National Conference on

BEATING THE PLASTIC HAZARD: CHALLENGES AND STRATEGIES

JUNE 4, 2018

Organized by

Department of Environmental Engineering
Delhi Technological University
and
Green Institute for Research & Development

Sponsored by

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दिल्ली प्रौद्योगिकी विश्वविद्यालय
DELHI TECHNOLOGICAL UNIVERSITY
(Formerly Delhi College of Engineering)

Prof. Yogesh Singh
Vice-Chancellor

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Message

I am very delighted to learn that Department of Environmental Engineering is conducting a National conference on Beating the Plastic Hazard: Challenges & Strategies in view of the theme of World Environment Day, 2018 being hosted by India.

Delhi Technological University is the premier engineering institute of India with a 76-year-old legacy of excellence in education and technology development. The Department of Environmental Engineering at DTU has been offering M.Tech. (Environmental Engg.) degree since 1972 and B. Tech. (Environmental Engg.) degree since 1998. The Department conducts cutting-edge research in developing the vital areas that address societal needs for environmentally sustainable life-style. Our faculty and staff are committed to educating our students such that they are best equipped to serve the nation and the world of professionals, scholars, academic learners and entrepreneurs.

In view of the importance attached to tackling the plastic waste management, Delhi Technological University is organising a National Conference to deliberate on different aspects of alternative ways of substituting, re-using, re-cycling plastics in the urban waste.

I hope that the scientists, academicians, representatives of urban local bodies and NGOs, research scholars, students etc. will be benefited by participation in this event. I send my beat wishes to the participants and organisers.

(Yogesh Singh)

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दिल्ली प्रौद्योगिकी विश्वविद्यालय
DELHI TECHNOLOGICAL UNIVERSITY
(Formerly Delhi College of Engineering)

DTU
Delhi Technological UNIVERSITY

Prof. S. K. Singh

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Message

It is a matter of immense pleasure for us that Department of Environmental Engineering, DTU is organizing a National Conference on "Beating the Plastic Hazard: Challenges and Strategies" on 4th June, 2018 in association with Green Institute for Research & Development (GIRD) to observe World Environment Day 2018.

This year's World Environment Day theme i.e. "Beat Plastic Pollution" has been aptly chosen in view of its relevance in our world today. Plastic is a great human creation due to its ability to be easily shaped, its light weight and high strength, inexpensiveness and durability. But the increased production and use of plastic has led to environmental and health problems due to widespread littering of plastics on the land and water bodies. The non-biodegradable plastic waste is a major component in the urban municipal waste which creates unhealthy and unhygienic surroundings.

The greatest challenge before mankind today is to strike a balance between industrial development and environment. I sincerely hope that the conference succeeds and the participants go on to make their contribution towards beating the plastic hazard thus building a better world.

(Prof. S. K. Singh)

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Message

I and my colleagues in the Green Institute for Research and Development (GIRD) are very delighted in being part of the organization of this important National Conference. We are grateful to the esteemed Delhi Technological University (DTU) and its Department of Environmental Engineering, now headed by Prof. S. K. Singh, for rendering all cooperation and assistance to us in holding this Conference. As an environmental NGO, working all over the country since 1996, we are engaged in different kinds of programmes for the protection of healthy natural environment, promotion of new and renewable energy, popularization of "green" buildings, etc. We also undertake human resources development programmes for the disadvantaged sections of the society.

The theme "Beating Plastic Pollution", selected by the UN this year for the World Environment Day is dear to us and it is connected with many of our campaigns and education programmes of the past and also the programmes planned for the future. This theme has connection with the recent good initiatives taken by the Government of India to launch the Swacch Bharat Mission and the Smart Cities Mission. These missions are very relevant and appropriate for India. As we have been recently reminded by the World Health Organization (WHO), Indian cities are among the worst cities in the world in terms of pollution, Delhi having been ranked the worst city among the mega cities of the world. It is, therefore, the responsibility of all Indians, whether they are policy-makers, administrators, research scientists, or research students, or the community leaders or the common educated people, to make these Missions a success and that is why our Institute has planned to organize intensive educational and awareness campaigns on the issue of urban waste management and clean cities. Most people are uninformed about the proper disposal of plastic and other hazardous waste. Even when people are informed, there is no will to follow the proper methods. Therefore, creating information for the public and making people strictly follow the proper methods of disposal are among tasks that need to be undertaken by us. I hope the Conference will shed light on these aspects, apart from other aspects of management of plastic waste like recycling, re-use, energy generation, etc.

Shamsuddeen, A.K.
Secretary/Director, GIRD

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WASTE PLASTIC DISPOSAL – ISSUES & CHALLENGES

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ABSTRACT

Plastics are inexpensive, lightweight and durable materials, which can readily be moulded into a variety of products that find use in a wide range of applications. As a consequence, the production of plastics has increased markedly over the last 60 years. However, current levels of their usage and disposal generate several environmental problems. Around 4 per cent of world oil and gas production, a non-renewable resource, is used as feedstock for plastics and a further 3–4% is expended to provide energy for their manufacture. A major portion of plastic produced each year is used to make disposable items of packaging or other short-lived products that are discarded within a year of manufacture. These two observations alone indicate that our current use of plastics is not sustainable. In addition, because of the durability of the polymers involved, substantial quantities of discarded end-of-life plastics are accumulating as debris in landfills and in natural habitats worldwide.

Recycling is one of the most important actions currently available to reduce these impacts and represents one of the most dynamic areas in the plastics industry today. Recycling provides opportunities to reduce oil usage, carbon dioxide emissions and the quantities of waste requiring disposal. Disposal of Plastic Waste is a major problem. It is non-biodegradable & it mainly consists of low density polyethylene plastic bags, bottles etc. Burning of these waste plastic bags causes environmental pollution. According to disposal policy of government of India plastic waste has to go to landfill site. In landfill, plastic material may take 1000 years to completely degrade. Plastics in different states of degradation release toxic material that leaches into ground and pollutes ground water. Plastic material should not be burnt. A multitude of toxic gases are released when plastic is burnt. These include carbon monoxide, phosgene, nitrogen oxide, dioxin etc. In addition, burning one kilo of plastic releases 3 kilos of carbon dioxide, a gas that contributes to global warming. At National Physical Laboratory, we have designed a technology wherein, waste plastic bags can be converted into tiles for building of structures and rooms for general public for societal benefits.

COMMUNITY AWARENESS TOWARDS RECYCLING OF POLYETHYLENE TEREPHTHALATE (PET) BOTTLES IN KARNAL CITY, HARYANA

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ABSTRACT

Recycling has a number of advantages as it saves natural resources and energy which leads to less production costs, generates income and jobs for the unemployed and poor besides reducing waste generation. It reduces environmental impacts, saves energy which is required for collection and transportation, the costs of landfilling, and helps in effective waste management. In order to assess the community awareness towards recycling PET bottles, a survey was conducted in April–May, 2015 to assess the different factors which can influence the recycling behaviour of PET bottles among individuals in Karnal city of Haryana. The data were collected by interviewing randomly selected 84 individuals using a self administered questionnaire. About 48 % respondents often practiced recycling PET bottles (mineral water and soft drinks bottles) by selling them to junk dealers (Kabaadi waala), 30 % individuals sometimes; and 22 % respondents never practiced recycling. About 20–40 % respondents were unaware about recycling, and clean environment. About 61 % respondent showed their willingness to regular practice of recycling if collection mechanism is approachable and nearby to their residents. PET recycling was lower than general recycling which was mainly due to large space required to sore the PET bottles. Some participants showed their willingness to carry PET bottles by themselves to junk dealer shops but hesitate to do so due to shabby conditions of junk shops. During the study, it was observed that there were around 95 junk dealers, 8 bailing machines, and 2 flake generators in Karnal which are engaged in recycling of plastic. According to respondents promotional schemes, bottles collection machines, buy back policy, and incentives are some factors which can motivate people towards recycling PET bottles. In addition to create awareness among respondents, more effective strategies should be made and implemented so as to influence/motivate the individuals or communities to participate in plastic recycling. Resident Welfare Associations (RWAs), Non-government Organisation (NGOs), and local authorities can co-ordinate to create awareness, collection of waste and its recycling.

POTENTIAL APPLICATION OF BIODEGRADABLE POLYMER IN PULP & PAPER INDUSTRY

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ABSTRACT

Plastics are one of the wonderful inventions and the world without plastics is unimaginable. In 1862, first man-made plastics were derived from cellulose, discovered by Alexander Parkes. But a first completely man-made plastic was Bakelite, discovered by New York Chemists Baekeland in 1907. Rayon, Cellophane, Nylon, PVC, Saran and Teflon were subsequently discovered in the 20th century. Since 1950, plastics have grown into a major industry that affects all of our lives. Because of their lightweight, low cost, and desirable properties, their use has rapidly increased and they have replaced other materials such as metals and glass. They are used in millions of items including cars, bulletproof vests, toys, hospital equipment and food containers. Plastics have also replaced traditional material like cloth, paper for packing and carry bags because of the low cost. As the urbanization increased growth and consumption of plastics also increased and also plastic waste. It is estimated that approximately 4-5 % post-consumer plastics waste by weight of Municipal Solid Waste (MSW) is generated in India as per CPCB report. The plastics waste is now considered as an Environmental Hazard due to "Throw away culture".

Most common packaging materials like paper, paperboard and corrugated boxes (carton) are produced from cellulose fibers which are produced from renewable materials. In paper and paperboard the cellulose fibers are tightly held together through hydrogen bonds. The strength of paperboard depends on the number of hydrogen bonds between the cellulose fibers. During paperboard making various chemicals are added to pulp slurry which not only impart different properties to paperboard but also improve the machine performance. All these chemicals are not environmental friendly because most of them are petroleum based therefore a biodegradable polymer as an alternate can turn into a boost for our environment. The association of biopolymers with paper provides interesting functionalities while maintaining the environment-friendly nature of the material and its recyclability. As an effort to produce environment friendly materials and a biodegradable biopolymer like chitosan was tried in papermaking which imparted good mechanical properties to paper.

PLASTIC POLLUTION: IMPACT ON HUMANS AND ITS RECYCLING

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ABSTRACT

Plastics are inexpensive, lightweight and durable materials, which can readily be moulded into a variety of products that find use in a wide range of applications. As a consequence, the production of plastics has increased markedly over the last 60 years. However, current levels of their usage and disposal generate several environmental problems. Around 4 per cent of world oil and gas production is used as feedstock for plastics and a further 3 –4% is expended to provide energy for their manufacture. A major portion of plastic produced each year is used to make disposable items of packaging or other short-lived products that are discarded within a year of manufacture. This indicates that our current use of plastics is not sustainable. The rapid population growth and enormous urban and rural development in many of the world's developing regions have caused considerable concern that anthropogenic pollution may reduce biodiversity and productivity of ecosystem, resulting in reduction and depletion of human food resources. Pollution reduces the aesthetic and intrinsic value of the environment. Another main concern about pollution is the direct effects of pollution on human health. Several studies have documented that human populations that consume large amounts of marine food have high burdens of persistent organic pollutants (POPs), such as dioxins, furans, polychlorinated biphenyls (PCBs), and some heavy metals. In addition, because of the durability of the polymers involved, substantial quantities of discarded end-of-life plastics are accumulating as debris in landfills and in natural habitats worldwide. To mitigate this, recycling is one of the most important actions currently available to reduce these impacts and represents one of the most dynamic areas in the plastics industry today. While plastics have been recycled since 1970s, the quantities that are recycled vary geographically, according to plastic type and application. Advancement in technologies and systems for the collection, sorting and reprocessing of recyclable plastics are creating new opportunities for recycling, and with the combined actions of the public, industry and governments it may be possible to divert the majority of plastic waste from landfills to recycling over the next decades.

PLASTIC POLLUTION: ISSUES, CHALLENGES AND POSSIBLE SOLUTIONS

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ABSTRACT

Presently, plastic pollution is one of the most serious environmental concern we are facing worldwide. The word plastic is derived from Greek word 'Plasticos' means able to mold in to various shapes on heating. It is estimated that more than 350 million tones of plastic is produced globally/year and approximately 500 billion plastic bags are used worldwide annually. According to BBC approximately 79% plastic waste is end up in landfills globally. Michelle Sigler (2014) revealed that more than 35 million plastic bottles and 500 billion plastic bags are used annually globally. Most of them end up in our oceans and along our beaches and around 70 per cent of all the litter in the oceans is made of plastic. An average of 18,000 pieces of plastic litter float on every square kilometer of ocean globally and by 2050, there will be more plastic in the oceans than there will be fish. It is well known that plastic is non-biodegradable and causes hazardous negative impact on the different components of the environment. The major detrimental impacts of plastic includes environmental pollution, threat to marine, aquatic and terrestrial animal life, stray cattle and lethal effect on human health. Some of the common health impacts in human are cancer, damage to nervous system and liver, impacts on eyes, skin, respiratory system, depression, hormonal system impairment, and fetal development, birth defects, Infertility, Pregnancy complications and renal system damage etc.

Inspite of detrimental environmental effects of plastic, its uses are increasing day by day because it is cheap, easily available, strong, durable, long lasting and can be shaped in to various form. It has uses in all sector of life e.g. domestic, agricultural, industrial, transport and health sector etc. Actually, it is not the plastics to blame, but it is the misuse of plastics which is responsible for pollution i.e. blaming plastic for pollution is not justifiable. We can resolve the plastic pollution by adopting the principal of 3R i.e. reduce, reuse and recycle in true spirit. Public should be encourage about using cloth bags instead of poly bag while shopping , using glass or tin bottles, using stainless steel Tiffin, using metal/glass/earthen Utensils, avoiding disposable plastic items. People's participation is most important component for the success of any movement e.g. we have the success story of 'Chipko' movement. The 'Earth Day' and 'World Environment Day' should be celebrated with themes based upon plastic pollution. Recently UGC directed all the universities and colleges for banning the plastic in their campuses and aware the students regarding this issue. Moreover, India is hosting the World Environment Day, 2018 and the theme of the this year is 'Beat Plastic Pollution' to aware general public and students throughout the nation. More emphasis should be given on the development of plastic derived from natural products i.e. development of biodegradable and bioplastics. Above all effective pollution prevention policies and their implementation is also a solution to combat plastic pollution.

MICROBIAL DEGRADATION OF POLYTHENE: OPPORTUNITIES & CHALLENGES

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ABSTRACT

At the present time the usage of plastic, mainly polythenes is increasing progressively. Polythenes are non-degradable linear hydrocarbon polymers comprising long chains of ethylene monomers. Polythenes are uncontrollably used for different purposes in various domain of human life such as packaging services, green houses construction, for manufacturing laboratory instruments, disposable articles, garbage containers and water pipes. Excessive use of polythene is responsible for increased solid waste in environmental matrix and creates numerous hazards in environment. Polythenes are long-lasting and recalcitrant, hence persist in environment, as a result creating critical environmental problems. Polythenes require thousand years for its natural degradation in environmental matrix. Therefore, when polythenes are not appropriately disposed, it resulted in elevated accumulation of large volume of unwanted polythenes or plastic every year and pollute our natural environment. In view of the fact that polythenes are not easily degradable and this turn out to be a major challenge. Considering the toxicity and global pervasiveness, remediation of polythene-contaminated sites is important. Different techniques such as photodegradation, thermo-oxidative degradation and microbial degradation have been used for polythene degradation. It becomes significant to choose environmental friendly treatment process for remediation of polythene contaminated sites. Microbial degradation i.e. bioremediation is a natural method and one such effective technique in which microorganisms such as bacteria, fungi and algae play a significant role in biodegradation or biological decomposition of polythenes. Microorganisms are known for their catabolic activity for pollutant degradation and the capability of microbial species to use polythenes as a carbon and energy source has recently recognized all over the Globe. Microorganisms have significant capability of generating metabolites that involve in polythene degradation. Numerous microbial species have been found to have the capability to grow on polythene and its biodegradation has been investigated by various researchers. Although the efficiency of microbial degradation is moderate but it is widely used as it is economic and environmental friendly alternative for cleanup of polythene contaminated sites. Therefore, the present study reviews the effects of polythene contamination and the role of microorganisms in biodegradation process of polythene-contaminated sites.

MICROBIAL CONSORTIA FOR DEGRADATION OF PLASTIC WASTE

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ABSTRACT

Plastic due to its excellent properties has become indispensable in modern times. The unregulated use of plastics has led to colossal amounts of plastic waste accumulation in landfill sites and in marine environments. These have become a threat to the entire ecosystem because of their deteriorating effects on soil fertility, animal health and water quality. Moreover the attempts for plastic waste disposal by incineration create toxic air pollution. The microplastics created by the action of abiotic elements such as weathering on plastics leads to bioaccumulation of toxic plastic products. Microorganisms have a fantastic adaptability and a huge potential for degradation of xenobiotics. Some of the microorganisms have shown a great potential for degradation of different types of plastic material such as low density polyethylene (LDPE), High density polyethylene (HDPE), polyethylene terepthalate (PET), polyurethane (PUR). In the present project, we endeavour to isolate and characterize the microbial strains for high capacity for degrading plastic material.

Plastic samples along with the adhered soil were collected from waste dumping sites in Faridabad. The microbial colonies were isolated using dilution plating technique. Isolates showing unique morphology were selected. The cultures were purified using streak plate technique. In order to understand the plastic degrading potential of isolates these were inoculated in mineral salt medium formulated using essential salts such as ammonia, phosphate buffer, Zinc and magnesium sulphates. These were supplemented with 0.1% PEG-4000 and 1% PET plastic strips cut from PET-disposable glasses. The culture was incubated at 35–C with shaking (125 rpm) in incubator shaker. After completion of the 30 days, the residual plastic strips were recovered by filtration and weighed.

Our preliminary studies have shown that, though individual isolates have capability to degrade PET, when the isolates were used as a consortium upto 30% degradation of PET could be achieved in 30 days. Microscopic studies have shown microbial film formation on the surface of the plastics. Further studies on characterization of strains and optimization of conditions for degradation would be carried out in the next phase of the present project.

THE HAZARDS OF PLASTIC WASTE

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ABSTRACT

Plastics are strong, lightweight and moldable so they can be used in thousands of products that add comfort, convenience, and safety to our everyday lives. Without plastic, our life will turn out to be very troublesome on this planet. Nonetheless, this valuable item comes at an overwhelming cost. Though convenient in our day to day use, they pose an alarming threat to the environment. Plastic is a non-biodegradable item and does not decompose by microorganisms. It takes around 1,000 years for plastic items to breakdown. They remain in their state even after we throw them. These, therefore, are responsible for polluting the land, ocean and the environment. A great many plastic manufacturing plants are delivering huge amounts of plastic bags which are famously utilized by the general population for shopping purposes due to its ease, cheap price and comfort, yet their negative effects are never featured or considered. To destroy plastics, we can either recycle or burn them. On burning plastic, they emit harmful chemical gases like carbon dioxide (CO,), carbon monoxide (CO), nitrous oxide (NO), methane (CH4), sulphur dioxide (SO2) and so on. These gases pollute our environment, though in negligible content but they add to greenhouse effect and endanger our environment. Numerous nations have prohibited the usage and production of plastic bags because of their negative effects on humans and environment, particularly in farming nations, for example India, Pakistan, South Africa, Bangladesh and so on. Some other dangers of plastic are, they contain chemicals that disfigure genitals, they increase the risk of childhood asthma, destroy our waterways and also destroy hormonal balance. Some solutions to these plastic hazards are to take preventive measures like reduce the use of plastic wherever possible, use of recyclable bags and other materials, and recycle the used plastic. This paper therefore talks about the various hazards of plastic waste and suggests appropriate preventive measures.

PLASTICS AND GREEN CHEMISTRY

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ABSTRACT

Plastics are commonly used by civilized society to meet out daily needs. Plastics have been one of the materials because of their wide range of applications due to versatility and relatively low cost. They are incredibly versatile materials; they are inexpensive, lightweight, strong, durable, and corrosion-resistant with high thermal and electrical insulation properties. Plastics can be moulded in desired shape, desired colour and it is easy to use and have many applications. Plastics are the macromolecules which are formed due to network linking of monomers. As a result, the production of plastics has increased significantly over the last fifty years. From last few years, a drastic growth has been observed in the production of synthetic polymers such as polyethylene (PE), polypropylene (PP), polystyrene (PS), polyethyleneterephthalate (PET), polyvinyl alcohol (PVA) and polyvinyl chloride (PVC) etc. The main issues with synthetic plastics are their non degradable nature and production of toxic gases on combustion which create environmental problems. The increase in use of plastic products caused by sudden growth in living standards had a remarkable impact on the environment. Plastic waste pollutes and obstructs our rivers, oceans, lands and badly affects the biodiversity.

In India, the infrastructure for handling of solid waste plastics particularly in urban areas is not inadequate. Poor littering habit of the general public has increased the problem. The authorities had indeed imposed restrictions on use of thin plastic carry bags to contain the waste problem indirectly. However, it is recognized that various Government notifications were not implemented effectively. This led to an increased pressure on the local authorities to take more stringent measures including complete ban on plastic bags. It is realized that complete ban on plastic carry bags is not the solution. Now the challenge is that how plastic waste is to be managed or recycled. Biodegradable plastics may be an alternative to conventional plastic because they are completely nontoxic and they do not convert into toxic substances on decomposition. Biodegradable plastic is still in their incubation period and still have lot of room for their improvement. It is clear that chemists are trying to change modern day chemistry to help protect our environment but still more work and research required to completely and successfully say there are 'green' plastic. Therefore globally steps are being required for development of environmental friendly, innovative plastic items (biodegradable plastics) using the concept of green chemistry and also with safe disposal methods.

SILICONES AS ALTERNATE MATERIAL TO PLASTIC

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ABSTRACT

The article presents the superiority of silicones over the plastics. Silicones have the potential of replacing plastic in the coming future. This is due to their high thermal stability as compare to plastic, biocompatibility, inertness and hydrophobicity. The silicones are easy to synthesize and their synthesis require raw materials which are cheap and easily available. The simultaneous presence of organic groups attached to an inorganic backbone give silicones a combination of unique properties. Among silicones the most common member is polydimethylsiloxanes (PDMS) but the methyl groups can also be substituted by other groups like phenyl, vinyl or trifluropropyl. The surface tension of polydimethylsiloxanes is low and is capable of wetting most surfaces. They form hydrophobic films with the methyl groups pointing outside. Silicone surface tension is appropriate as required for biocompatible elastomers. Like the silicone polyether copolymers , silicone organic copolymers can be prepared with surfactant properties. The high solubility and high diffusion coefficient of gas into silicones is due to high free volume of silicones as compared to hydrocarbons. Silicones are used as fabric softners. They also play the role of antifoams and also provide hydrophobic finishes on various fabrics.

The silicone sealants and adhesives have excellent thermal and weather stability, ozone and oxidation resistance, high gas permeability, extreme low temperature flexibility, physiological inertness and curability by a variety of methods at both elevated and ambient temperatures. Silicones can be used in every type of beauty product due to the properties such as good spreading, film forming, wash-off resistance, skin feel, volatility and permeability. Now a days silicones are used in many life saving medical devices like pacemakers or hydrocephalic shunts. They are also used in many pharmaceutical applications from process aids like tubing used to manufacture pharmaceuticals, excipients to topical formulation or adhesives to affix transdermal drug delivery systems. The silicone waste in environment is less harmful then plastic waste. The disposal of silicone waste is easy as compare to plastic. Silicon waste can be incinerated. The products formed on disposal of silicones are silica, water and carbon dioxide out of which the first two are not pollutants and even the third can be trapped to form useful products instead of contributing to global warming.

APPLICATION OF ADVANCED OXIDATION PROCESSES (AOPs) FOR TREATMENT OF PLASTICS: A REVIEW

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ABSTRACT

Plastics are manmade, long chain, polymer molecules and are used for making kitchen appliances, furniture, toys, etc. There are different types of plastics depending on the monomer unit present in the polymer like polyethylene (PE), polypropylene (PP), polystyrene (PS), polyvinylchloride (PVC), polyurethane (PU), polyethylene terephthalate (PET), polybutylene-terephthalate (PBT) and nylons. Biodegradability of plastics are very low due to which they remain in environment for many years. The increasing demand and use of plastics leads to over burden on environment. Plastic pollution damages both terrestrial and marine environment and leads to threat to wildlife and marine life. Sometimes burning of plastics generates hazardous vapors which contains toxic compounds ketones, acrolein, and methane. These compounds cause air pollution and degrade quality of environment. A very large fraction of plastic waste ends up as litter in the terrestrial and marine environment. Hence plastics are one of the major contributors towards air, marine and land pollution. Many traditional treatment and disposal methods like landfill, incineration, thermal degradation, biodegradation are used to treat plastics but these lead to many secondary problems and are not highly efficient. So the new advanced technologies are developed for the treatment of plastics. Advanced oxidation processes (AOPs) have recently gained emphasis to treat recalcitrant plastics. Advanced oxidation processes (AOPs) generate hydroxyl radicals (·OH) radical with very high oxidation potential. Several AOPs like ozonation, Fenton oxidation, ultrasound cavitation, and electrochemical oxidation are used to degrade plastics. Photocatalytic degradation of polymers such as Polyethylene stands out as the most promising. Photo catalysis using nanostructures as photo catalysts is an environmental friendly way to tackle the problem. Titanium Dioxide is a promising photo catalyst due to its high photo activity, high stability and low cost. Several hazardous substances may be released during the life cycle of a plastic product; and considering the large and growing global consumption of plastic products, and their omnipresence and persistence in the environment, there is a need for developing scientific intel of AOPs for sustainable treatment and disposal of plastic waste.

REUSE OF PLASTIC AS COMPONENTS OF GREEN BUILDING MATERIALS

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ABSTRACT

With the population growth in today's world is increasing, the need to the building has increased and to respond to this demand, the countries uses most of the industrial materials like bricks, cement extra. Which cost much moreover there is increase in energy consumption too. This becomes a major problem for the people who are under poverty line .on other hand the amount of environmental pollutants are increasing day by day , and they are degrading environment .in all plastic is also one of an urban junk with some of sustainability characteristics. Plastics can be used as building materials in construction in place of bricks. Plastic bottles are not just a waste but an important resource which on recycling can be used in constructing a green building. To use plastic bottles we filled it by using some filling materials like sand and gravel also we use cork and wood to complete the filling. Plastic have much less cost as compared to the buildings made from bricks and concrete blocks. Plastic is used in making the roofing tiles that look like slate but are lighter and easier to install than their traditional slate counterparts. It also helps to make our home warm in winter and cold in summer. The insulation is designed to form air pockets that help to improve insulation performance. Plastics are produced from the oil as non- renewable resources therefore it is considered as sustainable material. The need of sustainable development is based on three aspects these are economic, society and environment. Plastic bottles on reusing also reduces the amount of energy which is used during the production of something useable that is from recycling of plastics. This is how plastic plays a crucial role in our environment. The creative idea of construction of buildings from plastics is beneficial in many aspects. This paper tends to investigate the use of plastic in construction of building and how it can be used in sustainable development. it include some positive points with respect to use of plastic and also concluded time of execution, cost ,load capacity , flexibility, reducing waste and also its energy efficiency.

ENERGY GENERATION FROM PLASTIC

Harsh

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ABSTRACT

Plastic have both significance, it is useful for us as well as hazardous in nature. Plastic is one of the environment pollutant which is not easily decomposable. Many methods are applied to decompose them but these steps are not sufficient. Instead of decomposing plastic we can reuse them by converting it into fuel. Pyrolysis, depolymerisation, thermal cracking and distillation are some methods, from which we can get fuels like petrol, kerosene, diesel, lube oil etc. These methods can be used to reuse the plastic in a better way. From this we can tackle with the both problems shortage of fuel as well as the problem from the waste of plastics. In this paper we discussed about how the plastic can be converted into fuels. Plastics are low density polyethylene used for the pyrolysis to get fuel oil that has the same physical property as the fuels like petrol, diesel etc. pyrolysis is the process which runs at high temperature of 300°c without oxygen. This process is now economically popular as a good way to get more wealth. Moreover the waste produced from the plastic is also reduced. Plastic are made from natural gas specifically from ethane which further can be converted back to natural gas by different processes. The main importance of using the pyrolysis process is that it reduces the volume of waste; moreover any type of solid, liquid or gas waste can be reduced from this process. The study of conversion of plastic waste into fuel his a big boon to both our economy as well to our environment which on another account beneficial to our society. This paper tends to tell about the process for conversion. This concludes that plastic have the similar properties as that of petrol or other oils, further studies on this field provides the better result.

REUSE AND RECYCLING OF PET BOTTLES IN DTU CAMPUS

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ABSTRACT

Plastic waste has become serious problem in solid waste management due to its inertness to degradation and emission of harmful gases during its combustion. It is also known that the plastic serves as suitable packing material due to its low bulk density, inertness, and low cost, and so its replacement with other material has not been found. It is, therefore, necessary to plan a systematic way to handle the waste generated due to plastic. From the various studies it is found that only around 5-25% of plastic waste is recycled annually and the rest is either burnt or thrown on roadside, and it causes many environmental problems. PET bottle has its major application in storing and packaging of soft drinks, juices, drinking water etc. due to its good strength and stiffness, chemical and heat resistance, and good barrier properties for oxygen and carbon dioxide. PET bottles at the Recovery facility require energy and investment, and the infrastructure required for its recovery is not very efficient. Recycling of PET bottles was performed in DTU campus in the month of February, 2016. Bottles of different shapes and sizes were collected manually from different areas of the campus and annual plastic waste generation was estimated as 4.716 tonnes. Reuse of the PET bottles can be done in various forms due to its easy handling. Refilling of used bottles is one of the methods to reuse it. It can be easily moulded in different shapes. Bins of any shape and size can be made to collect other waste in it, flower pots, and other decorative material from this scrap can also be made. The marginalised women community in slum cluster of Sameypur-Badli was trained, and involved in practices of recycling and reuse of PET plastic. It was found that PET bottles occupy higher volume for the unit weight and the scrap dealer collects the bottles on the basis of weight which affects the collection efficiency of the bottles. Reducing its size/volume by cutting or shredding can increase the storage efficiency. Size reduction requires labour input which was performed by the marginalised women in the rural area of Badli. By reducing the size, selling price of bottles was increased. Reducing the size of PET plastic and selling it to recycling vendors not only minimised the waste, but also helped in generation of employment and wages for the marginalised communities.

IMPACT OF POLYTHENE AND PLASTIC ON AGRICULTURE AND SOIL

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ABSTRACT

India will expand its agricultural use of environment-damaging plastic to boost crop production even as we try to curb soil pollution. The plastic sheets, used as mulch over 12 percent of India's farmland, are growing in popularity because they trap moisture and heat, and prevent weeds and pests. These features can bolster cotton, maize and wheat yields, while enabling crops to be grown across a wider area. Polyethylene contamination occurs worldwide, the threat is especially acute for India, where about a fifth of land contained levels of toxins exceeding national standards. Plastic materials dumped into the earth prevent the production of nutrients in the soil. Because of this, the fertility of the soil is reduced and affects the agriculture sector. Its persistence in the environment can cause significant harm. It causes immune and enzyme disorders, hormonal disruption leading to endocrinal disorders and even infertility and is also considered as carcinogenic (cancer). Not only human health, it dangerously effects other animal life and alters the environment (air,water and soil) sustainability causing hazardous pollution.Plastic materials dumped into the earth prevent the production of nutrients in the soil. Because of this, the fertility of the soil is reduced and affects the agriculture sector. It causes immune and enzyme disorders, hormonal disruption leading to endocrinal disorders and even infertility and is also considered as carcinogenic (cancer). Not only human health, it dangerously effects other animal life and alters the environment (air,water and soil) sustainability causing hazardous pollution.

A PERFORMANCE REVIEW OF RECYCLED POLYPROPYLENE REINFORCED WITH AGRICULTURAL WASTE

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ABSTRACT

Polypropylene, a thermoplastic polymer finds a wide variety of applications due to its good resistance towards fatigue and easy mouladbility. About 56.44 million metric tonnes (mmt) of polypropylene was produced in 2016 and it is estimated to reach 75.72 mmt by 2022. Even though polypropylene is highly economical and versatile, it poses serious environmental concerns. Production of Polypropylene requires considerable amounts of butane and benzene which are known carcinogens. The fact that it is durable and rugged also makes it resistant towards degradation, and hence a huge burden on landfills. While it causes severe respiratory problems when burned, it causes even bigger threat when dumped in oceans in the form of marine bioaccumulation. Therefore, recycling was thought to be the most efficient way of handling polypropylene post discard. But recycling has a major drawback that it requires resources and capital and thus, is not sustainable. Hence, the plastics are downcycled into a lower value product to break even the economics of the business. But this problem can be rectified by enhancing the properties of polypropylene by reinforcing it with agricultural waste. Agricultural waste management is a big problem in India and reinforcing polypropylene with agricultural waste will reduce the resources and hazards related to agro waste. Sample was prepared by loading filler (agro waste) in 10, 20, 30, 40 and 50 percent weight and composite was formed by liquid injection moulding. The lignocellulose-plastic composite was later subjected to tests like Tensile Strength, Thermogravimetric Analysis (TGA), Moisture Absorption, Flexure Strength etc. The test showed increase in young's modulus with increase in the filler loading while the tensile strength decreased marginally. The percentage moisture absorbance also increases proportionally. The tests also showed a positive scope towards the biodegradation of the composite. Lignocellulose-Plastic composites can be the pillars of sustainable plastic production, consumption and disposal of polypropylene. These composites provide benefits for both, the plastic recycling sector as well as the agricultural waste management sector. The composite will reduce burden on resources and landfills, will protect from massive amounts of emissions from agricultural waste burning and will be a step towards a clean and sustainable environment.

AWAKENING THE CONSCIOUSNESS AND CONSCIENCE TOWARDS PLASTIC

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ABSTRACT

This review throws light upon the necessity of persistence of plastic on land and urgent need of removal of plastic from ocean and bins. Studying history of plastic, we came to know that human wanted better quality as well cost effective substance for multiple purposes. Plastic fulfils all the desired objectives and gave new height to development in all fields we know or might not have knowledge about. It was invented to last and its durability is now the biggest concern. Both break down and burning up of plastic is toxic to the environment and its creatures. Polyvinyl chloride (PVC), Polyethylene (PE), polypropylene (PP), polyethylene terephthalate (PET) and many other kinds of constituents and types of plastics when dumped in oceans broken down into microplastics can contaminate water, animals and can also cause disease and death of marine wildlife. The early initiatives focus on the removal and ban of single-use plastics like grocery bags, straws, cups etc. Today's 8.3 billion metric tons production of virgin will ramp up to 12 billion metric tons in landfills and environment by 2050 if no steps are taken to change the on-going trend. Common people are becoming more conscious on seeing the harassment of the natural beauty of seas and oceans. Plastic would be able to prevent human's footprint on earth, only when consumed wisely. Studies suggest that as many as 700 species are under threat of extinction. Starvation, suffocation, entanglement, infection and drowning due to plastic waste affect 84% of sea turtles, 44% of sea birds, and 43% of all marine mammals out of 267 suffering species. Initiatives taken up by other countries should be taken under consideration and can be implemented where possible in our country. Importance of recycling of plastic should be known to all and research on bio-plastic should be fastened. Individual awareness is most appreciated as it can be the reason for every minute improvement.

PLASTIC WASTE AND ITS IMPACT ON WATER ECOSYSTEM

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ABSTRACT

Plastic is one of the well known substance, used for synthesizing a wide varieties of products from clothes to automobile parts. Due to its various indigenous properties like flexibility, moisture resistant, lightweight and inexpensive, it is highly popular and most desirable substance on this planet. In recent years, plastics with its increasing range of products have totally changed our society by substituting traditional substances like paper, wood, glass, ceramic, metal, stone etc. Besides its various uses, plastic is one of the major toxic pollutant on earth surface. Plastic consume a major part of energy and natural resources during its synthesis. Also during its production and disposal it pollutes the basic components of life viz. air, water and soil on earth surface. Plastics have nonbiodegradable components which make them persistent in food chain at higher trophic levels. Annually more than 100 million tonnes of plastic and its products produced all over the world. When plastic waste is disposed in water bodies like lakes, rivers and oceans it not only pollutes the water but also affect their aquatic life. Plastics significantly affect the marine life from small microscopic species like zooplankton to large mammals like whale on shore and off shore. Mainly plastics and plastic substances eg. microplastics, having diameter less than 5 mm diameter are currently found in various freshwater and marine ecosystems throughout the world. A report by Greenpeace in 2006 states that around 267 different species have suffered by the ingestion and entangled of plastic debris. Globally plastic production has increased from 1.7 million in 1950 to 311 million tines in 2014. With increasing population, production of these substances has increased dramatically. Also the concentration of plastics has been continuously increasing in aquatic environment during recreational and commercial activities. The major problem associated with plastics is its management. Researchers are finding the way for the problems related to traditional plastic waste management. Along with research, recycling, new technologies, alternate and biodegradable packaging material should be used to reduce the consumption of plastic materials. Governments should implemented strict law for disposal and recycling of plastics waste. Awareness among people related to use and disposal of plastics is other alternative method to check excessive use of plastics. This review paper discusses the various harmful impacts of plastics and its products on water quality and aquatic life in water ecosystems.

IMPACT OF PLASTICS IN THE MARINE ENVIRONMENT

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ABSTRACT

To fully understand the impact of plastics in the marine environment, a mass balance exercise must be carried out to estimate the amount present in the oceans. The mass balance is typically evaluated using two approaches- measuring the input and output of plastics from the marine environment in its entirety and calculating the amount of plastic present in major marine reservoirs. The pathways of plastics into the environment can be through spillage of industrial resin pellets; improper management of plastic waste via open dumping, discarding in open landfills and littering; and loss of in-service plastic products through fishing and aquaculture, shipping, ocean science, and natural disasters (e.g. tsunamis, hurricanes, or floods). There is a serious dearth of standardized sampling methodology in the detection, quantification and characterization of plastic waste in the marine environment. Powerful and efficient methods to determine plastic distribution along coastlines, in the water, in sediments and on the seafloor need to be developed. In order to achieve this, the size-frequency distribution of plastic waste, from nano to macro size needs to be determined. Such studies will also shed light on the source, pathways, modification of plastics during transport, and threats posed to the biotic environment.

The possible effects of plastic contamination are entanglement by the litter resulting in injury, entrapment or drowning; ingestion of waste leading to bioaccumulation, biomagnifications, disease or death; floating waste that can be carried long distance posing a threat to navigation; and seafloor debris providing unwanted shelter for small animals and interfering with marine equipment, e.g., fishing gear. This paper examines how plastic debris can adversely impact specific organisms (micro and macro) and habitats that can alter the ecological web.

THERMOLYSIS OF WASTE PLASTICS TO LIQUID FUEL: A SUITABLE METHOD FOR PLASTIC WASTE MANAGEMENT

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ABSTRACT

The present rate of economic development is unsustainable without sparing of fossil energy like raw petroleum, flammable gas or coal. Therefore, humankind needs to depend on the other/sustainable power sources like biomass, hydropower, geothermal energy, wind energy, solar power, nuclear power, and so forth. Then again, proper waste management technique is another critical part of sustainable development. The development of welfare levels in present day society amid the previous decades has realized an enormous increment in the creation of a wide range of products, which by implication create waste. Plastics have been one of the materials with the speediest development in light of their extensive variety of utilizations because of adaptability and comparatively lower cost. There is an immense plastics waste stream that reaches every year to the last receivers making a genuine environmental issue. Once more, since transfer of post customer plastics is progressively being obliged by enactment and rising expenses, there is significant demand for alternate options to disposal or land filling. Propelled look into in the field of environmental science could yield biodegradable/green polymers however is excessively restricted now of time to substitute the non-biodegradable plastics in various applications. Among the options accessible are source diminishment, reuse, recycling, and recovery of the characteristic energy esteem through waste-to-energy burning and handled fuel applications. Creation of fluid fuel would be a superior option as the calorific estimation of the plastics is equivalent to that of fuels, around 40 MJ/kg. Every one of these alternatives conceivably decreases waste and preserves characteristic assets. Plastics reusing, keeps on advancing with an extensive variety of old and new advancements. Numerous research ventures have been attempted on chemical recycling of waste plastics to fuel and monomer. This is likewise reflected by various pilot, exhibit, and business plants handling different kinds of plastic waste in Germany, Japan, USA, India, and somewhere else. Promote examinations are required to improve the age of significant worth included items (fuel) with low ventures without influencing the environment. The paper reviews the available literature in this field of active research and identifies the gaps that need further attention.

ENVIRONMENTALLY PRISTINE EDIBLE BIOPLASTICS

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ABSTRACT

This project aims to substitute conventional crude oil based plastic with bioplastic. This bioplastic is created by renewable, economical and readily available organic materials. The key focus is onto make this bioplastic edible. This reduces adverse impact on environment by reducing the carbon footprint and pollution in the ecosystem.

We have developed a novel formulation for bioplastics using low cost and edible materials such as starch, agar and casein. The synthesized bioplastic is aimed to be non-toxic and biodegradable by eliminating use of traditional hydrocarbon polymers. PHA (polyhydroxyalkanoates) and PLA (polylactic acid) are the two key compounds which are synthesized along with the additives such as glycerol(plasticizer) , CMC (Carboxyl methyl cellulose- viscosity stabilizer) and acetic acid (agglutination). The resulting combinations are investigated and analyzed for their respective properties such as thickness, tensile strength, shear stress, durability, and biodegradability. Preliminary results have shown encouraging results. This bioplastics were used to create packing films, mobile covers, jewellery, novelty pieces etc. Further studies on improving the quality of plastics are underway.

TITANIUM OXIDE AS A POTENTIAL REAGENT TO CONTROL NOX FROM THE ATMOSPHERE- A STUDY

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ABSTRACT

Being a precursor to photochemical smog, acid rain, and ozone accumulation, Nitrogen oxides are considered as major pollutants in the atmosphere. The compelling technique for removal of nitrogen oxides include roofing tiles coated with Titanium dioxide which are capable of breaking down nitrogen oxides as it reacts with volatile organic compounds in presence of sunlight to create smog. It was found that TiO2 coated tiles removed 88% - 97% of nitrogen oxides which depends mainly on the surface area. The removal was also studied based on different parameters like presence of UV light, contact time, amount of TiO2 in paint, saturation point of the photo-catalyst. Rate of reaction is found to be reduced with decrease in amount of TiO2 taken.

NANOTECHNOLOGY ASSISTED PHOTOVOLTAIC CELLS

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ABSTRACT

Solar energy is a renewable energy which is naturally replenished and its conversion directly into electricity using photovoltaic (PV) cell is an attractive source. However current PV technology has challenges with its efficiency and high price of modules. Nanotechnology might be able to increase the efficiency and reduction of manufacturing cost of solar cell. Nanomaterial developed PV cell using CdTe, CuInSe (CIS), CuInGaSe (CIGS), Quantum dots(QD's) and organic materials with the aim of reducing the price per watt and also increasing the efficiency. Nanotechnology aided solar cell can be used to improve solar energy utilization, reducing manufacturing cost, conserving environment and enlightening the rural areas

PHOTOCHEMICAL SYNTHESIS AND BIOLOGICAL STUDIES OF NOVEL BISPYRONOPYRANES

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ABSTRACT

The syntheses of six membered oxygen heterocycles have been extensively carried carried in the last few decades owing to their numerous biological; and industrial applications. The pyrans are the heterocycles which are found to contain oxygen as the hetero atom in a six membered ring. These products have been prepared by using various complicated protocols under the thermal modes. The fusion of the pyronanone ring to pyrane is named as pyranopyranes which are found to be synthetically highly significant. The bis-pyronopyranes are the molecules which are formed by joining of two pyronopyrane moieties together through the internal spacer of varying lengths and structures. By considering the above facts in view, we have focused our researches upon the development of the milder photochemical method for the generation of new bis-pyronopyranes. The synthesis of oxygen heterocycles was started from the O-alkylation of the various 3-hydroxy-chromones with suitable alkylating agent in the presence of anhydrous K2CO3 and PTC in dry acetone. The bischromones thus obtained were photolysed in suitable solvent medium in a Pyrex photoreactor by using light from an Hg arc lamp to obtain the photolytic mixtures which were further worked up by using column chromatography to yield various types of the bis-pyronopyranes. The structures of starting compounds and resulting bis-pyronopyranes have been determined from the rigorous analysis of their IR, 1H-NMR, 13C-NMR, ESI-Mass and elemental analysis confirmed their purity. The antibacterial and antifungal activities of the starting bischromones and separated bis-pyronopyranes were also evaluated against the seven bacterial strains and five fungi strains. Some of the studied compounds showed significant activities against the tested microorganisms.

ELECTROCOAGULATION FOR COLOUR AND COD REMOVAL OF REAL REACTIVE DYEBATH EFFLUENT

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ABSTRACT

The textile industry discharges a lot of waste water that causes environmental problems in terms of high colour, dissolved organics and inorganic salts. In the present study, Electrocoagulation(EC) has been employed for the removal of color and COD from a real textile waste water consisting of reactive dye used for dyeing cotton fibre. Batch experimental studies using Aluminium(Al) electrodes has been incorporated to study the effect of various operating parameters i.e., contact time(t: 0-150 min), initial pH(pH0: 4-10), current density(j: 20-80 mA/cm2) and electrode spacing(z: 0.5-1.5 cm) on colour and COD removal efficiency. It has been seen that pH of the solution greatly influences the removal in terms of COD and does not have significant effect on color removal efficiency. Higher current density and less distance between electrodes favours the process. The removal efficiency in terms of color and COD were found to be 90% and 56% respectively. The electrical energy consumed during the process was 1.65 kWh/m3 of waste water treated. The scum and sludge produced during the process was analysed for the disposal of residue during treatment.

REVIEW OF CURRENT SCENARIO PLASTIC WASTE & MANAGEMENT TECHNIQUES

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ABSTRACT

Plastic has now become an essential part of human life. It made significant contribution most of the field of human activity like– packaging, agriculture, medical, electrical and electronics good, manufacturing of household and furniture rather approximately in all areas of daily or specific use. Despite all these benefits, it has become a part of waste and creating problems related to health, safety and environmental problems.

Major problem is that human beings have dependent on plastic, now days each person is using plastic material in his daily life, which is stimulating plastic production. Plastic having characteristic of non Non-biodegradability means once it is manufactured it will remain in nature for a long time; it also having different types of chemical. In current scenario consumption of plastic increasing day by day and it is very difficult to manage the plastic waste. It is very essential that people must aware about pros and cons of plastic waste. There are limited methodologies available for management of plastic waste. The paper discusses current status of plastic waste and technologies. It is concluded that the existing rate of environmental degradation is likely to continue unless effective long term remedial measures for plastic wastes management.

RE-USE OF PLASTIC AS COMPONENTS OF GREEN BUILDING MATERIALS

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ABSTRACT

Plastics are essential to modern living. Out of 100 percent, 60 – 70percent plastic is recycled and reuse for the different purpose such as Building Materials. The contribution that the re-use and recycling industry can make to lower the embodied impacts of buildings is significant. Re-use of plastic as component of building material helps in the environmental friendliness, i.e., they are easy to use, low maintenance which makes a perfect eco-friendly material, fully recycled industrials plastic products are extremely safe, have a very long service life, do not require any maintenance and environmentally friendly. Reuse of plastic may also leads to the energy generation, which further can be converted, into electrical energy, which can be utilized in various verticals.

Building and construction activities worldwide consume 3.0 billion tons of raw materials each year and represent 40 percent of the total global use. It is estimated that buildings worldwide consume about 40 percent of the planet's material resources and 30 percent of its energy and generate between 10 percent to 40 percent of the solid waste. Using green building materials into construction projects can help to reduce environmental impacts associated with the extraction, transportation, processing, fabrication, installation, reuse, recycling and disposal of construction industry source materials. The sustainable building incorporates many strategies during design, construction and operation of a building project. Using Green Building Materials in construction is said to be "sustainable design". The green materials are environmentally responsible materials as they help in reducing environmental impact. Plastic building materials used in the construction of roof, walls, interior and external works. In this paper, different types of green building materials discussed with their properties, these materials are environmental sustainable in nature. The energy generated from the plastic waste is having the great utilization in forthcoming future.

GENERATION OF FUEL FROM WASTE OF DOMESTIC PLASTICS

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ABSTRACT

As per the recent study done by Environmental Protection Agency (EPA) approximately billion of tons of plastic waste are generated annually. Statistics show that about 10% of the total plastic waste generated is recycled, 25% is burnt and the rest 65% is dumped in landfills. The cost for management of plastic waste is around $ 2800/ton of waste plastic. Dumping of solid plastic waste creates several types of pollution problems like water pollution, soil pollution etc. and management of solid waste is a challenging problem in India. Incineration of plastic waste is an alternative to disposal of plastic waste in landfills but this practice creates air pollution due to the emission of unacceptable substances into the air like oxides of nitrogen, oxides of sulfur, dusts, dioxins and other toxins. Recycling results into the products of lower quality and hence is not showing any signs of growth in recycling industries. Raw materials for plastics which are actually the polymers having long chain of hydrocarbons are petroleum and natural gases. Previously the simpler synthetic plastics like PE, PP etc. are synthesized by polymerization of those simpler molecules (monomers) whose original source is petroleum or natural gases. Later so many plastics are synthesized by further modification in the chemical structures of the monomers. So the process such as thermal/catalytic pyrolysis and gasification can be used to convert the plastic back into smaller hydrocarbon chains of naphtha, diesel, kerosene etc. The crisis of fossil fuels is the major problem of many developing countries. The generation of fuel from plastic waste can overcome this problem upto some extent. Among all plastics PE, PP and PVC are manufactured widely and used to make domestic articles. The waste of such domestic plastics can be easily converted into fuels. This paper aims to provide the best possible review of the conversion methods of plastic waste to fuel with the hope of visiting lowered fuel prices in the near future.

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