastes in our environment and improve the quality of environment. Today urban solid waste management program needs to be reviewed by separation of different kinds of wastes through screening, air classifying and magnetic separators. Controlled Incineration and Pyrolosis of wastes need to be done. Wastes from atomic power plants come in the form of fuels of uranium and plutonium, which needs to be properly disposed off to prevent the effects of harmful radiations. The biomedical wastes needs to be treated properly in incinerators, autoclave ,microwaves because they pose very dangerous threats when disposed untreated.

Apart from that *Biofuels play an essential role in reducing the carbon emissions from transportation and maintain air quality. The development of 'drop in' fuels produced from lignocellulosic raw materials will increase both the availability of biofuels and the sustainability of the biofuel industry.* **They can be produced from any source that can be replenished rapidly, e.g. plants, agricultural crops and municipal waste. Current biofuels are produced from sugar and starch crops such as wheat and sugar cane.**

Waste Disposal and Recycling

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We live in a time of throw away consumerism- A time where waste stream grows in volume and toxicity. Thus making waste disposal a major issue in recent years. India alone generates about 60 million tonnes of trash every year. The landfills of most cities are already overflowing. "Instead of constructing new landfills we need innovative methods" , said an expert of CSE. But the governments are so pressured to dipose waste that they rely on short sighted quick fix solutions.

The prominent 3 ways of waste disposal include landfills, incineration and recycling, where the former two have their flaws but recycling has morphed into a new concept 'ZERO GARBAGE'.

"Zero Garbage has potential to motivate people to change their lifestyles and incist corporations to behave in new ways", Peter Montague ,director ERF. Therefore in the presentation we will focus on waste disposal an issue , prevelant methods and its drawback , recycling an interesting development ,waste a potential resource , Zero Garbage (Elimination of waste rather than management), waste industry (commercial business) and contribution/awareness of society and government.

1. http://toxicsaction.org/problems-and-solutions/waste
2. http://zerowaste.org/
3. http://www.eprint.iitd.ac.in/bitstream/2074/1494/1/agarwalmun2004.pdf

Importance of Advanced Sensing in Smart Cities

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Today's world where resources are scarce and urban areas consume the vast majority of these resources, it is vital to make cities greener and more sustainable. Advanced systems are required to improve and automate processes within a city for leading them into smart cities. Some smart design of buildings, like capturing rain water for later use, to intelligent control systems, which can monitor infrastructures autonomously, the possible improvements enabled by sensing technologies are immense. Ubiquitous sensing poses numerous challenges, which are of a technological or social nature. A smart city is a city which functions in a sustainable and intelligent way, by integrating all its infrastructures and services into a cohesive whole and using intelligent devices for monitoring and control, to ensure sustainability and efficiency.

This paper presents an overview of the state of the art with regards to sensing in smart cities. Topics include sensing applications in smart cities, sensing platforms and technical challenges associated with these technologies. In an effort to provide a holistic view of how sensing technologies play a role in smart cities, a range of applications and technical challenges associated with these applications are discussed. As some of these applications and technologies belong to different disciplines, the material presented in this paper attempts to bridge these to provide a broad overview, which can be of help to researchers and developers in understanding how advanced sensing can play a role in smart cities.

Waste Disposal and Recycling

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Wastes are the materials which are not prime products for which the generator has no further use. There are also many problems faced during their disposal such as threat to public health, loosening our non-renewable resources, etc. So, it is necessary to dispose it properly.

Mainly 3 types of waste need proper disposal: solid waste, liquid waste and radioactive waste. Solid waste, can be disposed by composting, sanitary landfill, etc. Liquid waste, disposed through secure landfill and deep well disposal methods. Radioactive wastes are the most harmful waste and requires proper treatment involving storage, disposal or transformation of waste into non toxic form.

Simplest method of waste management is by reusing, reducing, recycling (3R's). Solid waste can be recycled. **Recycling** simply involves collecting, processing and selling products made from old materials. Radioactive wastes are also recyclable. Once reactor fuel is used in a reactor, it can be treated and put into another reactor as fuel.

Some of government initiatives and policies:

1). Self Employment Programme for Urban Poor (SEPUP) was introduced in 1986 and Nehru Rozgar Yojna was introduced in 1989.

2). Waste to Energy Policy as promoted by the ministry, of Non Conventional Energy sources (MNES), 1995, etc.

1. https://en.m.wikipedia.org/wiki/Waste_management
2. https://en.m.wikipedia.org/wiki/Recycling
3. http://www.yourarticlelibrary.com/waste-management/solid-waste-management-types-sources-effects-and-methods-of-solid-waste-management/9949/

Socioeconomic and Environmental Impact of Electronic Waste

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In today's world, most of us have the luxury of not having to face the daily realities of all the damage humans do to the planet. It is difficult to understand the devastation created by human beings unless you travel to a developing nation or actively try to find it in our own country -- pictures or words will never do it justice. E-Waste (Electronic Waste) is the rapidly growing stream of waste from discarded electronics and appliances. These items include anything from computers, TVs and phones to washing machines and refrigerators to everything else in between. Most of these electronics appliances are often not trash, but simply outdated and traded up for the latest version on the market. To manufacture one computer and its monitor it takes 530lbs of fossil fuels, 48 pounds of chemicals, and 1.5 tons of water. Toxic substances when burnt at low temperature create additional toxins such as halogenated dioxins and furans- harmful to mankind. According to the most recent report released by the United Nations University (UNU) on the matter, findings show that globally we produced 41.8 million tons of e-waste in 2014. Even more

startling -- it is believed that less than one-sixth is properly recycled or reused.

While the negative impact of e-waste is vast and growing, most people are probably unaware of its reach. The lack of proper recycling leads to harmful toxins like lead and mercury leaching into the environment. Harmful materials like these and many others found in e-waste, cause all sorts of health issues like neurological damage, kidney damage and some cancers, to name a few. And let's not forget about the ozone-depleting chlorofluorocarbons left behind. Maybe the worst part of this issue is that most e-waste from developed countries is exported to developing countries like India, Africa and China. Often the pits of discarded computers and other electronics are picked over by locals who attempt to mine profitable materials like copper and gold from them. The improperly performed recovery methods like acid baths and burning of electronics are extremely harmful and are often performed by local women and children.

These issues are environmental as well as social and related to mankind. So, it is for us to choose, whether we want to choose life of doomsday by the invasion of machines and radiations over us completely so as we loose humanity and mankind from this planet completely and forever.

Research in Chemistry to Generate Green Energy

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Green Energy refers to the environmental benign source of energy and it does not take into account the process of extracting and refining the energy. When extraction of green energy from a renewable source is processed, very often, it requires a fossil input which adversely affects the environment and consequently the sustainability of the process. The environmental sustainability of green energy production is expressed in energy returned on energy invested, carbon footprints and eco-footprints. Various modifications made in the process of producing green energy are: **1**. Production of hydrogen (H_2) gas (a great source of modern fueling) from supercritical water gasification of biomass. **2**. Nuclear routes for the production of H_2 gas-Electrolyzer is coupled to a nuclear reactor to produce oxygen (O_2) and H_2 gas. **3.** UNIST and KAIST have developed gold nanoparticles modified with titanium dioxide (Au-NPs/TiO_2) photoelectrodes that could boost the ability of water splitting to produce H_2. **4.** Solar water oxidation-Ta:TiO_2 and $BiVO_4$ used as photoanodes. **5.** P_{22} Hyd-This is a biomaterial made by *E. coli* in hydrogenase (Nitrogen-iron hydrogenesis).The resultant capsid produces P_{22} Hyd which can split water. **6.** Dubbed Combined Algae Processing (CAP)-A method used to produce ethanol from algae (Chlorella and Scenedismus). **7.** Camelina usage-Kansas State University engineered Camelina saliva, a non food oilseed crop, to produce high levels of acetyl triacyl glycerols. Camelina is a transgenic plant. These are some of the researches in chemistry in an effort to generate green energy that too via green routes which will be discussed in brief. Green synthesis will limit the emission of green house gases and usage of fossil fuels.

1. Applied Energy, **2016**, Volume 162, 131-138.
2. Green Car Congress.
3. Algal Research Doi, Algal **2015**, 12:02.
4. Industrial Crops and Products, Volume 65, 259-268.

Exploring the origin of nanocatalysis

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Gold at bulk level is inert material however, at nanoscale it is found to catalyze reactions. To explore the origin of this catalytic activity, we selected to theoretically investigate a simple chemical reaction that is, oxidation of carbon monoxide catalysed by Au_5 clusters (neutral, positively and negatively charged). We have studied the reactivity of gold clusters towards dioxygen in terms of binding energy of O_2. The binding energy is described in terms of various descriptors for example, d-band centre of metals, coordination number of binding sites, strain in the cluster i.e. bond lengths, angles etc. Such relationships are shown to successfully predict the catalytic activity of metals. We used regression analysis to quantify the dependence of binding energy on above said reactivity descriptors.

Partial Redundancy for a Sustained Future-The Carbon Case

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What differentiates humans from other animals lies in the literal meaning of the term associated with describing us, ‘Social’; needing companionship. This makes us suitable to integrate, as individual entities come and live together and develop not only the present, but laying a foundation for the future generations, what is known as ‘Sustainable Development’. However, the emotion of greed got the better off us, and a lot off the future.

Analytical Sciences has, over the years, helped immensely in understanding the severity of the ill environmental health, by estimating the levels of Greenhouse Gases (GHGs) in the environment, ‘Carbon Footprint’. A crude estimation of gases like Carbon di-oxide (CO_2) or Methane (CH_4) supports in developing strategies to reduce their levels, thus taking the present, with the future tagged along, a step closer towards efficient development and sustained living at both community and global level.

Reducing Carbon Footprint

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Essentially, the Ecological Footprint shows us how carbon emissions compare and interact with other elements

of human demand. The carbon Footprint is 54 percent of humanity's overall Ecological Footprint and its most rapidly growing component. Humanity's carbon Footprint has increased 11-fold since 1961[2]. Reducing humanity's carbon Footprint is the most essential step we can take to end overshoot and live within the means of our planet.

The Footprint framework also shows climate change in a greater context one which unites all of all the ecological threats we face today. Climate change, deforestation, overgrazing, fisheries collapse, food insecurity and the rapid extinction of species are all part of a single, over-arching problem: Humanity is simply demanding more from the Earth than in can provide. By focusing on the single issue, we can address all of its symptoms in a comprehensive way, rather than shifting the burden from one natural system to another.

1. How to reduce your carbon footprint - Green Wiki - Wikia
2. 25+ Tips to Reduce Carbon Footprint from COTAP.org

Waste Disposal and Recycling

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In this era, where we are mainly focusing ourselves to progress and development, we are unknowingly increasing the consumerism and thus the waste produced, which includes every kind of waste whether it is solid waste which is mainly classified into electronic waste, unincinerated hospital waste and other kind of non-biodegradable waste.This will now or later will surely lead to havoc, thus we must indulge our chemistry oriented scientific minds to overcome it.As it is chemistry which can replace polythene with PHBV (**Poly-Hydroxy butyrate – co - b-Hydroxy valerate)** like organic degradable polymers, it is chemistry which can synthesis products which will not release free radicals like CFC's and can prevent the major Kyoto protocol problems called ozone depletion.Thus we are here to depict our analytical knowledge about chemistry so as to explain less waste production and its management.

1. R. Cossu, International Journal of Integrated Waste Management, Science and Technology,**2014,** www.journals.elsevier.com
2. NCERT chemistry class 12th

Strategies Involved in Treatment and Disposal of Pulp and Paper Mill Effluent

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Pulp and paper industry is considered as one of the most polluted industry in the world due to its toxic effect on environment. Pulp and paper industry uses large quantity of freshwater and lignocelluloses materials in the process of production of paper and it generates large quantity of effluents. The problems associated with pulp and paper mill effluents are pH, colour, and high levels of biochemical oxygen demand (BOD), chemical oxygen demand (COD), suspended solids (SS), Absorbable Organic halides (AOX) etc. Paper manufacturing process release chlorinated lignosulphonic acids, chlorinated resin acids, chlorinated phenols and chlorinated hydrocarbon in the effluent. The high chlorine content of bleached plant reacts with lignin and its derivatives to form highly toxic and recalcitrant compounds, which are responsible for high biological & chemical oxygen demand.

The most important problem which the pulp & paper industry is facing today is the disposal of tremendous volumes of waste water. This waste water is rich in dissolved solid such as chlorides & sulphates of Na, Ca & varying amounts of suspended organic materials. In addition to these constituents, effluents also contain some trace metals like Hg, Pb & Cr etc. The effluents are generally alkaline in reaction, thus the effluents discharge into the water systems make the water unfit for irrigation & potable use & create health hazards. Physical & Chemical methods undertaken to study colour removal from the effluent is not found to be cost effective. Hence, biological treatment has been applied for the decolourization of effluent of pulp & paper mills. The biological colour removal process is particularly attractive since in addition to colour & COD it also reduces BOD & low molecular weight chlorolignins. Additionally, some fungi species are used to remove color & AOX from the effluents. Several studies have been carried out with the final purpose of reduction in the pollution load during the pulp & paper making process. In this paper, waste characterization of this industry in terms of type and source with management approaches will be discussed with exemplary applications.

Algal Biofuel: A Boon for Society in Future to Solve Energy Crisis

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Our fossil fuel based energy resources (petroleum, coal and natural gas) are vanishing at a very faster rate to fulfill the demand of energy for growing population worldwide. So depletion of these resources will lead us to the chains of problems which may occur due to fuel shortage. It has been estimated that as per present uses, our coal reserves will be exhausted in 200 years and if we increase the use by 2%, then it will be vanished in 165 years. Therefore in such a condition sustainable and renewable energy resources are beneficial to solve the problem of energy crisis. Fortunately, our scientists have developed different categories of biodiesel as an alternative fuel to meet growing energy demands. In recent scenario, they are focused on the algae as a raw material for biodiesel and which may be proved as a boon for the society in future. Biofuels play a vital role in mitigating CO_2 emission, reducing global warming and bringing down the hike in oil prices. The biodegradable, renewable and non toxic nature of biodiesel has made it a recent attraction. The objective of the paper is to study the potential of microalgae as an alternative raw material for biodiesel generation that can be converted into fuel. Its easy availability, high mass productivity and faster lipid

production have made it prior to all other alternatives for the raw material of biodiesel. Production of biodiesel from microalgae would be a greater alternative to oil crops due to economical instability, jeopardizing agricultural lands and insufficient oil crops. This paper provide holistic review to enhance the production and commercialization of biodiesel by improving cultivation of different microalgal species, lipid content in various algal species, modes and efficiency of harvesting and trans-esterification methods.

Saviour of Earth: Carbon Footprint Reduction

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'Carbon footprint' has become a widely used term and concept in the public debate on responsibility and abatement action against the threat of global climate change. With climate change high up on the political and corporate agenda, carbon footprint calculations are in strong demand**."The carbon footprint is the amount of carbon dioxide emitted due to your daily activities – from washing a load of laundry to driving a carload of kids to school**"[1]. It is proposed that landscaping works should focus on reduction of hidden carbon footprint in planning, design and construction and reduce dominant carbon footprint in the 3 stages through reasonable selection of planted vegetation, shortened long distance transport and reducing high fuel consumption of machineries [2]. The carbon handprint movement emphasizes individual forms of carbon offsetting, like using more public transportation or planting trees in deforested regions, to reduce one's carbon footprint and increase their "handprint." The carbon footprint is a very powerful tool to understand the impact of personal behaviour on global warming If you personally want to contribute to stop global warming, the calculation and constant monitoring of your personal carbon footprint is essential.

1. ISA-UK Report 07-01: carbon foot printing final.
2. IEEE XPLORE : carbon foot printing research of landscaping works based on life cycle analysis

Reducing Carbon Footprints

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Carbon emissions provide one of the most fatal grounds for acceleration of global warming which is a major threat to mankind. An individual's , nation's, or organisation's carbon emissions can be counted by taking in account GHG emissions assessment or other calculative activities referred as 'carbon accounting' . Carbon footprints is the amount of carbon produced by a person or an entity via direct emissions, resulting from fossil fuels combustion in transportation and manufacturing as well as emissions associated with production of electricity in goods and services consumed. This presentation focuses on elementary measures that can derogate the influence of green house gases (especially CO_2) on environment. A comparative study of various carbon footprint assessments standards, its causes and reduction techniques was carried out to identify their differences, similarities, deficiencies and advantages. We focused on alternative sources of energy such as solar, wind etc to mitigate carbon footprints. Furthermore, various innovative and lyrical ideas will be shared helping in the reduction of carbon footprint. Several guidelines have been made on this issue but further improvement is still needed.

Waste management and disposal

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Waste Management and Disposal are All Those Activities and Action Required to Manage Waste from Its Inception to its Final Disposal. The Central Principles of Waste Management include Waste Hierarchy; Life Cycle of Product, Resource Efficiency and Polluter pays Principle. The Disposal Solutions are Landfill and Incineration.

Recycling is a Resource Recovery Practice that Refers to the Collection and Reuse of Waste Materials such as Empty Beverage Containers, Steel Cans etc. Methods of Reuse include Biological Reprocessing, Energy Recovery, Pyrolysis, Resource Recovery and Sustainability. The Methods of Plastic Recycling that is Physical Recycling, Chemical Recycling and Water Recycling will be taken into Account and the Economic Impact of Recycling will be explained.

1. Glossary of Environment Statistics : Series F, No. 67 / Department for Economic and Social Information and Policy Analysis, United Nations. New York: UN, 1997.
2. Waste Management (2013). "Editorial Board/Aims & Scopes". Waste Management 34: IFC.doi:10.1016/S0956-053X(14)00026-9.

Photogalvanic Cell : A Green Approach in Conserving Energy using Lawsone as Photosensitizer

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Photogalvanic cells were made using natural dyes extracted from *Lawsonia inermis* in a photogalvanic cell which was an H shaped tube. Various factors affected the natural dye extract like pH of the dye and the solvent used for dye preparation. We successfully attempted to isolate and purify Lawsone from the leaves of henna. The progress of the isolation of Lawsone was characterized by Ultra Violet-Visible spectroscopy done by Chemito UV 2100 and Thin Layer Chromatography (TLC) on silica gel. We got the maximum absorbance at λ_{max} (Experimental) = 440-460nm in visible range and spot on the TLC plate when the solvent system taken was ethyl acetate and ethanol (2:1). Fabric

block prints of Lawsone dye were taken to show excellent dyeing ability of lawsone**.** We studied solar energy conversion through photogalvanic effect of the cell using Lawsone dye, glucose and NaOH system (Glucose as reductant, Lawsone as sensitized dye and NaOH aqueous solution). The photopotential generated was 250 mV which was measured by Keithley 2450 Source Meter and the observed power of the cell being 8 μW at room temperature [Solvent Ratio=6.5:6:7 (glucose: lawsone:NaOH)]. The effects of different parameters on the electrical output of the cell and other potential characteristics of the cell were studied.

By the different setups performed we conclude that these cells are the most promising cost effective photovoltaic technologies which are secure, clean and excellent in solar energy conversion.This kind of power management solution exemplified by this innovative project of ours is beneficiary for the living environment and for the booming industrial sector. We thus present our view on future prospects in the development of Lawsone dye as a photosensitizer.

Research in Chemistry to Generate Green Energy

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Green energy or Sustainable energy is derived from non-conventional energy which is continuously replenished by natural processes. If we see the electricity requirements of world including India are increasing at alarming rate and the power demand has been running ahead of supply. It is also now widely recognized that the fossil fuels and other conventional resources presently being used for generation of electrical energy, may not be either sufficient or suitable to keep pace with ever increasing demand of electrical energy of the world.

Chemists could smooth out the patchy supply of sun and wind power by developing fuels and batteries that can store energy during peak times. Various forms of green energy include solar energy, wind energy, hydroenergy, geothermal energy, wave and tidal energy. Renewable power is effective, reliable, sustainable, and environment friendly which we strongly need to cut our use of fossil.

Electrochemical Synthesis of Organic Light Emitting Diode(OLED) and Characterizations by X-ray Diffraction Techniques

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A facile and sustainable electrochemical approach towards the synthesis of tris-(8-hydoxyquinoline) aluminium(III) (Alq3) using 8-Hydroxy quinoline as a ligand is presented. The synthesis has been done at three different conditions (a) 0.015M of 8-Hydroxy quinolin in 50% methanol, at pH7 for 24 hours (b) 0.0303M of 8-Hydroxy quinolin in 40% methanol at pH1 for 48 hours (c) 0.0317M of 8-Hydroxy quinolin in 50% methanol at pH2 for 24 hours at 1.5 V and 12V respectively. Simple room temperature electrolysis method has been employed, wherein Al wire as well as Al foil were used as a sacrificial anode for Al^{3+} ion source and platinum wire as a cathode. Tris-(8-hydoxyquinoline) aluminium (III) (Alq3) was synthesized for the first time by direct dissolution of Al^{3+} into the solution of 8-Hydroxy quinoline from Al electrode in the electrochemical cell. The structural characterizations have been done by using Single X-ray diffraction and Powder X-ray diffraction (XRD) techniques. Complexes of Aluminium with 8-Hydroxyquinoline have a wide applications to material science as organic light emitting diode (OLED).

Bio-Sustainable fertilizers: An overview

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Synthetic fertilizers have been a cause of concern since many years. The problems related to their absorption by the land, their non-biodegradable nature (some are potential carcinogens), water polluting aspect make them ever-more dangerous to use. It leads to biological magnification too, which means they get accumulated in our bodies over time and cause various problems. Furthermore, recent studies show that increase in fertilizer use has led to a rise in Nitrous Oxide emissions having serious climate change impact.

This leads us to look for a better alternative that contributes less to climate change and augment our goal of sustainable development. Bio-fertilizers show the way ahead. Bio-fertilizers consist of micro-organisms that increase the availability of essential nutrients such as nitrogen and phosphorus to the plants and act as 'potential fertilizers'. In our presentation we would discuss Bio-fertilizers in detail covering its production, usage and impact ; and how it appears promising to control climate change and promote sustainable development.

The Garbage Dump Can't Solve it Any More

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Waste Management has been a major concern for environmentalists since the last few decades due to increased population and over consumption. Ample of researches have focused on methods of waste disposal, recycling, reuse and reduction in production of waste via sustainability. There are certain places all over the world where waste is efficiently disposed and recycled eg: Zabbaleen community in Cairo recycles 80% of the waste collected which is 4 times the average rate of recycling in any part of the world. The other

methods include **Plasma Gasification**, **Waste to energy process, Incineration, Composting, recycling, reusing** etc.

But how can a scientist reduce the production of waste in his lab? With the advancement of science and technology, a number of computational methods enable theoretical studies of processes which decades back could only be done practically. Resorting to theoretical studies can turn out to be a long term solution to minimize chemical waste which is not only difficult to dispose but also harmful for the mankind.

A Theoretical Proposal for Conversion of Polythene Waste to Ethanol

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Polythene waste is a stagnant menace in the society with no long-term solutions in sight. The present research proposes the conversion of waste polythene into ethanol and other hydrocarbons with high commercial value.

The conversion includes a two-step process. In the first step, solid polythene waste will go through thermal cracking at about 350°C-750°C. In the second step, the formed ethene gas will be hydrated in a cyclic process in the presence of an acid catalyst like phosphoric acid. The formed gases will be passed through a multilayered mesh coated with solid phosphoric acid catalyst producing ethanol as a major product [1]. The gaseous components can be cooled and dissolved inside a scrubber to yield ethanol and some lower alcohols. Ethanol can be distilled from this mixture using fractional distillation.

The aforementioned is theoretically proposed after literature survey and once analytically verified, can lead to commercial production of ethanol from waste polythene.

1. Morrison, R.T., Boyd, R.N. and Boyd, R.K. 1992, *Organic Chemistry, 6th edn.* p. 110, Benjamin Cummings Publications

Reducing the Carbon Footprint

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Carbon footprint refers to the total amount of greenhouse gases in the atmosphere caused by an individual,event or organization.The carbon footprint is 54 % of humanity's overall ecological footprint and its most rapidly growing component.

The total amount of carbon footprint is not easy to calculate because of large amount of data required and the fact that carbon dioxide can also be produced by natural occurences.The average household carbon footprint is 50 tonnes per years.

Developed countries are contributing most to the carbon emissions with USA as the largest contributor.Most of the carbon emissions come from burning of fossil fuels.The drastic effects include global warming & global climate change. Each one of us can contribute our part towards reduction of carbon footprint.Reduce,reduce & recyle should be the principle of our life.Afterall,it is our duty to give our future generations a healthier earth to live in.

1. http://articles.economictimes.indiatimes.com/keyword/carbon-footprint
2. https://www.gov.uk/government/statistics/uks-carbon-footprint
3. http://www3.epa.gov/climatechange/ghgemissions/gases/co2.html

Research in Chemistry to Generate Green Energy

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As global supplies of oil ,coal and natural gas shrink and as climate change becomes an increasinglingly important environmental concern, green energy is clearly a way for future. Difference between renewable energy and green energy can be made by saying that renewable energy comes from natural resources whereas green enegry includes natural energetic processes that can be harnessed with little pollution.

Types of green energy are; anaerobic digestion,geothermal power, wind power, small scale hydropower, solar energy, biomass power,, tidal power, wave power, CHP (combined heat and power) and some forms of nuclear power. In the case of nuclear power some say that its a form of green enrgy but others claims problems associated with radioactive waste.

Information regarding need of harnessing green energy and the ways will be explained further by taking into account the types of green enrgy. points will be taken into consideration by how we can go for green energy production and usage.this can incude usage of solar energy , heat pumps, LED lightening, various other energy saving ideass.

There has been a lot of research in the photovoltaic market:

1) first generation-using multi crystalline silicon wafers,

2) using thin film solar cells based on amorphous silicon-hydrogen alloys.

We can too have thermoelectric power generation using waste- that is using heat enengy as an alternative for green technology.

Pseudocapacitive Properties of Symmetry and the Asymmetry Two Electrode Type Supercapacitor Cells Made from Polyaniline-Hybrid carbon assemblage composites

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Pseudocapacitive properties of synthesised polyaniline integrated with hybrid carbon assemblage in a two-electrode cell type supercapacitor were investigated. Successful formation of the composites was confirmed with techniques

such as transmission electron microscopy (TEM), scan electron microscopy (SEM), electron dispersive X-ray spectroscopy (EDX) and X-ray diffraction spectroscopy (XRD). The pseudocapacitance behaviour of both the symmetry and the asymmetry PANI and PANI-HC based supercapacitor in 1 M H_2SO_4 electrolyte was evaluated using cyclic voltammetry (CV), electrochemical impedance spectroscopy (EIS) and galvanostatic constant current charge-discharge (CD) techniques. There was a good correlation between the CV and the GCD specific capacitance (SC) values for the symmetry and asymmetry supercapacitor. The symmetric and asymmetric configuration of 025PANI-HC cell approaches specific capacitance, energy density and power density of 194 F/g, 107 Wh/Kg, 873 W/Kg and 257 F/g, 142 Wh/kg, 978 W/kg at 1 A/g current density in 1mol/L H_2SO_4, respectively, indicate usefulness of electrode material for supercapacitor application.

Chromium speciation in water samples using various solid phase extractants and determination by Hyphenated Flow Injection Flame Atomic Absorption Spectrometry (FI-FAAS)

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The chemistry of Cr (III) and Cr (VI) is entirely contrasting to each other. Cr(III) is essential for glucose and lipid metabolism in mammals, whereas Cr(VI) is a carcinogen with strong oxidizing properties. Thus, selective determination of both species in environmental samples is of prime importance. In the last decade, solid phase extraction (SPE) was the method of choice and solid sorbents were used with and without chemical modification. In speciation analysis SPE offers many advantages the most important can be listed as selectivity, stability etc. One of the most widely used spectroscopic detection techniques is FAAS. It can be easily hyphenated to flow injection (FI) systems which makes the system automated and fast. The hyphenation of FI system to FAAS along with SPE has proven to be an excellent method for the speciation of chromium at ultra trace levels. Recent trends and futuristic aspects of the SPE to be used for speciation analysis are highlighted.

1. R. Saxena, S. Tiwari and N. Sharma, *RSC Adv*., 2015, **5**, 69196.
2. R. Saxena, N. Sharma and S. Tiwari, *Anal. Sci*., 2015, **31**, 1303.
3. S. Tiwari, N. Sharma and R. Saxena, New J. Chem., 2016, **40**, 1412.

Waste Disposal and Recycling

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Waste management is one of the most important topic in the contemprory times. Waste is basically the unwanted or useless materials. In biology, waste is any unwanted substance expelled from living organisms, metabolic waste such as urea and sweat. In this presentation i will be focusing on the types of wastes and its health impacts. Further, waste treatment processes and types will be discussed covering their advantages and disadvantages. Also some statistical data will be shared. Various research in the field of waste management has been done but further improvement is required for mitigation of waste.

Integrated Applications of Algal Biomass for Textile Effluent Treatment and Biodiesel Production

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Releasing of textile dyes into water bodies is a major environmental issue. Sustainable, eco-friendly bioremediation of azo-dye still remains a challenge to save the aquatic ecosystem. The focus has now shifted to the use of biological techniques for the treatment of textile dyes. This study was directed towards evaluating the potential of microalga (*Chlorella pyrenoidosa*) for simultaneous treatment of textile wastewater and lipid biosynthesis for the production of biodiesel. [1] *Chlorella pyrenoidosa* shows superior results in terms of maximum specific growth rate of 416 mg/m^3(glycerol)and 867mg/m^3(sodium acetate), biomass yield of 121 $mg/m^3/d$ and total lipid content of 17.3% (glycerol). The FAME (Fatty Acid Methyl Ester) composition of Chlorella pyrenoidosa lipid was found to be encouraging for biodiesel application and saturated: unsaturated fatty acid was favourable to about 3.82:1.[2] The study indicates that Chlorella pyrenoidosa can effectively utilize textile wastewater instead of using synthetic culture medium for its growth and can produce a significant amount of biomass for biodiesel production.

1. Sinha S., Singh R., Chaurasia AK and Nigam , *Journal of Hazardous Materials*,**2016**, *vol 306*, Pg no. 386-394
2. Nigam S, Rai M.P., Sharma R, *Biomass and Bioenergy* **2013,** *vol 58.* Pg no. 251-257

Waste disposal and recycling

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Recycling is the process of converting waste materials into reusable objects to prevent waste of potentially usefull materials, reduce the consumption of fresh raw materials, energy usage, air pollution (from incineration) and water pollution (from land filling) by decreasing the need for "conventional" waste disposal and lowering greenhouse gas emissions compared to plastic production. Recycling is a key component of modern waste reduction and is the third component of the "Reduce, Reuse and Recycle" waste hierarchy.

Waste management is all those activities and action required to manage waste from its inception to its final disposal. This includes amongst other things, collection, transport, treatment and disposal of waste together with

monitoring and regulation. It also encompasses the legal and regulatory framework that relates to waste management encompassing guidance on recycling etc.

The term usually relates to all kinds of waste, whether generated during the extraction of raw materials, the processing of raw materials into intermediate and final products, the consumption of final products, or other human activities, including municipal (residential, institutional, commercial), agricultural, and special (health care, household hazardous wastes, sewage sludge). Waste management is intended to reduce adverse effects of waste on health, the environment or aesthetics.

Green Chemistry

Niharika and Anjali

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Green chemistry is the utilization of a set of principles that reduces or eliminates the use or generation of hazardous substances in the design,manufacture and application of chemical products.this is a new philosophical approach that through application and extension of the principles of green chemistry can contribute sustainable development.green chemistry is essential in developing the alternative for energy generation by technologically and economically (hydrogen cell,solar energy,bio-fuels) .

Why to approach green chemistry to produce green energy- in case of traditional chemistry the chemical industry relies almost entirely non renewable petroleum as the primary building block to create chemicals .this type of chemical is very intensive inefficient and toxic resulting in in significant energy used and generation of hazardous waste.but in case of green chemistry it is to prioritize the use of alternative and renewable materials include use of agricultural waste.biomass and non-food related products and chemical reactions with these materials with less hazardous than when conducted with petroleum products.and this method focused the safely degrade in environment,efficiency and simplicity in chemical processes.

Method of preparation of green energy through green chemistry-(a) production of bio-diesel from vegetable oil with batch method - take a waste and virgin vegetable oil and methanol and koh catalyst at 55 degree celsius. this process with koh catalyst produce bio-diesel as well as soap and glycerol that have to be removed before use.wash with water to remove soap and separate glycerol from bio-diesel test of presence and quality of bio-diesel by mass spectrometrically. (b)preparation of solar cell of green energy from green method-solar energy is only renewable resource that have enough terrestrial energy potential to satisfy a 10-20 tw carbon-free supply supply constraint 2050.the solar energy is a technology intended to reduce both air pollution and co2 emission is the use of photo voltaic cell to generate electricity(electrons)from photons emitted by sun.for example through the use of nanotechnology the light and energy generation of crystalline silicon solar cells or organic solar cells can be enabled significantly increased.their manufacturing also requires less material and is more efficient.

Advantage and disadvantage of green energy-.the advantage of using green energy sources is that they are cleaner so they does not emit as many harmful pollutants into the air, which creates a lesser impact on the environment. Green energy sources are also renewable which means we will never run out of them. .the disadvantage is the fact that some of the green energy sources cannot be installed in certain areas of the planet. For instance, wave energy can only be utilized if ocean waves reach at least 16 feet. The use geothermal energy can only be done in geologically unstable parts of the planet.

Conclusion: chemicals and much more satisfactory pouring into the environment. Green research areas and their applicably appropriately provide safer specialty chemicals and much more satisfactory processes for the chemical industry.

Reducing carbon footprints

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Of all the potential threats faced by the present world, carbon footprint tops the index. When talking about climate change, footprint is a metaphor for the total impact that something has. And carbon is a shorthand for all the different green house gases that contribute to global warming.The term carbon footprint, is a shorthand to describe the best estimate that we can get of the full climate change of the impact of something. That something could be anything-an activity, an item, a lifestyle or even the whole world.

In our presentation we'll be dealing with the factors that are accountable for the increased levels of greenhouse gases primarily carbon. On the basis of studies conducted by us we'll also be discussing about the efforts that can be made on the grassroot level for dealing with the perils of carbon footprint. A lot have been done and so much more is yet to be if we want this earth to be a better place to live in.

Preparation of Biodiesel from Used Olive Oil

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In today's world, our life is highly dependent on energy. Due to high consumption of the natural fuel and gases the resources for the same are going to finish at a very high rate. The world is now looking for a sustainable alternative of energy. Bio diesel is one of the promising area coming up where the bio resources like oil, vegetables and fatty acids may be used as an alternative to mineral oil and gases. For this reason, in this work bio diesel have been prepared from waste oil sources by green chemistry method. This way, the work process also is useful from environmental point of view where waste is being reused and also because of green technology the process is safe and environmentally safe. The percentage yield of the biodiesel is about 70%. The calorific values of the bio diesel(8Kcal/gm) suggests that it can be used in place of mineral oil and also does not require the replacement or alternation of the car engines. The Fourier Transform Infrared Technique (FTIR) studies reveal that the structure of the biodiesel has the presence of ester groups.

Fruits Peels Get a Second Life as Water Purifiers

Nandini Dixit , Anjali Jain

Deshbandhu College, University of Delhi

Access to clean drinking water is a worldwide problem. Each year, waterborne pathogens make tens of millions of people sick and lead to 1.8 million deaths. And all of these are preventable. By using peels of fruits it was believed that it make water safe to drink, so for this...,Banana and orange – a versatile biomass for water purification. Highly colored industrial waste water is a serious environment problem as it seriously discolors waterways as well as blocking sunlight for photosynthesizing plant species in the water. Mining process, run off from farms and industrial waste can all put heavy metal such as lead and copper which can be treated by solid phase extraction using banana peels for waterways. Orange peels is used as absorbent for removal of acid dyes from industrial effluent which are highly colored, and disposal of these waste into the environment can be extremely deleterious. Using of fruit peels for the purification of water has many advantages such as it is eco-friendly, low cost, natural and abundant source for removal of harmful or undesirable species in the water effluent, it is been alternative to most costly materials.

Phytoremediation: Green Therapy to Cure Polluted Environment

Mithlesh Kumar Temre, Thaleshwar Verma, Deepak Kumar Dubey and Rajeev Kumar Jain

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Human population is increasing continuously and simultaneously requirement for various human need rising. Growing industrialization to fulfill human need increases various types of pollutions on our planet. The rapid build-up of toxic metal and other pollutants not only affects natural resources, but also causes major strains on ecosystems. Phytoremediation as a method to solve environmental contamination has been growing rapidly in recent years. In this green therapy, tolerant plant has been utilized in a contaminated matrix to remove environmental contaminants by facilitating detoxification of the pollutants. Plants are unique organisms equipped with remarkable metabolic and absorption capabilities, as well as transport systems that can take up nutrients or contaminants selectively from the growth matrix, soil or water. Phytoremediation is an ideal, cost effective, solar energy driven cleanup technology which can be used to clean our environment. In this poster presentation, phytoremediation technology will be explained briefly.

Waste Disposal and Recycling

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Over 6 billion people live on Earth.Every person creates waste such as food packages,made of cardboard and plastics,aluminium cans,worn out tires,used papaes,broken down cars,bent bicycle,old toothbrushes,grass clippings,leftover food, old movie tickets, etc. Whatever we throw away.Where Does It All Go?

In towns and cities all over the world,trash is put into a dump.A dump is a place where trash is left in one spot on top of the ground or in deep holes in the earth.The holes are filled with trash.This is done year after year ,untill there is no room at the dump. Then,a new dump is begun.In some towns,there is no room left for the dump.Trash has to be moved to the dumps in other towns.

One of the worst problems with older dump is that polluting chemicals were dumped there before any rules were made about how to handle it.Those chemicals seep into the soil and into the water,polluting that also.

In some towns and cities where the space for dumps is running out,laws have been passed that make people recycle.using something again is called Recycling.

For example,a lot of used plastic and glass can be meted and reshaped into new containers,carpetting,play ground equipment,and a lot of other useful items .Paper can be cleaned,soaked in water and turn into new paper.

3. http://www.kidsecologycorps.org/our-environment/natural-cycles/waste-disposal

Development Of Theranostics Based Product With Curcumin-Oligonucleotid-Rare Earth Metal based Nanoparticle Probes As MRI Contrast Agent

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Target-specific drug delivery and early diagnosis in cancer treatment is one of the priority research areas in which nanomedicine plays a vital role. Nanotheranostics aims at formulation of the therapeutic and diagnostic agents in nanomedicine as a single theranostic platform, which can then be further conjugated to biological ligand for targeting. Potential applications of theranostic nanomedicine formulations range from the noninvasive assessment of the bio distribution and the target site accumulation of low-molecular-weight drugs, and the visualization of drug distribution and drug release at the target site, to the optimization of strategies relying on triggered drug release, and the prediction and real-time monitoring of therapeutic to diagnose and treat the disease at cellular and molecular level. In particular gadolinium based compounds have the ability to enhance the contrast in MRI for better in vivo visualization. Lipid based formulations, liposomes loaded with curcumin conjugate and a gadolinium based contrast agents have been developed as new modalities for better theranostic effects with fewer side effects in cancer treatment . The fruition of nanotheranostics with highly suitable systems for (pre-) clinical implementation will also be able to provide personalized therapy with bright prognosis and less toxic treatment regimens for individual patients of cancer.

Analytical study of morphological and economically important traits of *Garcinia indica*

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Garcinia indica, an endemic tree species of Western Ghats in India, has been exploited throughout world for its property to regulate obesity. The fruit rind is an important source of stereoisomer of hydroxycitric acid (HCA). HCA triggers signals in brain to suppress appetite. Chemically it inhibits the oxidation of fat. The study of diversity in morphological and economically important traits of a species can help to locate and collect the best germplasm. Keeping this as a major objective, fruit samples from five different sites in Western Ghats were collected. These were statistically analyzed for their size, rind thickness, fatty acid and ascorbic acid content, seed protein and oil, and HCA content. High Performance Liquid Chromatography (HPLC) aws carried out for HCA content. The samples were significantly different most of their economically important traits. The differences in these traits are probably because of the habitat, topography and climate. The conservation of germplasm from specific location should be the priority of environmentalist and pharmaceutical scientist.

Synthesis and Characterization of Transition metal doped Polymer/ Carbon Nanotubes composite for Supercapacitor Electrode

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A facile in-situ chemical oxidative route for synthesizing transition metal doped polymer/Carbon nanotubes composite has been reported. The possible interactions between transition metal ions and PANI/CNTs were analysed by FTIR spectroscopy and UV- Visible spectroscopy. The X-Ray diffraction technique revealed the crystalline nature of the composite and indicates successful incorporation of metal ions in the composite structure. The morphological characteristics of the electrode materials were investigated by field emission scanning microscopy (FESEM). It is observed that composite has uniform coating of polymer onto CNTs surface. Composite possess the benefits of pseudoactive species and high surface area of CNT which make them promising candidate for applications in supercapacitor.

Design, Synthesis, Spectral Characterization and Molecular Docking of Pyrazole Derivatives as Selective Cox-II Inhibitors and Anticancer Agents

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A novel series of pyrazole bearing methyl amine derivatives (**8a-p**, &**11a**, **11b**) were characterized by IR, NMR and Mass spectral data and evaluated for *in-vivo* anti-inflammatory, analgesic, *in-vitro* COX-II and TNF-α inhibition activities. Compounds **8b**, **8d**, **8i**, **11a** and **11b** exhibited potent anti-inflammatory activity along with analgesic activity and it also exhibited optimal COX-II inhibitory potency with (IC_{50}= 1.90, 2.99, 2.87, 2.24, 2.60 and 3.11 µM respectively) along the selectivity index (SI) in arange of 14-72. Structure activity studies revealed that compounds **8i** and **11a** are highly potent anti-inflammatory agents and selective COX-II inhibitors (IC_{50} -2.99 and 2.60 µM, SI=64.40 and 72.73 respectively) which is comparable to celecoxib (IC_{50}- 0.31 µM; SI-78.06). The results of *in-vivo* and *in-vitro* studies prove that pyrazole ring attached with benzene sulphonamide groups could generate more potent anti-inflammatory and anticancer agents and it was also ascertained by docking analysis.

Green Energy through green synthesis of zero valent iron nanoparticles

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Iron nanoparticles (Fe NP) have been recieving ample attention by researchers due to their wide range of applications in various fields. Owing to their high intrinsic reactivity on their surface sites, they have been successfully employed for remediation of heavy metals from soil. Earlier methods of synthesis of Fe NP were based on using sodium borohydride as the reducing agent which incurred high cost and were toxic to the environment. To overcome these factors, the proposed green synthesis of Fe NP from biorenewable natural sources are bound to attract a great deal of attention. The green extracts are not only non-toxic and biodegradable but also act as both a dispersing and capping agent which also help to minimize the oxidation and agglomeration of zero valent Fe NP. FeNP obtained can be used in the remediation of waste ground water *e.g.* for removal of Ni(II), As(III), Cd(II), Pb(II) etc. Also, they can be used for the catalytic elimination of various environmental pollutants using bimetallic Fe NPs. Their strong reducing ability can be used to remove numerous pollutants (e.g. heavy metals, halogenated organic compounds, nitro and azo compounds and oxyanions. The technique for obtaining nanoparticles using naturally occuring reagents like plant extracts as reductants and capping agents could be considered as significant and attractive.

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Extraction of Algal Lipids for Use in Biodiesel Production

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Due to limited fossil fuel supplies and global climate change, alternative energy sources must be found. Biodiesel produced from algae shows great potential to sustainably replace petroleum-based transport fuel, but technological hindrances, including inefficient lipid extraction, have prevented their implementation.

Approach: In order to improve upon the current extraction methods, cell disruption, greener solvent systems, selective extraction, and simplified extraction-fuel conversion processes will be evaluated for their ability to increase efficiency and decrease hazard associated with lipid extraction. In particular, supercritical carbon dioxide ($scCO_2$) will be used as a non-polar solvent to solubilize the algal lipid. The supercritical extraction conditions will be modified by varying pressure, temperature, and co-solvent use, in order to find the most effective conditions in terms of efficiency and selectivity. The efficiency of extraction can be evaluated by assessing the fatty acid methyl ester (FAME) content of the lipid extraction and thus the algal biodiesel production potential. Further, the selectivity of each variation can be quantified by also assessing the full lipid profile of the extract, including triglyceride and phospholipid content.

Supercritical carbon dioxide ($scCO_2$) was used to extract components of interest from *Scenedesmusdimorphus*, a microalgae species, under varied algal harvesting and extraction conditions. Liquid chromatography-mass spectrometry (LC-MS) was used to quantify the concentration of fatty acid methyl esters (FAME) and the FAME profile of transesterified lipids, phospholipids and pigments extracted under varied supercritical temperatures and pressures. The $scCO_2$ extraction results are compared with conventional solvent extraction to evaluate differences in the efficiency and nature of the extracted materials. Algae harvested by centrifugation (*vs.*lyophilization) demonstrated a similar extraction efficiency in $scCO_2$, indicating potential energy benefits by avoiding conventional algal mass dehydration prior to extraction. Centrifuged algae and optimized extraction conditions (6000 psi; 100 °C) resulted in comparable FAME yields to conventional processes, as well as increased selectivity, reflected in the decreased pigment, nitrogen and phospholipid contamination of the FAME. Cell pre-treatments—sonication, microwave, bead beating and lyophilization—showed an enhancement in extraction yield in both conventional solvent and $scCO_2$ extraction, allowing for improved extraction efficiencies. This study suggests that $scCO_2$, a green solvent, shows great potential for algal lipid extraction for the sustainable production of biodiesel.

Depolymerisation of Post-consumer PET Bottles using Waste Acid

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Poly(ethylene terephthalate) [PET] is widely used in the manufacture of high strength fibres, soft drink bottles and photographic films. With increasing PET consumption as packaging material, the effective utilization of PET wastes has received wide attention for the preservation of resources and protection of the environment. A study conducted in Mumbai indicated that an average 25,03,334 virgin PET bottles were used for packing carbonated soft drink and water bottles per month in Mumbai only. Average consumption of Hotels, Airline and Caterers was 7.5 kg/day, 70.25 kg/day and 11.75kg/day respectively there. Also, along with the other application of PET, these accounts for 8% by weight and 12 by volume of the World's solid waste (www.plasticsnews.com; www.plasticseurope.org; accessed on December 5, 2015). Taking a closer look on the world

statistics, the observed facts includes the waste PET generation of 2.67 million tons, or 1.1% of municipal solid waste (MSW) by weight and 17.28 pounds of PET bottles per person per year.

Depolymerization is an important method for utilization of the waste PET. In the present work, we are using the waste acid to depolymerise the post-consumer PET bottles.

Waste-No More a Nuisance

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This poster presents an overview on the history of waste, its types, and the methods of its disposal and recycling. It focuses on the problems posed by solid waste, radioactive waste and waste from Electric and Electronic Equipments (WEEEs) which are currently considered to be some of the fastest growing waste streams in the world with huge impact on health and environment. Mountains of hazardous waste have been created on the outskirts of mega cities.Various methods like land filling, incineration and composting have been used for waste management, but none of them fully satisfy the growing need of waste management in major cities.

The poster throws light on new research in the field of waste management like Steam Pyrolysis of Amides as a Waste Solvent Management Method [1], Solid Waste Management through Plasma Arc Gasification [2], Greenhouse gas emission factors for recycling of source-segregated waste materials [3], etc.

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Waste Disposal and Recycling

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Waste management is all those activities and action required to manage waste from its inception to its final disposal. This include amongst other things, collection, transportation, treatment and disposal of waste together with monitoring and regulation. It also encompasses the legal and regulatory framework that relates to waste management encompassing guidance on recycling etc. For example- land fill trash in grey or black bins. Recyclable waste in blue colored bins and organic waste in green colored bins. There are number of concepts about waste management which vary in their usage between countries or regions.

E-waste or Electronic waste is also called universal waste. E-waste is the waste which includes electronic equipment, mercury containing equipment, LED, etc. all these contains a lot of heavy metals and toxic material that can seep into the water supply or poison ground. All of these materials can be contained and most can be reused, if they are properly disposed off.

There are 3R's of waste management. These are Reduce, Reuse and Recycle. It is the order of priority of actions to be taken to reduce the amount of waste generated and to improve the overall waste management processes and programs.

Research in chemistry to generate green energy

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Biofuels play an essential role in reducing the carbon emissions from transportation.Current biofuels, such as ethanol, have a lower energy content compared with conventional hydrocarbon fuels, petroleum and natural gas. The aim is to produce fuels that have a high carbon content and therefore have a higher volumetric energy density. This can be achieved by chemical reactions that remove oxygen atoms from biofuel chemical compounds. This process produces a so called 'drop-in biofuel', i.e. a fuel that can be blended directly with existing hydrocarbon fuels that have similar combustion properties.

Levulinic acid and furfural are examples of potential 'platform molecules', *i.e.* molecules that can be produced from biomass and converted into biofuels. Levulinic acid can be produced in high yield (>70%) from inedible hexose bio-polymers such as cellulose, which is a polymer of glucose and the most common organic compound on Earth. Furfural has been produced industrially for many years from pentose-rich agricultural wastes and can also act as a platform molecule.

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Synthesis and biological screening of 1,3,4-oxadiazole clubbed quinoxaline Derivatives as potential anti-inflammatory Agents.

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A new series of substituted 2-(phenyl)-5-(quinoxalin-2-yl)-1,3,4-oxadiazole derivatives **(5a-l)** were designed and synthesized from the key intermediate Quinoxaline-2-carbohydrazide (**4**). Cyclization of **(4)** with substituted aromatic acids in the presence of phosphorous oxychloride ($POCl_3$) afforded 1, 3, 4-oxadiazole derivatives (**5a-l).** The structure of synthesized derivatives was confirmed by ^{1}H NMR, ^{13}C NMR, IR and mass spectrometry. All the compounds were evaluated for anti-inflammatory activity by carrageenan induced rat paw edema method. Among the synthesized derivatives, compound **5d** was found to be most

active (**81.95 %**) and equipotent to indomethacin (**86.30 %**). The compound **5d** exhibited lower ulcerogenic activity probably due to the inhibition of lipid peroxidation in the gastric mucosal wall. Furthermore, compound **5d** was found to be potent COX-2 inhibitior, having a selectivity index (SI) of 115.3, as compared to the standard COX-2 inhibitor Celecoxib (SI = 117.5). Docking studies of the compound **5d** revealed that interaction with key amino acid residues Arg120 and Tyr355 is responsible for COX 1 and COX 2 inhibition.

Optimization of Parameters for *In-situ* Hydrolysis and Extraction of Solasodine from Fruits of *Solanunvirginianum* L.

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Solasodine is a potential alternative to diosgenin which is used in the synthesis of steroidal drugs through the formation of 16-dehydropregnelone. The biggest problem, however with the extraction of solasodine from the plant materials is the formation of hydrolysis intermediates of glycoalkaloids as precipitates resulting in its low yield as well as low purity.

The present study was performed with the aim of optimizing the solasodine extraction from fruits of *Solanumviriginianum* L. Initial extraction studies were carried out in two hydro-alcoholic solvent systems *viz.*, methanol-water and 2-propanol-water with a solid-to-solvent ratio of 1: 8 w/v. The yield of crude solasodine was selected as the basis for assessment. The methanol-water solvent system was found to give higher yield than 2-propanol-water combination. Therefore, methanol-water was used as solvent for extraction in further studies.

The optimization of parameters was carried out in two stages. In single factorial design,one parameter was varied keeping the other parameters constant. The parameters such asacid concentration, reflux time and solvent system for in-situ hydrolysis and extractions were optimized.The assessment of these studies was done on the basis of solasodine content in the extractives by HPTLC densitometry at 510 nm. Ascending development on pre-coated silica gel plates using chloroform-methanol (5:1, v/v) as mobile phase was followed by derivatization with 10 % sulphuric acid and heating at 100^{o} C for 20 min.Methanol content, acid concentration and reflux time were found to have significant effect on solasodine extraction. In further optimization more than one variable were simultaneously varied in order to study the interaction between variable. The optimum condition for *in-situ*hydrolysis extraction of solasodine was found to be: extraction with methanol-water (80:20, v/v) containing 5% HClwith a solid-to-solvent ratio of 1:8 w/v and refluxedfor 4 hours.

Arsenic Bioremediation by Arsenite Oxidase from Pseudomonas Stutzeri TS44: An In-Silico Approach

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Bioremediation techniques using microorganisms especially bacteria have been a promising alternative technique for the removal of toxic metals like arsenic because of their low cost and eco-friendly nature. This article tries to find a bioremediation of arsenic using bacterial enzyme. We herein present the 3D models of arsenite oxidase of Pseudomonas stutzeri TS44 by homology modelling using BioPredicta module of the software VLifeMDS. BLASTp, ProtParam tool and CFSSP server were used to identify the conserved regions, to determine physiochemical properties and to predict the secondary structure of protein of the arsenite oxidase of P. stutzeri TS44 against the existing database respectively. The 3D structure of arsenite oxidase was modelled, validated and used as a target macromolecule for docking to find the chain having the best binding efficiency to accomplish bioremediation of arsenic. The results showed that arsenite oxidase Rieske subunit's chain D and Mo-pterin subunit's chain A of P. stutzeri TS44 are potential to be developed for the enzymatic bioremediation of arsenic

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Sustainable approach in denim production: handloom denim

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The issue of sustainability with regard to denim (fabrics) has for many years been a matter of concern to environmentally-concerned garment consumers as well as retailers. Also increased awareness among consumers and regulatory standards has increased the importance for sustainable clothing. They are gradually getting into mainstream fashion and consumer preferences. This trend, rather a necessity, has influenced the making of denims also. Denim is one of the oldest known fabrics in the recorded history of modern textiles. Its qualities like durability and comfort make it popular amongst all age group. Although it is very popular but it is the most pollution causing fabric

amongst all. Its manufacturing process consumes a lot of water and chemicals, it also discharges huge quantities of waste-water mixed with strong chemicals. The industrial production of denim, consumes a lot of electricity and steam, thereby consuming a lot of fuel. There is a very strong need to turn-around and look at the eco-friendly options available to us.

A recent development in the making of denim fabrics is handloom denim which is an ecofreindly method of denim production. It is both innovative and sustainable method of denim production Denim made on handlooms is softer than mill made denim, has a unique texture, breathes well, helps feel cool in summer and retain body warmth in winter. It has negligible carbon footprint. The entire process of making fabric from yarn is hand-based. The handloom denim is made out of 100% cotton yarn.

The aim of present study is to understand the manufacturing process of handloom denim and problems encountered during manufacturing of handloom denim.

Arsenic toxicity in the environment

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Arsenic (As) is ubiquitous in the environment originating from both natural and anthropogenic sources, and both may pose a threat to human health. Arsenic contamination of the environment is of particular interest among the various toxic elements because of its high toxicity and carcinogenicity of the inorganic redox species. Various As species get accumulated in living organisms and exert different toxicological impacts. Arsenic has been shown to be a non-essential element for plants; though it is considered to be essential for animals at low concentrations. It may be toxic to plants even at low concentrations, though at very low concentrations it has been reported to be beneficial for plant growth. At higher concentrations, As becomes toxic for all plants as it interferes with plant metabolic processes causing chlorosis, necrosis, inhibition of growth, often leading to death.

Although there are various settings of As exposure, ingestion of contaminated ground-water is more widespread. Arsenic exposure occurs to the greatest extent from contaminated drinking water with dissolved inorganic forms and secondarily from contaminated foods. However, As ingestion might also occur locally from air. In recent years, bioaccumulation of As in crops grown in areas with elevated atmospheric deposition, contaminated lands, and areas irrigated with contaminated ground-water has emerged as an issue of great concern.

Arsenic is well known to be poisonous to organisms. However, the toxic effect of As is highly dependent on its chemical form. Inorganic As species are generally considered to be more toxic than organic species. Arsenic is identified as a human metallic carcinogen by the US Environmental Protection Agency, World Health Organization and the International Agency for Research on Cancer. The adverse effects from exposure to this metalloid are considered among the top priority health hazards in the world. Various carcinogenic, teratogenic and mutagenic effects of As have been recognized. Inorganic As is a general cellular poison causing arsenicosis that produces a variety of effects in different organ systems. It is known to cause cancers of several organs including skin, lung, liver, bladder and kidney.

The "Dark World" of Cosmetics

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Cosmetics are substances used to enhance the 'appearance' of the human body. Cosmetics include skin-care creams, lotions, powders, perfumes, lipsticks, nail polish, eye and facial makeup, hair colours and gels, toothpastes, dental care products, deodorants, personal hygiene products and many others. Millions of consumers use cosmetic and their ingredients on a daily basis. The cosmetics industry has traditionally relied on convincing people that they are incomplete without a particular product. In a country such as India, the dominance of fair skin has both a colonial and a caste legacy and the global narrative is that those at the top of society have fair skin. With issues such as employment and relationships often resting on skin tone, people invest in skin-whitening creams in the hope of a better existence. In addition, natural and synthetic substances may produce local effects in human skin, such as irritation, sensitization or photoreactions. Some of the chemicals used in the preparation of cosmetics are harmful and can even cause serious threatening diseases. Given the significant and relatively uncontrolled human exposure to cosmetics, these products must be thoroughly evaluated for their safety. This presentation will provide an overview of the dark world of cosmetics.

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Nanomaterials in waste water treatment

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Water is the most important and essential component on Earth for vital activities of living beings. As there are limited sources of drinking water and due to geometrical growth of population, industrialization and environmental changes quality of our water resources is deteriorating continuously [1]. Therefore there is an urgent need to conserve and purify this valuable resource. Air pollutants, litter, agriculture waste, sewage etc. are the major contributors of the

pollutants in water. A large number of organic, inorganic, and biological pollutants have been reported as water contaminants, such as heavy metals, organic pollutants, and many other complex compounds [2]. Some of these pollutants are highly toxic with a few being lethal and carcinogenic. Consequently, treatment of contaminated waste water is essential for a healthy life. The rapid and significant progress in waste water treatment has been made, including photo-catalytic oxidation, adsorption/separation processing and bioremediation. However, their application has been restricted by many factors, such as processing efficiency, operational method, energy requirement, and economic benefits. In this poster, an overview on the history of waste and its types, and methods remediation has been discussed.

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Biodiesel: A Sustainable fuel Alternative

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The world is confronting the energy crisis due to the excessive utilization of the world's depleting oil reserves. The world's economy is largely dependent on the transportation of goods and services, which is mainly dependent on energy from petroleum products. The utilisation of these fuels led to increasing prices, deteriorating health and environmental degradations. These concerns have led to the search for sustainable biofuel alternatives. Therefore, the research is aimed at retarting the risk of climate changes with reduced health problems. A renewable and sustainable fuel currently receiving renewed interests and intensive experimentations is biodiesel. It is increasingly becoming attractive as an alternative to petro-diesel. It is worthy to note that biodiesel is considered the fastest growing industry worldwide. The key focus of this presentation is to highlight the potential of biodiesel and its applications.

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Gentle footprint today will ensure a path for tomorrow

Riya, Shiksha, Shyamali, Sakshi and Shubhi
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Carbon footprint is a new buzzword that has gained tremendous popularity over the last few years. Carbon foot printing is actually a measure of the total amount of carbon dioxide and methane (greenhouse gases) emissions of a defined population system or activity considering all relevant sources [1].Once the size of carbon footprint is known, a strategy can be devised to reduce it by technological developments product management, carbon capture and changed green public. Everyone has a responsibility to reduce their individual carbon footprint and there are lots of ways to do so. We encourage everyone to think about their lifestyle decisions and find opportunities to reduce their climate impact. Basically, we should focus on the reduction of carbon footprint of cars, travel, air travel, home, office and your life [2]. Carbon footprints are much more specific than ecological footprints since they measure direct emissions of gases that cause climate change into atmosphere.

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Gentle Footprint Today will Ensure a Path for Tommorrow

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A carbon footprint is defined as the total set of greenhouse gas emissions caused by an individual, event, organization and is expressed as CO2. The carbon footprint is 54% of humanity's overall ecological footprint and its most rapidly growing component.

The total amount carbon footprint cannot be calculated because of large amount of data required and the fact that carbon dioxide can be produced by natural occurrences. The average U.S. household carbon footprint is about 50 tons CO2 per year.

Most of the carbon emissions come from fuel burned to produce goods far away from final consumer and deforestation, burning fossil fuels, over exploitation of natural resources. The most common ways to reduce the carbon footprint of human is to reduce, reuse, recycle, refuse. This can be done by recycling the packing materials, by using reusable items, by driving less, by using less air conditioning and heating in home, by optimizing the supply chain.

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Reducing the Carbon Footprint

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A carbon footprint is defined as the total amount of greenhouse gases produced to directly and indirectly support human activities usually expressed in equivalent tons of carbon dioxide.It is the sum of two parts namely primary footprints and secondary footprints.Primary footprints is a measure of direct emissions of CO2 from burning of fossil fuels.Secondary footprint is a measure of indirect CO2 emissions from the whole lifecycle of products we use. The cause of carbon footprints is driving cars and other transportational vehicles that emit large amount of carbon dioxide into the air.Use of electricity,coal,gas also create

large carbon footprints. The ways to reduce carbon footprints are: alternative to driving,driving a low carbon vehicle etc,insulating and sealing your home,using more and more renewable resources such as wind power and solar power that emit no carbon. The 3R's principle is the most common way to reduce carbon footprints. Various acts and agreements were also passed in the world to reduce carbon footprints like climate change act 2008,global warming pollution act 2007,federal act,US-Canada air quality agreement.

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Conservation of some endangered and economically important medicinal plants of India – A sustainable approach

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India has a great wealth of medicinal plant biodiversity which is used by various tribal's and local people to cure different ailments. Unchecked commercialization, habitat loss and habitat degradation have placed many medicinal plant species at a risk of extinction. Therefore there is an immense need for their conservation. There are two basic methods of biodiversity conservation: *in situ* (on site) and *ex situ* (off site), both are complementary to each other. *In situ* methods allow conservation to occur at gradual rate with natural evolutionary processes while *ex situ* conservation involves conservation outside the native habitat. *Ex situ* conservation via tissue culture technology helps in achieving the objective at a faster rate. The present paper discusses the various *in vitro* protocols developed for some of the selected endangered and economically important medicinal plants of India such as *Tinospora cordifolia*, *Pterocarpus santalinus*, *Stevia rebaudiana*, *Tylophora indica* and *Aquilaria malaccesis.*

Determination of Amoxicillin in Plasma by Liquid Chromatography Tandem Mass Spectrometric Detection

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The aim of this work was to develop a simple, sensitive and selective UPLC/MS/MS method for the estimation of amoxicillin in rat plasma. A protein precipitation followed by liquid-liquid extraction method was developed to isolate amoxicillin from rat plasma. Separation was performed on an Acquity UPLC BEH C_{18} column (2.1 mm × 100 mm, 1.7 µm), using acetonitrile-1 mM ammonium acetate (85:15, v/v) as mobile phase. Amoxicillin was detected by Waters Q-TOF Synapt mass spectrometer when operated in positive mode with 1.0 min scan time and 0.02 s inter-scan delay.

Calibration curve with good linearity r≥0.995 was obtained in the range of 100-2000 ng/mL for amoxicillin. The mean recovery from plasma was 88.87% (± 5.89 SD, n = 3) for amoxicillin and 80.37% (± 6.21 SD, n = 3) for ampicillin (Internal Standard).The method provided a simple and selective procedure that can be easily used for the evaluation of pharmacokinetic profile of amoxicillin in plasma. The method was successfully applied to a bioavailability enhancement study of amoxicillin with oleic acid in rats.

Modified chelating sorbents in flow injection-SPE systems coupled to FAAS – A study of chromium speciation in industrial water samples

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Chromium exists in two chemically stable forms – trivalent and hexavalent. While Cr(III) is an essential component of the glucose tolerance factor, Cr(VI) exhibits carcinogenic activity and causes oxidative stress. Though singular analytical techniques such as flame atomic absorption spectrometry (FAAS) can determine the amount of total chromium, chromium speciation is important due opposing biological behavior of the two forms. Solid phase extraction (SPE) is a sample preconcentration steprequired before speciation analysis due to thelow concentrationof chromium in environmental samples, especially water. SPE leads to reduction insolvent usage and extraction time, while removing interferents. Flow-injection SPE coupled with FAAS simultaneously preconcentrates and detects the chromium species. This coupled technique is advantageous as it offers high preconcentration factor, enhanced detection and quantification limits with high reproducibility. The application of different chemically modified chelating sorbents in chromium speciation in industrial water samples by preconcentration using flow injection-SPE and determination using FAAS has been explored.

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Preparation and Characterization of Polymer Gel Electrolytes

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Electrolyte, that separates cathode and anode, is one of the key components of a battery. It plays important role in deciding charging/discharging capacity and current density

of a battery. Polymer gel electrolytes (PGE), comprising a polymer matrix plasticized with an electrolyte solution is of practical interest for the various types of fuel cell applications.[1,2] They have several advantages over solid and liquid electrolytes. In recent years, a variety of polymers has been used to prepare such polymer gel electrolytes. PGEs have been given much attention due to their possible applications in various electrochemical devices such as fuel cells, humidity sensors etc. The most commonly available polymeric membrane is fluorinated membrane, known by its trade name, Nafion. It has shown good electrochemical property and mechanical stability. But still, its wide application is hampered by its high cost and difficulty in synthesis and processing.

The present work deals with the synthesis and characterization of PGE by using polyvinylalcohol (PVA) with an aim to get the high conducting membrane.

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Effects of 10 GHz microwave radiation in male infertility and its amelioration by melatonin

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Microwave at X-band (8-10 GHz) is widely used in communication systems for civil and military application devices such as aircraft, weather forecast system and various types of radars. Increased usage of such radiation in occupational environment poses a threat to human health. Our study aims to investigate the detrimental and deleterious effects of microwave radiation on reproductive system of male Swiss albino mice. The study also aims at investigating the ameliorating properties of Melatonin against the detrimental effects of these radiations on male reproductive system. A comparative analysis of the physiological and biochemical parameters of control group v/s radiation exposed group of animals will help us to explore the detrimental effects of harmful radiation on the reproductive system of mammals.

Research in Chemistry to Generate Green Energy

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Green energy or Sustainable energy is derived from non-conventional energy which is continuously replenished by natural processes. If we see the electricity requirements of world including India are increasing at alarming rate and the power demand has been running ahead of supply. It is also now widely recognized that the fossil fuels and other conventional resources presently being used for generation of electrical energy, may not be either sufficient or suitable to keep pace with ever increasing demand of electrical energy of the world.

Chemists could smooth out the patchy supply of sun and wind power by developing fuels and batteries that can store energy during peak times. Various forms of green energy include solar energy, wind energy, hydroenergy, geothermal energy, wave and tidal energy. Renewable power is effective, reliable, sustainable, and environment friendly which we strongly need to cut our use of fossil.

Power Production from Waste Materials: A Review

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In today's world we are facing two major problems; one is energy crises and another is disposal of waste. This review aims to study the wide research field that has become a necessity for the sustainable development. The review has been brought out to study various types of wastes that are produced worldwide in the form of solid, liquid, gas, and heat and various techniques that have been evolved over due course of time from incinerators to modern waste-to-energy plants. Various pathways are studied in the review to convert the industrial waste to electrical energy that can be used easily. These include thermo-chemical, bio-chemical and physio-chemical conversion pathways for power production from industrial waste depending upon the nature of the waste. It also depicts the various factors affecting the energy recovery from waste which includes quality, quantity and physio-chemical parameters of waste. The review also includes efficiency of various techniques and various countries which are making best use of waste in power generation.

Waste Disposal and Recycling

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"If it can't be reduced, reused, repaired, rebuilt, refurbished, refinished, resold, recycled or composted then it should be restricted, redesigned or removed from production.

Given the growth in population, the changing patterns of consumption and expansion of urban living, the need to properly manage waste is becoming a challenge throughout the world.

Evolution of Waste Management: The evolution in the waste management industry dictates change in the environmental well-being, decrease in the number of diseases, and reduction in the number of pest infestations. Waste Management solely focuses on ways to reduce risks of pollution produced from the waste generated from domestic, commercial, manufacturing, municipal consumption and disposal. Keeping all these factors in view,

how are we progressing in the field of waste management so that we can rely on some substantial efforts in the present and future?

Anaerobic Breakdown of Organic Waste: Initially bio waste was being composted in open air to be used as fertilizer. Later, in vessel compost plants were created to get rid from problems like odor. Through research and development in vessel waste treatment eventually evolved to Anaerobic Digestion. This new advancement utilizes microorganisms, kept in an environment without oxygen. Air tight reactors, known as anaerobic biogas digesters are used to transform this decomposed waste into bio gas. is utilized as energy and is adapted to fuel low-tech set ups in many developing countries today.

Zero Waste: According to the Zero Waste Alliance, *"A future without waste and toxics is not just a dream; it's a necessity*. Waste reduces the effectiveness of our businesses, increases pressures on the natural environment and harms the vitality of our communities. It does not have to be this way; waste is the result of a broken process. Fortunately, this is a process that can be fixed."

• Create and handling the overall process through a systematic approach; in order to, avoid and eradicate the harmfulness of waste.
• Protect and reuse energy that can be attained from waste resources.
• Eliminate discharge of toxic elements to water, air, land or those which are threatening quality of life, in any way.

The core principles of zero waste are quite identical to that of waste to energy as it emphasizes on utilizing waste to its core and transforming all to energy.

Waste Disposal and Recycling

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Over 6 billion people live on Earth.Every person creates waste such as food packages,made of cardboard and plastics,aluminium cans,worn out tires,used papaes,broken down cars,bent bicycle, old toothbrushes, grass clippings, leftover food, old movie tickets, etc. Whatever we throw away. Where Does It All Go?
In towns and cities all over the world,trash is put into a dump.A dump is a place where trash is left in one spot on top of the ground or in deep holes in the earth.The holes are filled with trash.This is done year after year ,untill there is no room at the dump. Then,a new dump is begun.In some towns,there is no room left for the dump.Trash has to be moved to the dumps in other towns.

One of the worst problems with older dump is that polluting chemicals were dumped there before any rules were made about how to handle it.Those chemicals seep into the soil and into the water,polluting that also.

In some towns and cities where the space for dumps is running out,laws have been passed that make people recycle.using something again is called Recycling. For example,a lot of used plastic and glass can be meted and reshaped into new containers,carpetting,play ground equipment,and a lot of other useful items .Paper can be cleaned,soaked in water and turn into new paper.

Research in Chemistry to Generate Green Energy

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The aim of this study is to highlight some of the revolutionary work that is being undertaken by scientists across the globe in generation of green energy. The everincreasing demand for energy has put up great pressure on the energy sector to come up with a solution with little or no usage of exhaustible resources. Generation of side product should be low and our method should not leave much carbon footprint behind. Development of 'Spherical sun power generator' which can "squeeze more juice out of the sun" is commendable. Scientists at University of Arizona developed way to generate energy out of heat which until now used to be total waste. Organic Rankine Cycle converts low temperature heat into electricity.Scientists at MIT have developed thermo-chemical technology to convert solar energy into electrical energy.nanotechnology has been utilized in generation of hydrogen as fuel and algae for production of butanol to replace ethanol.

Synthesis and characterization of Tin Doped MnO_2/CNT composites as electrode materials for supercapacitor

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Tin doped MnO_2/carbon nanotubes composite was synthesized by chemical co-precipitation method to be used as an electrode material for supercapacitors. The structural features of composite was characterized by FTIR spectroscopy and UV- Visible spectroscopy. The spectral peaks obtained indicate the presence of Sn doped MnO_2 and CNT in the composite. The X- Ray diffraction pattern revealed crystalline nature of the composite and successful incorporation of metal oxide in the composite structure. The morphology of the composite studied by scanning electron microscopy (SEM) confirms that the composite had a nanofiber mesh like structure. The resulting composite combine the advantages of pseudo active species and the high surface area of CNT providing a conductive network of amorphous composite, which shows good conductive behaviour.

Catalytic Reductive Degradation of Methyl Orange Using Copper Nanostructures

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The textile industry and its waste water have been increasing proportionally, making it one of the main sources of severe water pollution. In particular dyes comprise a major section of industrial waste water effluents as they are released in abundance, upto 50% of the dyes may be lost in directly into the water ways due to inefficient and uneconomic dyeing techniques. The release of these dyes in aquatic systems is of environmental concern due to their carcinogenic, persistent, and recalcitrant nature. Dyes released in waste water may also undergo incomplete anaerobic degradation, inducing additional toxicity caused by mutagenic end products. Besides this the coloring decreases sunlight penetration and oxygen dissolution in water which is also a considerable threat to ecosystem. In order to cope with increasingly strict legislations and regulations concerning waste water management, the associated industries are required to find green, efficient and economically viable solutions for waste water treatment. The conventional routes include adsorption, biological, coagulation routes, and ozonation. However these methods are expensive, time consuming and inefficient resulting in secondary pollution with overall increase in method cost because of extra disposal procedures.

Advanced oxidation processes employing metal oxides are being adopted as technically feasible degradation processes but are proving to be inefficient and impractical. Among such processes reductive degradation of organic dyes with metal nanostructures is a convenient degradation model system which is not only viable in terms of efficiency and costliness but also greener as it provides biodegradable end products like aromatic amines, which are readily and easily degraded by microorganisms.

Present study is targeted towards the application of oxidation resistant copper nanoparticles as a catalyst for waste water remediation, particularly water from water bodies near dyeing and printing industries. Cu nanoparticles capped with an organic protecting group, sodium dodecyl sulphate were synthesized via an aqueous reduction route. The obtained Cu nanoparticles were characterized for their sizeand charge using DLS measurements and also by UV spectroscopy. These surfactant capped Cu nanoparticles have been used as a heterogeneous catalyst for the comparative reductive degradation of commercial azo dye, Methyl Orange in the presence of sodium borohydride, used as a potential reductant.

Design & Development of Optimized Vibration Isolation Systems for High Resolution Analytical Instruments in Industrial Environment

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This is an Industry-Academia oriented presentation highlighting the design and application aspects of Vibration Isolation Systems focusing the high resolution analytical instruments like Atomic Force Microscopes (AFM), Laser Confocal Microscopes, Photo-Acoustic Spectrometers will be highlighted. The performance of these instruments are affected by various types ground disturbances of micro-seismic nature induced by the rail & roads traffic in the vicinity of the test laboratory. With the development of Micro-Electro Mechanical Systems (MEMS) and VLSI the demand for Nano-Dimensional metrology has increased in QC lab located in Micro-Electronic Component fabrication workshop situated in industrial area, the micro-seismic disturbances in the environment require vibration isolation systems for the accurate and repeatable results. In introduction the Fundamental Forces of nature inducing vibrations and oscillations in Atoms & molecules to machines and mechanisms, buildings & structures and its related frequency spectrum will be focused. An analogy of Molecular Vibration and Machine Vibration spectrum will be presented. The other industrial application areas include Earthquake protection of Buildings and plant machineries, isolation of sensitive electronic equipments in aircraft & aerospace vehicles, automobiles, railways, naval ships & Submarines.

Green Odorants

Sajal Pramanik

Odorants are added in Petroleum Gases and Liquified Petroleum Gases and its products for its proper identification in atmosphere. Since long the organic synthesized product as Thioether ,Thiopenes or Thioal are being used for the purpose. In order to detect if presence and prevent an explosion from a buildup of propane gas, odorant (almost always ethyl mercaptan) is added to liquid LP-Gas. Ethyl mercaptan has a distinctive order and has a high odor impact. Propane is occasionally odorized with something other than ethyl mercaptan and it may smell different.

In India these odorants are used in domestic LPG product for its quick identification in case of any leak. As per IS 4576, a minimum 20ppm has been recommended for the said purposes. Moreover, it has been very popular in indian community of domestic LPG users.These synthetic products are highly carcinogenicand dangerous for marine species. Everyone handling or using LP-Gas should realize that the odorant used to give propane a distinctive smell may not be detected by all people under all circumstances. Certain

individuals (especially the elderly) can have an impaired sense of smell. Environmental conditions also may exist which diminish odor detection. For example: 1. the odorized gas may be masked or covered up by other odors such as musty basements, cooking odors and certain foods, or 2. high concentrations of odor can shock or diminish the sense of smell which can also occur from prolonged exposure to the odor of LP-Gas.

Extracts of Herbs present in India, Sri Lanka, Thailand does the same purpose without affection the ecology, flora and fauna. Easy available leaves of herbs alcoholic extracts have been tested mixing in a stoichiometry ratios gives a successful results.

Advantages :

1. Easily available green product
2. Easy Process

Microwave Assisted Synthesis, Characterization and Antibacterial Activity of Some Arsenic (III) Derivatives of O-Alkyl or O-Aryl Trithiophosphates

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Arsenic (III) O-alkyl or O-aryl trithiophosphate of the type ClAs[S2(S)P(OR)] and ROP(S)[SAsS2P(S)OR)]2 (R=Me, Et, Pr^i, Bu^i, Ph, CH2Ph) have been synthesized by solvent free microwave assisted procedure from the reaction of arsenic trichloride with potassium salts of O-alkyl or O-aryl trithiophosphate in 1:1 and 2:3 motar ratio respectively. These derivatives have been characterized by elemental analysis, molecular weight determinations and spectroscopic (IR, 1H and 31P NMR) studies. On the basis of them distorted tetrahedral geometry has been proposed for these derivatives. The newly synthesized derivatives show good activity against gram positive and gram negative bacteria and a comparative study of antibacterial efect has also been made with standard drugs.

Study of Different Varieties of Holy Basil as Potential Corrosion Inhibition on Tin in Inorganic Acid

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The study of corrosion inhibition of three different varieties of Holy basil viz. ocimum canum (E_C), ocimum basilicum (E_B) and ocimum sanctum (E_S) in controlling corrosion of tin immersed in nitric acid solution in absence and presence of inhibitor has been evaluated by weight loss and thermometric methods. Maximum efficiency was found up to 97.45 % for tin in 2.5N HNO_3 solution. Inhibition efficiency of all inhibitor increases with increasing concentration of inhibitor as well as acid strength. In thermometric method inhibition efficiency also increases with increasing concentration of acids. Results show that all varieties under study are good corrosion inhibitors, among which (E_C) is most effective.

Synthesis and Spectroscopic Studies of Some Biologically Important Esters of o-Alkyl Trithiophosphates

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A series of substituted organic esters of the type $ROPS_3(C_6H_4CH_2)_2$ and $ROPS_3(RCO)_2$ have been synthesized by the reaction of dipotassium salts of o-alkyl trithiophosphate with acetyl, benzyl and benzoyl chloride. The newly synthesized complexes are white crystalline solids, insoluble in common organic solvent but soluble in corrdinating solvent like DMSO. The compounds are charized by elemental analysis, molecular weight measurement and spectroscopic (IR, ^{1}HNMR, ^{31}NMR) studies and tested for anctibacterial activity. On the basis of physic-chemical as well as spectral studies distorted tetrahedral geometry of molecule has been established.

Inhibitive Effect of Some Schiff Bases on Corrosion of Mild Steel in Hydrochloric Acid Solution

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Mass loss method and thermometric methods have been employed to study the corrosion inhibition of Mild steel in acidic media (HCl). Three Schiff's bases viz; N(vanillidine)-4-methyl-1-phenylimine(SB),N(vanillidine)-4-methoxy-1-phenylimine(SB),N(anisidine)-1-napthylimine(SB). Values of inhibition efficiency obtained from two methods are in good agreement and dependent upon the concentration from the mass loss data, it is concluded that the inhibition efficiency increases with the increase in concentration of inhibitor.