

School of Chemical Engineering

(Accredited by National Board of Accreditation)

IChE Students Chapter

Organizes

PRAKALP 2019

15th National Chemical Engineering Students Conference

September 16th & 17th, 2019

“WASTE TO ENERGY”

Organized by

IChE Students' Chapter School of
Chemical Engineering

(Accredited by National Board of Accreditation)

MIT

Academy of
Engineering

[An Autonomous Institute affiliated to Savitribai Phule Pune University]

Alandi (D), Pune-412105.Maharashtra.India

(Accredited by NAAC with 'A' Grade)

In Association with



IIChE Pune Regional Centre

Preface

It gives us immense pleasure and happy occasion to host “15th Annual Session of National Chemical Engineering Students Conference, PRAKALP-2019” at School of Chemical Engineering, MIT Academy of Engineering (MIT AOE), Alandi (D), Pune, and Maharashtra during 16th-17th September 2019.

PRAKALP-2019 is jointly organized by IChE Students Chapter, School of Chemical Engineering, MITAOE and IChE Pune Regional Centre on theme “Waste to Energy” The abstracts have been segregated into various thrust areas and 02 parallel sessions have been arranged. We hope the deliberations at the congress would give exposure to the various trends of Waste to Energy and hence becomes extremely beneficial to the students community and industry in near future. We wish this association would run a long way for the better tomorrow.

We take this opportunity to express our sincere gratitude towards, management, faculty, staff & students of MITAOE, IChE PRC, students, academicians, industry persons and all, who supported this event directly or indirectly to make this event a grand success.

We wish all delegates fruitful deliberations and pleasant stay at MIT Academy of Engineering, Alandi (D) Pune Maharashtra during PRAKALP-2019.

MIT ACADEMY OF ENGINEERING

MIT Academy of Engineering (MITAOE), Alandi, Pune, formerly known as Maharashtra Academy of Engineering established in the year 1999 is an extended vision of Prof.Dr.Vishwanath.D.Karad , founder, Executive & Managing trustee , MAEER's MIT group of Institutions , Pune , India. Executive Director of MITAOE Dr.Sunil Karad has set up a culture of continual improvements in quality of education with a focus on extra and co-curricular activities to achieve holistic development of students. MITAOE is awarded Academic Autonomy since June 2016 and is permanently affiliated to Savitribai Phule Pune University (Formerly University Of Pune) and imparts education at UG (Chemical, Computer, Mechanical,Electronics,Electronics&Telecommunication,Information Technology & Civil) and PG (Electronics, Computer & Mechanical). The Institute has research center in Electronics Engineering for PhD guidance and work. The institute is approved by AICTE, New Delhi. Its quality is reflected through accreditation of all departments by NBA, NAAC with "A"grade and ISO 9001:2008 certification.

SCHOOL OF CHEMICAL ENGINEERING, MITAOE

(Accredited by NBA, ISO 9001:2008 Certified)

The School of Chemical engineering has made a name for itself in the short span of thirteen years since inception. Established in August 1999, the department has proved its worth by its stellar performance.

Results at the University level have increased the confidence of the Department and help to rank amongst the best Engineering Colleges. Chemical Engineering students at MIT Academy of Engineering get intense practical and theoretical knowledge. This has served to reiterate that the excellent quality of teaching and commitment to research in the Chemical Engineering Department. This has been made possible by a team of dedicated faculty drawn from the best institutions in the country, and the research laboratories on our campus. The aim is to provide the best chemical engineering graduates to the corporate world.

Our mission is to become the leaders in chemical engineering education and research. We train our students to be the best in shaping and solving complex problems, particularly the translation of molecular information and discovery understanding of physical, chemical, and biological processes; engineering design and synthesis skills; and interdisciplinary perspectives on technological, economic and social issues. We also emphasize the value based teaching and learning in the global scenario which is another feature of a top chemical engineering college.

INDIAN INSTITUTE OF CHEMICAL ENGINEERS (IChE)

Indian Institute of Chemical Engineers was born just before the Indian Independence during the days fomenting with nationalistic inspirations. Dr Hira Lal Roy, the great visionary and pioneer of chemical engineering education in India, along with few other stalwarts felt the need for such a forum within the country to rear the nascent initiatives for spread of chemical engineering education and foster the interest of the profession.

A modest beginning was made on 18th May 1947 in a room of Jadavpur University, Kolkata, with 30 members, little fund and nominal infrastructure. The IChE has come a long way since. Today, with around 15,000 members on its roll, the Institute has emerged as the apex professional body of chemical engineering professionals in India and has developed a distinct profile of its own which is ever-changing. Even as the IChE is always molding itself and playing a proactive role to keep up with the dynamic needs of the society and the economy, its working, governed by an all-India Council, has already revolved round the basic objectives set forth in the Memorandum of Association.

The activities of the Institute are spread across the country through its 33 Regional Centers and 58 Student Chapters, apart from the HQ located at a five storied building of its own at the Jadavpur University campus. The Regional Centers promote and complement the organizing meetings, conferences and seminars; arranging workshops, refresher courses and counselling sessions; promoting research; guiding chemical engineering students in career planning; and initiating any other activities which are of social, technical and professional relevance to their members. They serve as open for their members who regularly gather for informal get-togethers and exchange of notes. The Regional Centers also confer awards, prizes and scholarships.

Student members pursuing under-graduate degrees in Chemical Engineering from Student Chapters, under the auspices of the respective Regional Centers. The Student Chapters also arrange lectures, seminars, short courses, plant visits, etc., at regular intervals to better equip and empower the students when they come out of their academic precincts. Academic activities apart, Student Chapters organize cultural events and sports activities for their members.

The IChE has been conducting the Associate Membership Examination since 1960. It is held twice a year- in March and September- at different centers across the country. The examination is meant for those working in the chemical engineering related professions, who have a diploma in engineering or a degree in science but lack a degree in chemical engineering. This examination offers them the opportunity to qualify as chemical engineers. The Government of India and most of the public and private sector undertakings recognize it for purpose of recruitment to superior posts and services, for which a degree in chemical engineering is considered as a qualification.

The Institute publishes a quarterly journal, the Indian Chemical Engineer (ICE), which has been the Institute's main organ since 1959. Even before that, Transactions of Chemical Engineers was

regularly published between 1948 and 1958. The ICE, divided into Sections A and B, is a compact journal, striking a balance between fundamental research papers from India and abroad in Section A and news snippets on industrial and corporate front, environment, safety and hazards, recent research trends, latest software, etc., in Section B. This section also features technical articles and offers in-house news.

The Institute is recognized by the Department of Science and Technology, Government of India, as a Scientific and Industrial Research Organization. The spectrum of R&D projects undertaken by the Institute in recent times covers a wide range and research work involving field studies like Comprehensive Assessment of Management of Municipal Solid wastes in Kolkata, study on Improvement of Quality Management System at Naihati works of Jeson & Nicholson (India) Ltd, etc, as also laboratory or pilot scale experiments on membrane-based Techniques in Desalination of Brackish Water, Fruit juice concentration, etc.

The Annual Session of the Institute, popularly known as the Indian Chemical Engineering congress (CHEMCON), is the most important event in the calendar of IChE. Held every December at one of its centers, the four-day CHEMCON features a host of events, which include memorial lectures, plenary, lectures, symposia's, panel discussion, exhibitions, etc. To the Indian chemical engineering fraternity in the country and abroad, CHEMCON offers the most attractive platform, ensuring four days of intensive interface with best of brains – national and international – in chemical engineering and allied fields.

The pleasure and inspiration that a greenhorn in research gets by presenting his work and by interacting with his peers and seniors in a conference instill a strong desire of making innovative contribution to his discipline and profession. IChE is organizing SCHEMCON (Students' CHEMCON) annually since 2005 to encourage the chemical engineers of tomorrow to come out with innovative ideas as well as to boost their self-confidence.

Each year the institute confers a large number of awards and prizes to honour eminence as well as to nurture young talents. These awards have been instituted with endowments from leading industry houses, media enterprise and R&D Organizations. The awards indeed cover a wide spectrum - revered scientists, esteemed industrialists, respected academics, meritorious students and research scholars, etc.

The institute maintains close association with number of professional bodies at home and abroad. Post-globalization, the IChE has embarked on a number of initiatives to become part of a wider network of inter-disciplinary forums and to be more visible in the international chemical engineering circuit.

The IChE welcomes all into its fold – the aspiring chemical engineers of the future as well as veterans with vast experience. The membership of the Institute in itself is an accomplishment that stands one in good stead in one's future career. The horizon of chemical engineering is fast widening with newer disciplines merging with it and new ideas emerging. As a member of the

Institute, one gets plenty of opportunities to share the platform with many well know academics and established professionals in one's field. These interactions help one to constantly update and equip oneself so as to keep pace with the fast changing professional scenario. Equally important, as one becomes a member of his network of fellow professionals with multifarious connections, one can derive rich dividends to further one's professional goals.

IIChE PUNE REGIONAL CENTRE

IIChE Pune Regional Centre (IIChE PRC) was established on 1963. Since its inception, PRC is very active. The PRC is regularly conducting various events like training sessions, workshops, seminars, conferences etc for the benefit of the Indian industries and the academia.

Organizing Committee

Chairman:	1)Dr. M.D. Goudar
Vice Chairman:	2)Mr. M. Senthilkumar
Convener:	1)Dr. S. P. Shewale 2) Ms. S. S. Shende

Local Organizing Committee

Sr. No.	Name	Sr.No.	Name
1.	Dr. N. M. Rane	12.	Dr. M. P. Patil
2.	Prof. M. Senthilkumar	13.	Dr. V. K. Rathore
3.	Dr. S. P. Shewale	14.	Mr. D. M. Chavan
4.	Mr. S.S. Gandhi	15.	Mr. M.S. Walunjkar
5.	Mrs. M. D. Sardare	16.	Mr. P.R. Kulkarni
6.	Mr. V.D. Pakhale	17.	Mr. A. R.Magdum
7.	Mr. V.A. Tarange	18.	Mr. S. N. Bhokare
8.	Mrs. S. S. Shende	19.	Mr. A.P. Munde
9.	Mr. A. M. Kapse	20.	Mr. S. B. Dewalwar
10.	Dr. P. N. Sutar	21.	Mr. B. B. Khade
11.	Dr. A.B. Kangare	22.	Mr. A. D. Thakur

IChE Students' Chapter, MITAOE

Executive Body (2019-2020)

Name	Designation
Mr. Swarup Patil	Secretary
Mr. Shantanu Joshi	Joint Secretary
Ms. Laxmi Shaha	Treasurer
Ms. Sakshi Dusane	Ladies Representative
Ms. Shreya Gonnade	Member
Mr. Adarsh Paraskar	Member
Mr. Shubham Patil	Member
Mr. Kedar Dhongade	Member
Mrs. Shraddha Shende	Coordinator

Schedule

Day 1: Monday 16th September 2019

0 9:00 AM Onwards	Registration Begins
09:30 AM to 10:00AM	Breakfast
10:00 AM to 11:30 AM	Inaugural Function
11:30 AM to 01:30 PM	Session I (Oral Presentation)
01:30 PM to 02:30 PM	Lunch
0 2:30 PM to 03:30 PM	Session II (Oral Presentation and Poster Presentation)
03:30 PM to 3:40 PM	High Tea
03:40 PM to 4:30 PM	Session II (Oral Presentation and Poster Presentation)

Day 2: Tuesday 17th September 2019

8:00 AM to 8:45 AM	Breakfast
8:45 AM to 10:45 AM	Session I(Oral Presentation)
10:45 AM to 11:00AM	Tea Break
11:00 AM to 12:45 PM	Session II (Oral Presentation)
12:45 PM to 1:45 PM	Valedictory and Prize Distribution Function
1.45 PM to 2.45 PM	Lunch

SEQUESTRATION OF NOXIOUS POLLUTANTS FROM WASTEWATER

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Abstract: The discharge of industrial and domestic wastewater leads to the mixing of noxious pollutants to the aquatic ecosystem. Advanced oxidation processes (AOP) has tremendous scope regarding the segregation of non-biodegradable organic and inorganic substances to environmentally safe products by chemical oxidation. This method has been substantiated to purify water and its treatment to separate various pollutants like natural toxins, pesticides and other harmful impurities. In this project, firstly we studied the many removal techniques that have been used for wastewater treatment. And the objective is to determine application of UV/H₂O₂ and UV/TiO₂ to treat the wastewater by forming hydroxyl ion to oxidize the pollutants.

Keywords— Wastewater; Advanced oxidation processes; Chemical oxidation; Noxious pollutants; hydroxyl ion

HYDROGEN GENERATION IN WATER SPLITTING REACTION USING ALUMINUM IN PRESENCE OF GALLIUM

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Abstract: Present study focuses on the in-situ/on-demand generation of hydrogen gas through water splitting reaction using waste aluminium. The waste aluminium obtained from waste soft drink cans of 0.097 mm thick was utilized as the source of aluminum. The use of room temperature liquid metal gallium was evaluated as the activator for aluminum metal under alkaline conditions. Hydrogen generation has been parametrically studied at various concentrations and temperatures of alkali. The gallium proportion of 99% by weight of the total weight of metal and the low concentrations of alkali, sodium hydroxide of 0.1 - 0.5 N concentrations has been evaluated at the temperatures of 50, 60 and 70 °C. The complete conversion of aluminum was reported and the gallium was observed to intensify the rate of hydrogen generation as compare to the hydrogen generation in absence of gallium. The experiental data has been treated using Shrinking Core Model and the possible rate controlling mechanisms has been discussed. The added gallium was separated after the reaction.

Keywords— hydrogen generation, water splitting, activator, intensification

REPLENISHMENT : ENVIRONMENT BENIGN PROCESS

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Abstract: Water scarcity is becoming a global concern. Textile industry uses large amount of water in their production processes, with subsequent generation of large quantity of waste water. The major operations performed in a typical textile processing industry are desizing, scouring, mercerizing, bleaching, neutralizing, dyeing, printing, and finishing. As the cost of water supplied to industry's keep increasing. Textile industry needs recycling of waste water generated and conservation of water to reduce the water requirements and also dependency on other water sources. Reduction in water consumption can be done by replenishment of the treatment baths. In this work, attempt has been made to reduce water consumption, chemical consumption, to reduce the load on ETP plant, energy consumption, increases the production, and saving money also. By replenishment of pretreatment baths of various processes. After replenishing the fresh bath of desizing, desizing efficiency in terms of % weight loss and TEGEWA ratings are observed. Similar results were obtained in the case of scouring efficiency in terms of % weight loss, % wax content and absorbency. From bleaching replenishments it was found that there was no remarkable difference in whiteness indices of samples from fresh and replenished baths. No significant difference was observed due to replenishments of resizing, scouring and bleaching baths on the performance of reactive dyeing in terms of K/S value, colour difference [ΔE], washing fastness and rubbing fastness. And this process of replenishment is now applying in the textile processing houses in Ichalkaranji and nearer area from last 6 months some industry's like Radha-mohan textile processing Ichalkaranji. Yashwant processing house Ichalkaranji.

Keywords— Resizing, Scouring, Bleaching, Replenishment of bath

EXTRACTION OF METALS FROM SPENT LITHIUM ION BATTERIES— ROLE OF ACID, REDUCTANT AND PROCESS INTENSIFICATION IN RECYCLING:

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Abstract: A comparison of various approaches evaluated to process spent lithium ion batteries to extract metals has been carried out. The leaching is carried out with sulphuric acid in the presence and absence of reductant, thus defining the role of reducing agent (NaHSO₃ and H₂O₂) in assisting dissolution of all metals, especially Co and Mn. As the direct process incurs all metals in solution and employs high concentration of acid, a two-step process (acid baking

and leaching) has been attempted to lower acid consumption indicating benefits in the selective dissolution of metals viz., Co and Li (in 1st stage) over other metals (Ni and Mn in 2nd stage).

Keywords— Spent LIBs ;Recycling ;Sulphuric acid ;Reductant ;Baking.

USE OF ACETYLENE AS A FUEL IN VEHICLES

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Abstract: This project leads to the idea of using acetylene gas in the internal combustion engine such that it reduces the demand of the petroleum products that is going to be extinct in near future. It includes about the emissions of harmful gases that can be reduced by the use of acetylene instead of petroleum products. Various fuels have been tested on IC engines for their suitability as alternate fuels. Except few alcohols, CNG and LPG, not many fuels have been found to be matched with IC Engines requirements. Thus this project is an attempt for the use of an alternative resource such that it can prove to be useful for the peoples in near future.

Keywords— Alternative fuel, emission, thermodynamic approach, exhaust analysis, comparison, efficiency

PREPARATION OF BIO OIL AND BIO CHAR FROM SUNFLOWER HUSK

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Abstract: We study about the preparation of bio char, a carbon-rich and a potential solid bio fuel, is prepared during the process of, pyrolysis of sunflower husk. Bio char can be used as fuel for heating. To understand or study the investigated the effect of temperature on bio char preparation during the Pyrolysis process of sunflower husks.

The process were carried out in an stainless steel pyrolysis reactor at 450^o C. Sunflower husks were in process at various temperature (450-500^o C) to influence of reaction temperature on the bio char yield. Process was carried out under the atmospheric pressure with a residence time of 45 min.

Keywords: Pyrolysis, Sunflower husk, bio oil, bio char.

**CONSERVE TO PRESERVE MANDHARE ANIKET GAJANAN, MALUNJKAR
ROHIT ASHOK**

NIPHADE SHUBHAM SANJAY

(A/P- ASHWI KH, 413738)

(A/P- AKOLE, 422601)

(A/P- Nashik, 422010)

Abstract: Energy is the primary and most universal measure of all kinds of work by human beings and nature. Energy is a crucial input in the process of economic, social and industrial development. Development of any country is directly related to the energy resources present since energy is the backbone of technology. To meet the necessary demands great pressures have been created on the natural energy resources. Thus it is essential for today's world to concentrate on renewable ones to satisfy the demand and conserve our finite natural resources for the generations to come. Since the major energy comes from the finite, non renewable fossil fuels thus it becomes crucial to look for other renewable alternate energy sources such as Solar, Wind, and Biomass etc. The presentation introduces Need of use of renewable energy, elaborate profit of using this sources, hazards and limitation of Fossil fuel and awareness to society. Collectively approach for presentation on use and awareness about renewable energy sources.

Keywords -Fossil fuel, Natural resources, Necessity of renewable energy, profit and losses, Awareness about renewable energy sources

WASTE TO WEALTH VIA MICROBIAL FUEL CELL

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Abstract: Current review focuses on the recent developments of the Microbial Fuel Cell (MFC) technology, its scale-up and implementation in real world applications. Microbial Fuel Cells produce energy from waste streams and reduce environmental pollution at optimized cost of the treatment. Although the technology is still considered "new", it has a long history since its discovery for small scale power generation. However, recent environmental pollution abatement has compelled mankind to introspect on waste reutilization concerns. The present work covers all research and possible developments done by applying MFC's for waste reutilization. It also throws light on its implementation in real world settings, as a precursor to commercialization.

Keywords— Microbial Fuel Cell; Energy; Waste treatment; Commercialization

CARBON CAPTURE AND SUSTAINABLE UTILIZATION- EFFECTIVENESS AND COMMERCIAL VIABILITY

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Abstract: With the increasing challenge to curb greenhouse gas emissions, Carbon Capture and sustainable Utilization (CCU) would be an essential practice. CCU involves recycling of CO₂ from stationary (industrial) sources into products with significant commercial value; like polymers, biofuels or reactants for various chemical synthesis. The recycling of any of these products would be an endothermic process as CO₂ is thermodynamically very stable which would necessitate sources of energy like solar or other renewable energy sources. CCU could be an economically viable solution to Carbon Capture and Storage (CCS) as CCS involves permanent storage of CO₂ mostly in underground geological formations which has no direct commercial gain associated. Here, we will review the various technologies used for CCU, their impact in reduction of atmospheric CO₂ and their commercial viabilities.

Keywords— Carbon Capture; Biofuels; Algal Biomass;

WASTE TO ENERGY: ALGAE TO BIOFUEL

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Abstract: There is global increase in energy demand due to increase in population, advanced technology and economic growth is resulting in the decline of stock of fossil fuels. Therefore, we need to find an alternative source of fuel. There are many alternatives, one among them is algae. Excess phosphorus (P) and nitrogen (N₂) content in water promotes algae growth. Algae growth is harmful for humans as well as aquatic life, as they divide rapidly hence, producing toxins and pungent smell. Thus, algae are biological waste. As every coin has two sides so have algae. Along with demerits it also has merits. Algae based biofuel is non-toxic, does not require fresh water, is sustainable and biodegradable and does not use cultivable land. Eutrophication, which was considered as a matter of concern, has now become a great boon as it provides a lot of algal growth in production of biofuel. For production of biofuel algae is allowed to grow in man-made ponds. Algae inhales carbon dioxide, so we need not supply CO₂ externally, but algae takes up CO₂ which is released into atmosphere as a result of combustion of fossil fuels. Algae convert sunlight to energy and store the energy in the form of oil which contains 80% hydrocarbons. By using appropriate methods biofuels are extracted by pressing and compressing algae due to which breakdown of cell structure of algae occurs. This can be done by using solvents. The production of biofuels involves enzymatic reactions also. The enzymatic reactions are less

contaminating and seem to produce higher yield of biofuel as compared to chemical reactions. After oil is extracted, it is processed at an integrated biorefinery which gives biofuels like biodiesel, biogas. As per estimated values, algae give 2000-5000 gallons of biofuel per acre. It helps in reducing the effect of greenhouse gases, hence reducing global warming. As a result, it reduces pollution, is a renewable and sustainable source of energy.

Keywords— Biological waste, Biofuel, Eutrophication Enzymatic reactions, Biorefinery, Renewable.

CONVERSION OF WASTE PLASTIC TO FUEL: PYROLYSIS

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Abstract: Over 1.3 billion metric ton of plastic is being manufactured every year to meet the demands of modern world. Plastic is made by polymerization of hydrocarbons. These hydrocarbon are of typically high molecular mass and may contain some other additives to enhance the capabilities of the final product. Plastic is an important material which is strong, durable, and cheap and has numerous other properties. Disposal of waste plastic is of great concern for everybody as it takes decades to decompose if left at its own. On the other hand, continuous increase in industrialization and urbanization has created measurable rise in the demand of fuels. Now a days it has become the need to seek the alternate energy sources in the place of conventional fuels. In this scenario, Conversion of plastics to fuel is a hope to solve both the problems. Pyrolysis is a process which involves thermochemical decomposition of organic matter at high temperature (>370°C) in the absence of oxygen. Products of this process are Pyrolysis Oil, Carbon Black, and Hydrocarbons. This review paper is focusing the most efficient and widely used method of converting plastics to fuels: ‘Pyrolysis’ and its effectiveness on resolving the both issues of waste plastic management and the requirement of good alternative fuel for use. Pyrolysis is a process of decomposing plastics by heating in absence of oxygen generating gaseous and liquids products which can be utilized as fuels. This process can be thermal or catalytic and is an alternative that allows the conversion of polymers into gas and liquid hydrocarbons. The plastic waste is processed to produce petrochemical compounds.

Keywords— Pyrolysis, Decomposition, Plastic Waste, Green Technology, Waste Management .

RENEWABLE ENERGY

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Abstract: The Poster Represent the Renewable energy resources and technology practice in world. It also represent energy scenario of the renewable energy resources and future progress in the world. By 2020 energy demand in the world will be double. Different renewable energy technology project have been started to facilitated an increase the use of renewable energy resources. Large application of the renewable energy has resulted in the significant improvement in energy security climate change and economical benefits. These posters include innovation techniques used now days like the utilization of the Biomass, Solar Energy etc. These Poster also include the innovation idea like solar car, solar power road etc. These Posters showing our innovation of solar car. Although these are the unlimited supply of the free energy, we should go for the renewable energy as it is safe, freely available and eco friendly.

Keywords— Solar Car; Solar Power Road; Overcome the effect of the Global Warning etc

ELECTROACTIVE POLYMER

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Abstract: Electro active polymers are a field of material that demonstrates large strain in response to electrical fields. These actuators closely emulate the stimulus response capacities of animal muscle and so are often referred to as artificial muscles. The development of highly electroactive polymer materials with actuation strains as high as 300% has sparked a wave of research and development into the capacities of EAP materials for various fields. A nonexhaustive list of potential EAP material applications includes biomimetics such as artificial muscles, active catheters, and biomimetic robots, tactile displays such as refreshable braille devices, and unmanned vehicles including aerial, underwater, and aerospace devices. EAP materials are largely classified into two categories: ionic and electric. Ionic EAP's involve the diffusion of ions, whereas electric EAP's are driven by an electric field. Examples of ionic EAP's include ionic polymer metal composites, carbon nanotubes, ionic polymer gels, conductive polymers, and electro rheological fluid. Electric EAP can be further divided into piezoelectric polymers, electrostrictive polymers, dielectric elastomers, liquid crystal elastomers, and ferroelectric polymers. The following paper thoroughly investigates the history, theory, and current and future applications for the aforementioned types of EAP's, and hypothesizes on the role this actuator technology could play in the future.

Keywords— Electric (EAP); Ionic (EAP); Non Ionic (EAP) ; Carbon nanotube actuator ; conductive polymer.

GRAPHENE: A FUTURE FILTER

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Abstract: Graphene is a two-dimensional, tightly packed layer of carbon atoms that bond together in a hexagonal honeycomb lattice:

At just one atom thick, graphene is both the thinnest compound and the lightest material known to man. Scientists have been aware of this material for a long time but were unable to find a way to extract it from graphite until 2004. That year, two researchers working at the University of Manchester – Professor Andre Geim and Professor Kostya Novoselov – made a significant breakthrough that had the potential to revolutionise every part of everyday life.

Graphene has some incredible qualities: it is around 200 times stronger than steel, it has unique levels of light absorption, it is the best-known conductor of electricity and the best-known conductor of heat at room temperature. Despite its incredible strength, graphene is also remarkably flexible: the bonds between its carbon atoms allow it to bend and stretch with enormous pliability. It is no wonder that scientists believe this abundant and low-cost miracle material could spark a graphene-led revolution with diverse applications ranging from protective coatings to spray on solar panels.

Graphene may not immediately seem like the perfect candidate as a water filter. Despite being just one atom thick, it would appear to be impervious to practically every liquid and gas. However, scientists have been working on the creation of a membrane that will allow water to filter through the graphene, removing impurities along the way.

Graphene oxide membranes have been shown in the laboratory to be effective at removing contaminants from water to an exceptional level. The research conducted on graphene membranes today is bringing the possibility of delivering clean, safe drinking water to millions in developing countries ever closer.

Due to the extraordinary properties of graphene it can be widely used for filtration of water as well as some organic compounds.

Keywords:-Membranes, Graphene, Absorption, Impurities, Filtration, Organic compounds.

WASTE HEAT RECOVERY IN CEMENT INDUSTRY

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Abstract: Growing India has a humongous demand for energy. And these energy demands come along with increasing carbon emissions with burning of fossil fuels. Solid waste generation in the country is increasing over the years due to changing lifestyle and consumerism resulting from rapid urbanisation and economic growth posing environmental threats. This paper attempts to focus on production of electrical energy from waste heat which is to be recovered from cement industries using AQI and WHRBs. We are also focusing on integration of solar energy in case of failure of the main source and also to reduce carbon emissions and lower the dependability on non-renewable energy resources and switching over to more cleaner, efficient and renewable energy resources.

Keywords— Waste heat energy, solar energy, renewable resources.

SOLID OXIDE FUEL CELL

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Abstract: The generation of energy by clean, efficient and environmental-friendly means is now one of the major challenges for engineers and scientists. Fuel cells convert chemical energy of a fuel gas directly into electrical work, and are efficient and environmentally clean, since no combustion is required.

Solid Oxide Fuel Cells (SOFCs) an oxide ion conducting electrolyte offer a clean, low- pollution technology to electrochemically generate electricity at high efficiencies. These fuel cells provide many advantages over traditional energy conversion system including high efficiency, reliability, modularity, fuel adaptability and very low level of NO_x and SO_x emission. This fuel cell has an application in cogeneration and residential application.

The benefit of this high temperature is that there is no need for any kind of catalysts to trigger/speed up the reaction. They are ideally facilitating high levels of carbon capture without substantial additional cost. The need of this type of power source in generating power for

satellites and space capsules, to powering fuel cell vehicles like automobiles, buses, or boats, to generating primary or emergency backup power for buildings.

Solid oxide fuel cells, focusing on the research, development, and commercialization of the technology because it is able to convert a wide variety of fuels and with such high efficiency which it converts it into electricity.

Keywords— Fuel cells; Electrolyte; Catalyst; Electrochemical; Combustion

**A FUEL CELL DIRECTED BY A SPLIT PH AND POWERED BY
PROPANOL OR GLYCEROL**

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Abstract: A fuel cell with a split PH value can be prepared by using a fuel stream which is mainly alkaline in nature containing NaOH and an alcohol (may be glycerol, 1-propanol or 2-propanol) along with an acidic oxidant stream having H₂SO₄ and 3% H₂O₂. The electrodes were palladium black anode and Pt. black or carbon black cathode which are separated by a cation exchange membrane with Na⁺ ions. The split PH environment improves the capability of fuel cell by creating a large potential difference between the electrodes.

When the fuel cell is constructed with carbon black cathode the maximum power densities observed were 115mW/cm² for 1-propanol, 105 for glycerol and 101 for 2-propanol. When the cathode is of platinum black material the power densities were observed as 275 mW/cm² for glycerol, 241 for 1-propanol and 228 for 2-propanol. Thus platinum can achieve higher power densities with these fuels.

Keywords— Alkaline-Acid Fuel Cell; Alkaline Fuel Cell; Cation Exchange Membrane; 1-Propanol; 2-Propanol

A NOVEL INTEGRATED APPROACH FOR THE ENHANCEMENT OF YIELD OF ETHANOL FROM SUGARCANE MOLASSES

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Abstract: Present study deals with an integrated approach for the production of ethanol from sugarcane molasses to fulfill the growing demand of Indian market of the fuel. The ratio of molasses to water was taken 1:3 (w/w) for the dilution. Initially the solution of molasses was treated with the help of ultrasonic cavitation (UC). Also, checked the synergic effect of UC+alkali and UC + Acid. It was observed that the glucose concentration in the molasses increases after UC treatment which means depolymerisation of polysaccharides of glucose occurs. Effect of ultrasonic cavitation was checked with UV spectroscopic analysis in terms of Total Reducing Sugar (TRS). pH was maintained in between 4.5-5.0 during fermentation using buffer solution. The outstanding enhancement in TRS in the pretreated molasses with UC+Acid is obtained up to 39% due to synergetic effects of integrated pretreatment process. It is helpful to reduce the fermentation time as well as increase in glucose concentration for the ethanol production. This would be breakthrough for the India as well as agricultural based countries to become self reliance for fuel.

Keywords:-Ethanol Production, Total Reducing Sugar, Sugarcane molasses, Ultrasonic cavitation, Novel Method.

COMPARATIVE ANALYSIS OF ON THE PRODUCTION OF OXALIC ACID FROM RICE HUSK AND COCOA

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Abstract: Comparative analysis of Oxalic Acid produced from rice husk and cocoa seed was carried out by nitric acid oxidation of carbohydrates in order to ascertain which waste sample produced better yield. The results obtained showed that HNO₃:H₂SO₄ ratio of 50:50 for rice husk sample gave a percentage of 48.0, 63.2 and 49.3 at temperature of 55°C, 75°C and 85°C respectively. At 60:40 acid ratios, the percentage yields were 47.8, 67.8 and 46.6 at three different temperatures respectively. At 80:20 ratios, were 44.6, 54.7 and 47.4 at temperatures of 55°C, 75°C and 85°C respectively. For cocoa seeds, a percentage of 50:50 acid ratio, the percentage yields were 44.6, 54.7 and 47.4 at temperatures of 55°C, 75°C and 85°C respectively. At 60:40 ratio, the percentage yields were 45, 54.8 and 46.4 at these three temperatures. At 80:20 acid ratio, the percentage yields were 47.6, 51.3, and 45.8 at the above stated temperatures. The variable ratio of 60:40 gave the maximum yield at the maximum temperature of 75°C for both samples. But in comparison, it was found that the oxalic acid produced from rice husk gave higher yield by 13% than that from cocoa seeds. The use of these raw materials to produce oxalic acid will minimize environmental pollution.

Keywords— Oxalic acid; Rice husk ; Cocoa seed ; acid oxidation.

MUNICIPAL SOLID WASTE MANAGEMENT AND ENERGY GENERATION

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Abstract: In a growing world, where the conventional form of energy are on the verge of rapid extinction as well as are contributing generously to global concerns like the greenhouse effect and global warming, there is need to innovate and employ alternate or nonconventional energy source has become crucial for existence of a future. Every month millions of tons of waste are produced. Either they become a part of landfill or dumped at specified place covering large area. This causes huge environmental impact on wildlife, ecosystem and human health. Keeping this in mind, many new waste treatment plants have come up and have developed new waste to generate energy from municipal solid waste (MSW). It can be clearly seen that massive amount

of garbage produced every day is burnt in the landfills which causes many significant impacts on environment. This paper presents a detail review about MSW management options, effect of MSW on environment, different methods of energy generation from MSW such as Anaerobic Digestion and Pyrolysis and its application in India.

Keywords-Greenhouse; Global warming; Energy source; MSW.

WASTE TO ENERGY: BIOHYDROGEN

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Abstract: Hydrogen produced through the action of living organisms is called as biohydrogen. This is a type of bio-fuel like bio- ethanol, bio-diesel, bio-gas Or bio oil.

1. There are three classes of biofuels-First generation (made from food crops) , second generation (made from non food crops or waste and third generation or advanced(made from microbes).
2. Biohydrogen is example of advanced or third generation bio-fuel.
3. The various methods for hydrogen production are dark fermentation, photo-fermentation, biophotolysis, plasmolysis, pyrolysis of biomass etc.
4. In advanced bio-fuel technologies, microbes are grown in special bioreactors and provided with energy and nutrients that they need including sunlight, waste organic material, co2 from air or conventional gas plants. As they grow microbes produces the bio-fuel .
5. Biohydrogen is the ultimate choice of energy carrier in future due to its superior qualities such as fewer greenhouse gases emission, high energy density (142 kJ/gram), and high energy conversion using a fuel cell. Production of biohydrogen from organic waste e.g. pineapple waste offers a simultaneous solution for renewable energy production and waste management.
6. Recently, biohydrogen production advances with improvement in co-culture system, replacement of costly substrates with utilization of organic waste (lignocellulosic and food waste) and industrial waste (crude glycerol , eggshells etc.). For example; crude glycerol produced from bio diesel industry as a byproduct has proven excellent source for biohydrogen production.
7. Biohydrogen is excellent method because as hydrogen is used n biohydrogen is easy to remove from reactor.

Advantages:

1. Bio hydrogen appears to be a promising biofuel in the future.
2. It has the potential to reduce the dependence of fossil fuels.
3. Bio hydrogen can be used in either internal combustion engines or fuel cells.
4. bio hydrogen is considered a longer-term option for the transport sector.

Keywords-Hydrogen production, dark fermentation, bio-fuel, primeval biomass, efficient method

CONVERTING INDUSTRIAL WASTE AND POLYETHYLENE TO BLEND OF CONSTRUCTING MATERIAL

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Abstract: Now a days the disposal of industrial waste and the polyethylene has become a bigger environmental issues. As this waste possess a huge threat to biotic and abiotic species. Normally these waste are dumped in grounds, incinerated or slightly modified to reuse. Dumping and incineration again possess threat to nature. The reuse again requires lot of energy input which again increases the

carbon emission. In our work we have presented a unique way of dealing with both the industrial waste

and polyethylene. We have acquire a nearby industrial waste which cost around Rs 5/ kg .Its constituent cannot be revealed as per the clause of industry.

To this industrial waste 100 gms we have added 20 gms of fined polyethylene. The mixture was heated to 140⁰C for 30 minutes it was observed that entire polyethylene got soluble in that industrial waste. Later this waste was treated with methanol as solvent, so has to remove odor of the mixture. Then the obtained mixture was odorless. Later this mixture was blended with concrete in various ratios to check the optimal ratio. We found that 35 % of industrial waste mixture and 65% Concrete it showed better results in durability and strength compare to the previous constructing mixture.

Keywords— Industrial waste, material reuse, energy, temperature

EFFECT OF MIXING ON BIOGAS PRODUCTION FROM CANTEEN WASTE

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Abstract: Day by day quantity of food waste is a goes on increasing, and the disposal of it is controversial, causing increased food prices and the resources required. Food waste makes up an estimated 8.4% by weight of municipal solid waste. The food waste includes uneaten food and

food preparation leftovers from residences, commercial establishments such as restaurants, institutional, industrial sources like school cafeteria, factory lunchrooms, etc. Food waste is a widely diverse feedstock for biogas production. The amount of biogas that can be generated from food waste is dependent on composition, pH and moisture content. Physical pre-treatment helps to reduce the

particle size of the material. This allows the microbes to have better access to the food and results in a faster overall process. Mixing in digester causes further increase in biogas production, by maintaining homogeneity in digester. In this work we added ammonia salt to adjust the pH of food waste and observed increased biogas production and stable process. At higher pH biogas production in mixed digester was higher than that of unmixed digester. Hence pre-treatment of food waste was very essential part for biogas production.

Keywords: Food Waste; Anaerobic Digestion; Mixing ;Biogas Production.

STUDY ON THE PYROLYSIS OF WASTE RICE STRAW

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Abstract: The recovery of value added products from the waste agricultural biomass is important concerning the efficient resource utilization and financially boosting the agricultural sector. The process of pyrolysis is one of the methods for effective conversion of the waste biomass to value added

products like bio-oil and char. The present study discusses the experimental pyrolysis of waste rice straw to recover the bio-oil and char. The rice straw consist of various component particularly, hemicelluloses, cellulose and lignin. The pyrolysis of rice straw has been reported at various applied vacuum in the range of 50 - 150 mm Hg. The vacuum was found to have the positive effect on the process of pyrolysis but it will be ineffective at certain applied vacuum. The maximum conversion of rice straw to bio-oil was observed as 30%. The possible method for liquid analysis is GCMS and C/H/N/S test and for solid analysis is surface area, pore volume.

Keywords: agricultural biomass, pyrolysis, rice straw, vacuum, bio-oil, char.

ANALYSIS AND DESIGN OF COOLING TOWER

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Jayesh Kamdi DYPIEMR, Akurdi

Abstract: The Cooling Tower is a heat rejection device that rejects waste heat to the atmosphere through the cooling of a water stream to a lower temperature. Cooling Towers are used in all heat producing industries. In our project we are going to design Induced Draft Cooling Tower, they are typically mounted with a fan at the top, which allows hot air out and pulls air throughout. The fills we are going to use very economic. Design and analysis of Induced Draft Cooling Tower is made with consideration of different mathematical aspects.

Keywords—Induced Draft Cooling Tower; Heat Rejection; Economic Design; Fills.

PRODUCTION OF FUEL FROM DIFFERENT TYPES OF PLASTIC BY PYROLYSIS PROCESS

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Abstract: Over 1.3 billion metric ton of plastic is being manufactured every year to meet the demands of modern world. Fast exhaustion of oil resources and increase in energy demand have focused the researchers to find alternate ways to produce high quality oils that could replace fossil fuels. The idea of waste to energy recovery is one of the promising techniques for managing the waste plastic. Waste plastics are attractive for energy conversion because of their high heat of combustion and bulk availability. Exponential rate of increase in plastic production happens in every year due to the wide range of plastic appliances in domestic as well as industrial purposes. The drastic increase in the plastics production naturally lead to large amount of plastic waste that endangers the environment because of their disposal problems. The conversion of plastic to high quality liquid oil through pyrolysis process is highly advisable as the oil produced has high calorific value than that of commercial fuel. This paper describes commonly used varieties of plastics and potential of pyrolysis process to produce fuel using them.

Keywords— plastic production; plastic waste; pyrolysis; Fuel production; Energy recovery.

FUEL CELL TECHNOLOGY

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Abstract: A fuel cell is an electrochemical cell that converts chemical energy of fuel into electricity through a pair of redox reaction. Fuel cell are different from most batteries in

requiring a continuous source of fuel to sustain the chemical reaction. Fuel cell can produce electricity continuously for as long as fuels are supplied. The first fuel cell was invented by Sir William Grove in 1838.

As the population rises, the need of energy is increasing day by day, the fuel cell can fulfil this increasing demand. We envision a future where industry can meet growing energy demand in an environmentally sustainable way. Fuel cells have a real potential to be an important part of the solution. Emissions from industries, motor vehicles, release nitrogen oxide, sulphur oxide and carbon dioxide into environment. All of these can affect human health and ecosystem. So, if we use fuel cell it will reduce the pollution. New innovations in this technology can help for economic development and job growth for people.

Fuel cells are classified by the type of electrolyte they used. They are as Alkaline fuel cell, Solid oxide fuel cell, Molten carbonate fuel cell, Phosphoric acid fuel cell, Proton-exchange membrane fuel cell.

The fuel cell consists of two electrodes where the reaction takes place, one is positively charged called anode and the negatively charged called cathode. Every fuel cell comprises of an electrolyte and catalyst to fasten the rate of reaction and to mobilize the ions from one electrode to another.

The advantages of using fuel cells are high efficiency, good reliability, silent operation, environment

beneficial (greatly reduces CO₂ and harmful pollutant emission), fuel cell is significantly lighter, does work of combustion engine and battery, H₂-O₂ fuel cell produce drinking water of potable quantity, low maintenance cost.

The disadvantages of fuel cells are expensive to manufacture due to high cost of catalysts, require a constant fuel supply, fuel cells generate direct current, while industries and home appliances rely on alternating current.

Fuel cells have been used in many applications. Fuel cells are used for primary and backup power for commercial, industrial, residential building and in remote or inaccessible areas. They are also used to power fuel cell vehicles including forklifts, automobiles, buses, boats, motorcycles and submarines.

Keywords – Need; types; advantages; disadvantages; applications

T MEMBRANE DISTILLATION REVIEW AND IMPLEMENTATION

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Abstract: In many of the process industries, the different separation technologies are used, in many of that Distillation, Evaporation, Drying, Extraction, Absorption, Adsorption, Crystallization, and physical property-based operations. As per study the distillation, evaporation etc. are highly energy consuming. Membrane distillation (MD) is a recent and unique separation technology used in the process industry Membrane Distillation (MD) is a membrane-based operation able to give 100% theoretical ions rejection and to efficiently work with high concentrated brines. Both features make

MD of interest for the purification of wastewater, the production of ultra-pure water and the concentration of brines produced in desalination. The process of separation in MD involves the simultaneous heat and mass transfer through a hydrophobic semi permeable membrane, using thermal energy. MD utilises low grade or alternative energy, solar energy, geothermal energy, etc., as a source and is the most cost effective separation technology. Hence the process has come to acquire the attention and interest of researchers, experimentalists and theoreticians all over the world. This article is a comprehensive review of the prominent research in the field of MD technology, including its basic principle, MD configurations, area of applications, membrane characteristics and modules, experimental studies involving the effect of main operating parameters, MD energy and economic, fouling and long-term performance.

Keywords—Membrane distillation; Wastewater treatment; MD configurations; Membrane characteristics.

EXTRACTION OF AZADIRACHTIN FROM NEEM SEEDS

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Abstract: Botanical Insecticides are on the rise nowadays owing to the factors such as increasing sustainable agricultural practices, environment and health hazards arising due to excessive usage of their synthetic substitutes. India being an agricultural economy is in dire need of such potential green substitutes. Azadirachtin (C₃₅H₄₄O₁₆), a tetranortriterpenoidal compound, obtained from the neem tree (Azadirachta Indica) perfectly fills in the gap as a potential bio-insecticides; possessing anti-feedant, growth disrupting and larvicidal properties against an array of agricultural insects' pests. Firstly we use Ultrasonic sonicator for proper mixing purpose. In these batch there is 20gm Neem Seeds powder and 80ml methanol and time duration is 1 hr. Then that 100ml mixture we make up 400ml in round bottom flask and extraction is there. Extraction by convectional method multi solvent (methanol, n-hexane, ethyl acetate) usage was done for reference purpose. The present study deals with applying the best possible extraction technique and for that we use sonicator to break bonds between neem seeds powder for proper mixing to get yield of product.

Keywords: Azadirachtin; Soxhlet Apparatus; Sonicator Apparatus; Neem seeds.

BIOREMEDIATION OF COPPER METAL AND ELECTRICITY GENERATION USING SINGLE CHAMBER MICROBIAL FUEL CELL

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Abstract: It necessitates the removal of copper as its biological toxicity, large volume and solubility leads to groundwater pollution. Effective and environment gracious methods needed to alleviate the problem. In this work, Microbial abiotic and cathodic Cu²⁺ removal using microbial fuel cell (MFC) was performed; effectively removal of the Cu²⁺ from synthetic copper solution

with cogeneration of electricity and catholyte. The study revealed the 96.5 % COD reduction for glucose as substrate with set 4 (50 mg/L Cu²⁺). The maximum power density obtained was 17.3 W/m³. The maximum 0.793 V open circuit potential (OCP) was generated at 50 mg/L Cu²⁺ concentration with 95.80% Cu²⁺ removal as compare to 91.88% for 10 mg/L Cu²⁺ concentration and 93.02 % for 30 mg/L Cu²⁺ concentration.

The 13.7 ml of catholyte was obtained with 50 mg/L Cu²⁺ due to osmotic and electro-osmotic drag. The study shows the new approach of abiotic and cathodic Cu²⁺ reduction using MFC with unswerving electricity generation.

Keywords: A biotic Cu²⁺ reduction; Cathodic Cu²⁺ reduction; Microbial fuel cell; Catholyte.

EXTRACTION OF ANTHOCYANIN FROM PUNICA GRANATUM PEELS

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Abstract: Punicagranatum better known as Pomegranates fruits have innumerable health benefits and its implication in diseases cure have been widely recognized since ancient time. Moreover, pomegranate fruit, seeds and peels are intensively used in traditional medicine as a natural therapy. It contains numerous valuable ingredients like Anthocyanin, Ellagitannin, Punicalagin, Ellagic acid, vitamins, minerals, flavonoids. The principal constituents including Punicalagins , Anthocyanin are responsible for innumerable health benefits due to strong antioxidant activity. Additionally, constituents of pomegranate show health promoting effect trough the modulation of physiological and biochemical pathways. Recent evidences suggested that pomegranates fruits peels illustrate therapeutic

implications in health management via inhibition of modulation of enzymes. General sources of Anthocyanin are red skinned grapes, apples, pears, etc. but this is to overcome the conventional sources and obtain best from waste. The project is based on extraction and separation of Anthocyanin and other by products . It basically consists of 2 methods i.e. Vessel method and SoxhletAppratus method. We are mainly interested in getting the maximum yield from either of the two methods mentioned above. Extraction of Anthocyanin is the major motive as it serves as a major component of pharmaceuticals and cosmetic industry.

Keywords: Anthocyanin;flavonoid ;therapeutic; extraction; anti-oxidant

ACIDIC LEACHING FOR SELECTIVE REMOVAL OF PHOSPHORUS FROM IRON ORE

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Abstract:The present paper deals with the hydrometallurgical method for the removal of phosphorus from iron ore. The phosphorus content ($\approx 1\%$) of an iron ore is removed ($>95\%$) by leaching the ore with nitric acid. The iron loss is less than 0.05% while the alkali metal content is

greatly reduced by 60%. The quality of the ore, as a sinter feed, has been slightly improved upon leaching. The characteristics of the percolation leaching operation by nitric acid solutions (2-8 M) were also observed. The leaching kinetics has also been considered. It is shown that the principal reaction of apatite dissolution is first order with respect to hydrogen ions and is step-limited by diffusion. The dissolution of iron is found to be sensitive, more than that of the phosphorus, to the initial acidity of leach solutions. The variation of the flow velocity has a similar effect on the dissolution of both phosphorus and iron. An overall leach-rate equation is established, and the phosphorus content is been lowered as per requirement.

Keywords: Iron Ore ;Hydrometallurgical method ; Phosphorus.

REVIEW: EXTRACTION OF AMMONIA FROM WASTEWATER & USING IT AS A CARBON FREE FUEL

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Abstract:Due to global warming and ozone depletion there is an urge to stop carbon dioxide emissions. Also the fossil fuel reservoirs are decreasing day by day. Other energy sources such as solar energy, nuclear energy and electrical energy cannot support the supply for ever increasing energy demand. So the only option to find out an alternative carbon free Fuel. Ammonia can be used as a carbon free Fuel. At normal and medium temperatures combustion of ammonia produces nitrogen and water. But at high temperatures the fuel ammonia produces nitrogen oxides which are also harmful. It is found that if CuO_x & $3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$ used as a catalyst ammonia combusts without producing NO_x at high temperatures as well. But the present process of production of ammonia releases large amount of CO_2

into the atmosphere. So we need to find out alternative methods to produce ammonia. The wastewater contains many nitrogen compounds along with ammonia. We can extract ammonia from urine and wastewater using polytetrafluoroethylene (PTFE) membranes. It is found that extraction from urine gives 67% efficiency. This is how ammonia is collected from wastewater and further in the presence of catalyst used as a fuel to produce power.

Keywords—Ammonia; CuO_x & $3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$; PTFE membranes; wastewater; NO_x .

**SOLAR DISTILL WATER–AS A FEED STOCK TO
INDUSTRIAL BOILER’S**

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Abstract: There is an important need for clean, pure drinking water in many developing countries. Often water sources are brackish (i.e. contain dissolved salts) and/or contain harmful bacteria and therefore cannot be used for drinking. In addition, there are many coastal locations where seawater is abundant but potable water is not available. Pure water is also useful for batteries

and in hospitals or schools. Distillation is one of many processes that can be used for water purification.

This requires an energy input, as heat, solar radiation can be the source of energy. In this process, water is evaporated, thus separating water vapour from dissolved matter, which is condensed as pure water. For people concerned about the quality of their municipally-supplied drinking water and unhappy with other methods of additional purification available to them, solar distillation of tap water or brackish groundwater can be a pleasant, energy-efficient option. This water can be used for many purposes. One of its industrial applications is, "Distilled water is used as a feed stock for Industrial Boilers."

Keyword's :-Drinking Water; Harmful Bacteria; Seawater is Abundant; Water Purification ; Solar distillation

**STUDY ON DETECTION OF ADULTERANTS IN MILK IN COST EFFICIENT
METHOD IN HOME- TESTING KITS**

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Abstract: One of the most commonly consumed foods in almost every household in the country as well as around the world is milk. Its nutritional values as well as culinary variability makes its way into the diet of children and adults alike, in one way or another. Due to the deficit of milk or the cupidity of producers, milk is often adulterated in processing by addition of water, sugar, and harmful substances like starch, urea, sodium bicarbonate, detergents etc.

To avoid the hazardous health effects of these adulterants, one must be able to detect their presence in the milk. The devices that do the same currently available in the market are expensive and hence not accessible. This project focuses on cost efficient method to detect some common adulterants in milk like starch, urea and sodium bicarbonate by using the principle of TLC (Thin Layer Chromatography). By developing a kit which provides easy- to- use instruments and instructions which can be followed along by a layman and test the milk they consume. At the current stage of development of this kit, we have synthesized our results using petroleum ether + ethyl acetate (8.5:1.5) as eluent. Our kit consists of a solution chamber, an iodine chamber, TLC plates, capillary tubes, and eluents.

This project can not only be used on an individual level but also at a community level where a smaller number of milk supplier are present.

Keywords: Milk adulterants; TLC; cost-efficiency.

PRODUCTION OF BIOHYDROGEN FROM MICRO-ORGANISMS

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Abstract: Bio-hydrogen is H₂ that is produce biologically. Interest is high in this technology beacuse H₂ is a clean fuel and can be readily produced from certain kinds of biomass. Many challenges characterize this technology, including those intrinsic to H₂, such as storage and transportation of a non- condensable gas. Hydrogen producing organisms are poisoned by O₂. Yield of H₂ are often low. It produces valuable metabolites as a butyric acid, propionic acid. Hydrogen is combustibile and 1 gm of combustion provides 30,000 calories.

It is an anaerobic processes so no oxygen limitation. It can produce carbon during day and night relatively lower achievable yield of H₂, as a portion of substrate is used to produce organic acids.

Anaerobes are incapable of further breakdown of acids. It can be produced by electrolysis, steam-methane reforming process, biological process (bio-hydrogen)

CLEANER PRODUCTION APPROACH AT CARBON GRADING INDUSTRY

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Abstract: United Nations Environment Programme (UNEP) defines Cleaner Production as the continuous, application of an integrated preventive environmental strategy applied to processes, products and services in order to increase efficiency and reduce risks to humans and the environment. Carbon powder grading industry is differentiating the carbon powder in their grade and processing the grinding carbon powder. During the last two to three decades, treatment with active carbon become an important unit process of separation and purifications in the food, pharmaceuticals, sugar, chemical removal of color or odor, oxidizing chemicals, compound responsible for foaming, metallic icon which constitute impurity and invisible impurities. In this study the aim was to implement CP in carbon grading industry processing having capacity of 120 tons/month. The major focus was given on the equipment which was processing the carbon as it was the one emitting maximum pollution in terms of repairable suspended particulate matter and causing health effects to workers. There was also a loss of nearly 15% of raw materials. Implementing CP at site not only modified the equipment but also reduced the loss to 5% and saved 10,08,000 rupees annually.

Keywords: Cleaner Production; Activated Carbon, Grading Industry, Suspended Particulate mater

ACTIVATED CHARCOAL FROM BIOMASS OF PALM TREE

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Abstract: Palm tree a plant from Perennial family. This plant is abundant in coast line and commonly used as decorative plant. The palm is cultivated in aid and semi- arid regions which are characterized

by long and hot summers, no (or at most low) rainfall and very low humidity level during the

ripping period. Exceptional high temperature is well endured by a date palm for several days under irrigation.

The biomass of this plant is burn openly which causes environmental pollution. A solution for this situation is to recycle the biomass for the production of activated charcoal. Activated charcoal has various applications in industrial and residential uses which includes purification of drinking water. It is used for removing suspended impurities from ground and municipal water. Activated charcoal is also used for the purification of chemicals and gases and as decolorizing agent in sugar industry. In the present study charcoal is produced by using biomass of palm tree and activated using calcium chloride. The amount of carbon present in charcoal is determined by proximate analyses. In this analysis we get following results

Proximate Analysis	Charcoal	Activated Charcoal
Fix carbon %	19.69 %	71.86 %
Ash %	6 %	10.23 %
Volatile Matter %	59.87 %	16.23 %
Moisture Content %	14.46 %	1.59 %

The results show great variation after activation of charcoal. The noticeable elevation occurs in fix carbon and ash, Also there is great depletion in volatile matter and moisture content. The effect of calcium chloride as an activation agent was observed quite good.

Keywords— Palm tree; Activated Charcoal; Proximate analysis; Activation; Calcium Chloride.

POLLUTION ABSORBING MATERIALS

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Abstract – The purpose of this paper is to bring intolight various pollution absorbing materials so as to minimize health risks due to air pollution by maximum use of these materials. The World Health Organisation states that 2.4 million people die each year from causes directly attributable to air pollution. Global populations suffer immensely from respiratory diseases, skin diseases, eye-infections, etc. due to primary and secondary pollutants present in air. These pollutants include hydrocarbons, Nitrogen oxides, Carbon mono and dioxides, Sulphur oxides which are a result of vehicular traffic, industrial emissions etc. The materials studied in this paper help reduce these pollutants from air thus, improving the quality of air. The various pollution absorbing materials included in this paper are Activated Carbon, Sodium alginate & Silica fume compound, 3D printed Titanium dioxide material, bio-material hemp fiber, liquid Lithium carbonate, etc. The paper includes introduction, importance, synthesis, fabrication and assembly, outcomes, efficiency and potential applications of these materials. These materials are utilized in form of building materials, cement, paints, etc. Apart from reducing pollutant levels from air, these materials have many benefits. For example, the liquid Lithium carbonate

compound mentioned above removes Carbon dioxide from the atmosphere – and produces something valuable at the same time. It produces a by-product called Carbon nanofibers which are very important composites and also very expensive. A ton of carbon nanofibers are worth \$25,000. Also, the paper emphasizes on indoor pollution which includes its introduction, causes, effects and how these materials help reduce indoor air pollution.

Keywords- Eco-friendly, Carbon nanofibers, Indoor pollution, Smart materials

SAVING THE PLANET ONE BITE AT A TIME

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Abstract: Many researchers, engineers and are expressing deep concerns about changes in the overall climate of the planet. Fossil fuels are being continuously used to produce electricity. The burning of these fuels produces gases like carbon dioxide, methane and nitrous oxides which lead to global warming. Deforestation is also leading to warmer temperatures. The hazard of global warming is continuously causing major damage to the Earth's environment. Most people are still unaware of global warming and do not consider it to be a big problem in years to come. What most people do not understand is that global warming is currently happening, and we are already experiencing some of its withering effects like burning of Amazon forest, flood and many more.

The presentation introduces global warming, elaborates its causes and hazards and presents some solutions to solve this hot issue. Above all, alternative energy sources (solar, wind, hydro, geothermal, bio mass) need to be seriously pursued. Finding and using renewable sources of energy is one of the methods to combat the ever increasing global warming effectively.

To sum up, the presentation has attempted to illustrate one approach for developing adaptation strategies to global climate change in the regional context, despite the uncertainties of predicted.

Keywords- Carbon dioxide, greenhouse gas, emissions, weather vs climate, Global warming vs Human beings

A NOVEL INTEGRATED APPROACH FOR THE ENHANCEMENT OF YIELD OF ETHANOL FROM SUGARCANE MOLASSES

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Abstract: Present study deals with an integrated approach for the production of ethanol from sugarcane molasses to fulfill the growing demand of Indian market of the fuel. The ratio of molasses to water was taken 1:3 (w/w) for the dilution. Initially the solution of molasses was treated with the help of ultrasonic cavitation (UC). Also, checked the synergic effect of UC+alkali and UC + Acid. It was observed that the glucose concentration in the molasses increases after UC treatment which means depolymerisation of polysaccharides of glucose occurs. Effect of ultrasonic cavitation was checked with UV spectroscopic analysis in terms of Total Reducing Sugar (TRS). pH was maintained in between 4.5-5.0 during fermentation using buffer solution. The outstanding enhancement in TRS in the pretreated molasses with UC+Acid is obtained up to 39% due to synergetic effects of integrated pretreatment process. It is helpful to reduce the fermentation time as well as increase in glucose concentration for the ethanol production. This would be breakthrough for the India as well as

agricultural based countries to become self reliance for fuel.

Keywords: Ethanol Production, Total Reducing Sugar, Sugarcane molasses, Ultrasonic cavitation, Novel Method.

WASTE-TO-ENERGY

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Abstract : Municipal solid waste (MSW) management is one of the major problems in almost all major cities all over the world. A variety of technologies have been employed to manage the problem of solid waste as well as the conversion of waste to clean energy. The constant rise in world's population invariably gives rise to more waste production as well as rise in energy demand which places a strain on already existing energy resources like fossil. Waste in the 21 century is no more seen as waste as it were but a resource which can be transformed into variable forms and use like energy. Therefore waste multi-reused and conversion should be given priority in developing countries, for a better solution of waste control and management. This will not only reduce the ecological and environmental damage caused by pollution, but also reduce the energy demand and consumption. Thus save primary energy. MSW can be converted into valuable energy source using waste to energy (WTE) technologies such as Pyrolysis, incineration and thermal depolymerization. It is expected that various aspects of sustainability related to energy and waste treatment can be improved.

The paper introduces various WTE technologies and applications in terms of sustainable urban energy development and MSW treatment.

Keywords: Municipal solid waste (MSW), Waste to energy, Environment, Conversion, Pyrolysis.

RECLAMATION OF WASTE FOUNDRY SAND USING ORTHOPHOSPHORIC ACID.

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Abstract: India ranks second in the World for casting productions with annual production of 11.35 million tons. There are 5000 foundries across the country which consume a huge amount of sand for making molds. When molten metal is poured into the mold it deactivates the binders and leading to formation of undesired brittle coating on sand surface which makes it unfit for further molding operations. The waste sand is usually dumped in isolated places or creating sand hills which are a threat to environment and human health. Also, the government regulations on environment and pollution control are becoming strict day by day. Therefore, there is an urgent need to reclaim waste sand and make foundry operations economical. The reclaimed sand will reduce environmental and health issues and also increase the economy of foundries. This discusses the chemical reclamation method for waste foundry sand. The aim of this study is to remove deactivated binder from sand grains using orthophosphoric acid and make it liable for reuse. Several types of sand were used for this purpose and thereafter analysed through standard Indian foundry tests, to check the suitability of reclaimed sand. Chemical reclamation successfully brought down the clay content at higher operating cost. However, the reclaimed sand cost using industrial effluent was found to be lower than

orthophosphoric acid.

Keywords: Reclamation, binders, foundries, casting, total clay

AN OVERVIEW OF THE ADVANCED SEPARATION PROCESSES INVOLVED IN AN INDUSTRY

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Abstract: A separation process is a method which converts mixture or solution of chemical substances into two or more distinct product mixtures. In some cases a separation may fully divide the mixture into pure constituents of a mixture. The separation processes involved adsorption, centrifugation, chelation, chromatography, electrophoresis, extraction, floatation, etc. which are commonly used in separation of two phase components or a uniform mixture into two different components.

However recent advancement in separation processes includes multi-component distillation, absorption, solvent extraction, membrane technology, ion exchange, adsorption, etc. which provides a modified option for efficiently separating the fluid mixtures. This advanced separation processes provides a key alternative to obtain an efficient product and to achieve a higher

efficiency.

Keywords:-Separation Processes, Ion-Exchange Process, Phase Separation, Efficient Separation, Solvent Extraction

RENEWABLE ENERGY (HYDROPOWER)

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Abstract: Renewable energy is the energy which is collected from Renewable sources, which are naturally replenished on a human such as sunlight, wind, Tides, waves geothermal etc. As per current scenario research into an alternative for energy production is one of the most important priorities due to ever increasing pollution and concern of climate change, Renewable energy generation can be considered as an best alternative for anergy production. Nowadays, increase in population and industrialization result in more power requirement we want to generate a large amount electricity or power. The power generation through non-renewable sources result in more consumption of fuel, due to large consumption of fuel will effect the exhaustance of fuel. The non-renewable energy sources emit a variety of pollutant that effect people's health and the environment. It also increase the amount of greenhouse gas emissions. Renewable energy generation can be considered as an best alternative for

energy production. Many renewable sources are available, the Renewable sources for power generation are Hydropower energy, solar energy, wind energy, Tidel energy and geothermal. The Renewable energy are the efficient as compare to non-renewable as they saves money, the sources are environment friendly etc. From the above sources of renewable energy, the hydropower plant is one of efficient source of energy. Hydropower refers to the conversion of energy from flowing water into electricity. The advantage of hydropower plants are once a dam is constructed, electricity can be produced at constant rate. Hydropower generat electricity or power without reducing the waters quantity, it is more economical. Hydropower is the largest contributor of all renewable energy sources and for 6.7% of worldwide electricity production. Hydropower is an abundant, low cost source of power (where applicable), despite high upfront buidling costs. It is also a flexible and reliable source of electricity compared to other renewable options, as it may be stored for use at a later time.

Keywords:Renewable energy, Hydropower energy and advantages of Hydropower energy.

INTENSIFIED PHOTO CATALYTIC TREATMENT OF PESTICIDE WASTEWATER USING COMBINED OXIDATION APPROACHES

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Abstract: Flonicamide insecticide is vitally important to increasing and protecting the growth and quality of agricultural crops. Due to the excess use of pesticide their application cause adverse effect to environment and human health and its concentration is increased in soil and waters. To eliminate these problems remediation of contaminated sites and the treatment of pesticide residues are required. The conventional water treatment methods, mostly relying on physical and biological processes, seem to be inadequate for effective removal of pesticides, while advanced oxidation processes showed a good performance for the same purpose. In the present work we investigated the photocatalysis oxidation of aqueous pesticide solution at 365 nm. In this study we optimize and investigate the effect of operating conditions such as pH, reaction time, initial concentration, catalyst loading with addition of heterogeneous photocatalyst. It has been observed that the effect of UV light with photocatalyst (TiO₂) given maximum rate of degradation in terms of COD reduction. The photo oxidation process follows first order degradation rate kinetics.

Keywords: Flonicamide, Photocatalysis, COD reduction, TiO₂.

STUDY ON FAULT TOLERANCE FOR SOFTWARE DEFINED NETWORKING IN SMART GRID

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Abstract: A smart grid system is a self-sufficient electricity network system based on digital automation technology for monitoring, control, and analysis within the supply chain. Smart Grid contains of different digital operator including smart meter, smart appliances, power control, etc. It is an electrical grid which helps in utilities conserve energy, reduce costs and increase reliability as well as transparency. The vital part of Smart Grid is designed for reliability data transmission, a fault tolerant network system. In this paper, we render a brief summary of a mechanism for improvement in resilience of energy communication network. To accomplish this we apply software defined network (SDN) concept to Smart Grid, advantages of implementing SDN and how it guarantee high resilience for network failure.

Keywords— Software Defined Network; Smart Grid; Resilience

ELECTROCHEMICAL CELL SYSTEM CONVERTING WASTE CO₂ TO ELECTRICITY

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Abstract: The world has reached such an extremity that there lies an urgent need to develop a cost-effective and an efficient method of carbon sequestration and utilization to control carbon emission and mitigate climate change. A shift to renewable sources of energy is required to minimize our dependability on fossil fuels for power generation. Hence, the use of carbon dioxide to generate power will stand out being a sustainable solution to reduce carbon footprint in the atmosphere. O₂ assisted Al/CO₂ electrochemical cell has been used for the generation of electricity by utilizing CO₂. The electrolytic cell consists of monoethanolamine (MEA), an organic electrolyte, Al as anode and stainless steel mesh having mixture of CO₂ and O₂ as cathode, which completes the electrolytic circuit to electrochemically generate a useful carbon species (C₂) and a substantial amount of electricity. The mechanism for the electrolyte reaction results in the formation of zwitterion which ultimately leads to the production of a carboxylate and carbamate ion while also generating electricity at an energy density of approximately 4.5 mW/m². The electrolyte used MEA is preferred over 1-Ethyl 3-Methylimidazolium Chloride ([EMIm]Cl /AlCl₃) and water as an electrolyte as it is a viable option for industrial operations considering that a 99.5% pure MEA costs approximately ₹110/kg and it produces relatively high energy density. The reason behind using Aluminium lies in its low reactivity, high availability and high specific energy (2980 A.hour/kg) making it highly suitable for converting CO₂ to electricity. Power generating stations, according to the statistical data, produce twelve billion tonnes of carbon dioxide every year. Thus, this technique, if applied, would provide industries their own electricity which will help to reduce harmful carbon from the atmosphere and ultimately cut their costs too. Today, when the balance of nature is under stress and its dynamic equilibrium is being disturbed, this technique will help generations thrive and survive.

Keywords: Carbon dioxide conversion; Carbon footprints; Electrochemical cell; Monoethanolamine; Power generation.

WASTE TO ENERGY: ALGAE TO BIOFUEL

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Abstract: There is global increase in energy demand due to increase in population, advanced technology and economic growth is resulting in the decline of stock of fossil fuels. Therefore, we need to find an alternative source of fuel. There are many alternatives, one among them is algae. Excess phosphorus (P) and nitrogen (N₂) content in water promotes algae growth. Algae growth is harmful for humans as well as aquatic life, as they divide rapidly hence, producing toxins and pungent smell. Thus, algae are biological waste. As every coin has two sides so have algae. Along with demerits it also has merits. Algae based biofuel is non-toxic, does not require fresh water, is sustainable and biodegradable and does not use cultivable land. Eutrophication, which was considered as a matter of concern, has now become a great boon as it provides a lot of algal growth in production of biofuel. For production of biofuel algae is allowed to grow in man-made ponds. Algae inhales carbon dioxide, so we need not supply CO₂ externally, but algae takes up CO₂ which is released into atmosphere as a result of combustion of fossil fuels. Algae convert sunlight to energy and store the energy in the form of oil which contains 80% hydrocarbons. By using appropriate methods biofuels are extracted by pressing and compressing algae due to which breakdown of cell structure of algae occurs. This can be done by using solvents. The production of biofuels involves enzymatic reactions also. The enzymatic reactions are less contaminating and seem to produce higher yield of biofuel as compared to chemical reactions. After oil is extracted, it is processed at an integrated biorefinery which gives biofuels like biodiesel, biogas. As per estimated values, algae give 2000-5000 gallons of biofuel per acre. It helps in reducing the effect of greenhouse gases, hence reducing global warming. As a result, it reduces pollution, is a renewable and sustainable source of energy.

Keywords: Biological waste, Biofuel, Eutrophication Enzymatic reactions, Biorefinery, Renewable.

BIODEGRADATION OF PET USING BIOTECHNOLOGY

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Abstract: Polyethylene terephthalate (PET), a strong, a stiff synthetic fibre & resin, & a member of polyester family of polymers. PET is produced by the polymerization of ethylene glycol & terephthalic acid. When heated together under the influence of chemical catalysts, ethylene glycol & terephthalic acid produce PET in the form of molten, viscous mass. Molten PET can be blow molten into

transparent containers of high strength & rigidity that are virtually impermeable to gas & liquid. In this form PET has become widely used in carbonated beverages bottles & in jars for food process at low temperature. When collected in a suitably pure state, PET can be recycled into its original use. Issues with PET: Due to rapid industrialization and large-scale anthropogenic activities, the pollution level is increasing at a rapid rate, which is a major concern. Plastic kitchen wares are made of completely recyclable polyethylene terephthalate (PET) plastics, but PETs don't biodegrade they photodegrade, which means they break down into smaller fragments over time. PET can be recycled but upto what extent? PET can be recycled once, twice or thrice but after that it loses its characteristics and at last turns into a non-recyclable plastic. PET is subjected to various types of degradations during processing. The main degradations that can occur are hydrolytic, and probably most important, thermal oxidation. When PET degrades, several things happen: discoloration, chain scissions resulting in reduced molecular weight, formation of acetaldehyde, and cross-links. Those fragments absorb toxins that pollute the food items & waterways, etc. It's harder to recycle plastic wares than we think. Of the mass numbers of plastic consumed throughout the world, most of them are not recycled because only certain types of plastic kitchen wares and other things made up of PET plastic can be recycled by certain municipalities. They either end up lying stagnant in dump yards or leaching dangerous chemicals into the ground still take more than a human lifetime to decompose. It gets worse. In the case of bottled water, the plastic-making process requires over two gallons of water for the purification process of every gallon of water. This becomes a problem when the optical requirements of the polymer are very high, such as in packaging applications. The thermal and thermo oxidative degradation results in poor processibility characteristics and performance of the material. But there is a method by which we can eradicate plastic into biodegradable material via bacteria which converts plastic again into terephthalic acid and ethylene glycol thus again biodegradable. This bacteria colonize & break PET. If this method is upgraded and applied in a better way then it can help to reduce this plastic pollution by some extent.

Keywords: PET; Thermal oxidation; polymer; recycle; biodegradable;

BIODEGRADABLE PLASTIC FILM FROM STARCH

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Abstract: Our whole world seems to be wrapped in plastic. Synthetic plastics are manufactured from non-renewable resources, which will get depleted in near future. Synthetic plastic wastes are polluting the soil, water and air. There is a need of reducing the pollution, this can be achieved by biodegradable plastics. Biodegradable plastics are those plastic when disposed into biologically active environment are converted into smaller molecule that are not harmful to environment. Biodegradable plastic is produced using the mixture of corn starch, glycerol, vinegar and water. The process mainly consists of the conversion of raw corn to starch. Followed

by forming biodegradable plastic film by using Two Screen Process. For checking degradability of it we took three tests as follows. Enzymatic test

confirms enzymes increase the rate of degradation. By Soil burial test we can conclude that the prepared plastic film can be degraded in regular soil as well as compost soil. From water dissolution test we can state that the films get degraded not only in distilled water but also in sea water. Here we have mainly studied the biodegradability of the plastic film in soil for 15 days as well as in water for 2 days. Further research in this area can surely result in a better environment as we can change scenario of plastic waste management to a large extent. Starch based biodegradable plastics are degraded by enzymes so, we require less energy and various kind of pollutions are also decreased, hence biodegradable plastics are environment friendly.

Keywords—Biodegradable plastic; Corn starch; Degradability; Enzyme

SOLID OXIDE FUEL CELL

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Abstract: The generation of energy by clean, efficient and environmental-friendly means is now one of the major challenges for engineers and scientists. Fuel cells convert chemical energy of a fuel gas directly into electrical work, and are efficient and environmentally clean, since no combustion is required. Solid Oxide Fuel Cells (SOFCs) an oxide ion conducting electrolyte offer a clean, low- pollution technology to electrochemically generate electricity at high efficiencies. These fuel cells provide many advantages over traditional energy conversion system including high efficiency, reliability, modularity, fuel adaptability and very low level of NO_x and SO_x emission. This fuel cell has an application in cogeneration and residential application. The benefit of this high temperature is that there is no need for any kind of catalysts to trigger/speed up the reaction. They are ideally facilitating high levels of carbon capture without substantial additional cost. The need of this type of power source in generating power for satellites and space capsules, to powering fuel cell vehicles like automobiles, buses, or boats, to generating primary or emergency backup power for buildings. Solid oxide fuel cells, focusing on the research, development, and commercialization of the technology because it is able to convert a wide variety of fuels and with such high efficiency which it converts it into electricity.

Keywords: Fuel cells; Electrolyte; Catalyst; Electrochemical; Combustion

RECOVERY OF METALS FROM EWASTE BY BIOLEACHING AND PHYTOMINING

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Abstract: Electronic waste (E-waste) has become one of the major component of total waste globally produced. According to UNEP some 20-50 million metric ton of E-waste are generated every year. E-waste is not easily disposable so we have to come up with some solution to recycle it or recover the metals from it. Improper and irresponsibly dispose of E-waste can cause serious damage due to toxic heavy metals such as mercury, lead and corrosive chemicals. When they are to dispose in the trash and subsequently ends up in landfills.

We can dispose E-waste by recycling or by recovering the metals from it. some of the methods are

- **BIOLEACHING**
- **PHYTOMINING**

Bioleaching and Phytomining is the extraction of metal from their ores through the use of living organism. Both are applications within biohydrometallurgy in order to recover copper, zinc, lead, arsenic, antimony, nickel, molybdenum, gold, silver. According to our studies Metals can be recover from electronic scrap by biological leaching using moderately thermophilic strains of acidophilic chemo lithotrophic bacteria, fungi such as (*ASPERGILLUS NIGER AND ACIDITHIOBACILLUS THIOXIDANS*). This class of fungi are able to metabolize sulphur-based component to sulphuric acid. The acidic medium dissolves the metallic fraction of E-waste by various mechanisms. At scrap concentration of 10gm per litre, a mixture of symbiotic bacteria which are adapted to this culture was able to leach more than 81% of Ni, 89% of Cu, 79% of Al and 83% of Zn after 18 days of bioleaching electronic scrap. In Phytomining the phenomenon of plants accumulating in ordinate concentration of heavy metals is called hyperaccumulation. Plants such as (*HUMANIASTRUM, BRASSICA JUNACEA, THLASPI ROTUNDIFOLIUM*). After hyperaccumulation dried plants are burned to ash which allows the metal ore to recover according to conventional metal refining method.

**DESIGN OF A 'CNG/LPG LEAKAGE DETECTION SYSTEM' FOR
PROCESS INDUSTRY, HOUSEHOLD PURPOSE & TRANSPORTATION VEHICLES**

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Abstract:

LPG/CNG leaks can happen inside a home, commercial premises, gas powered vehicles or in processing industries. Leakage of this gas can be harmful as it raises the risk of building fire or an explosion. The casualties happened by this hazard are still common news in the media. One of the prophylactic techniques to stop mishaps related with the gas spillage is to introduce a gas spillage discovery gadget at feeble spots. The framework recognizes the spillage of the LPG/CNG utilizing a gas sensor to caution the individual about the gas spillage through signal. At the point when the centralization of LPG/CNG in air surpasses a specific level, the sensor detects the gas spillage and the Resistance (opposition) of the sensor goes low. The discovery is finished by the gas sensor, through

the microcontroller the LED and buzzer are turned ON all the while. We designed a minimal effort CNG/LPG recognition framework which will maintain a strategic distance from the real mishaps happens because of gas spillage inside commercial premises and in processing industries. Our product provides a cost effective solution for LPG/CNG leakage detection in chemical plants, vehicles, commercial premises and audibly alert the users of those premises in case of a hazardous situation and provide warning signals (beeps) in case of leakage of LPG/CNG.

Keywords: LPG/CNG detection, Resistance, microcontroller, LED, buzzer

EXTRACTION OF ANTHOCYANIN FROM PUNICA GRANATUM PEELS

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Abstract: Punica granatum better known as Pomegranates fruits have innumerable health benefits and its implication in diseases cure have been widely recognized since ancient time. Moreover, pomegranate fruit, seeds and peels are intensively used in traditional medicine as a natural therapy. It contains numerous valuable ingredients like Anthocyanin, Ellagitannin, Punicalagin, Ellagic acid, vitamins, minerals, flavonoids. The principal constituents including Punicalagins, Anthocyanin are responsible for innumerable health benefits due to strong antioxidant activity. Additionally, constituents of pomegranate show health promoting effect through the modulation of physiological and biochemical pathways. Recent evidences suggested that pomegranates fruits peels illustrate therapeutic implications in health management via inhibition of modulation of enzymes. General sources of Anthocyanin are red skinned grapes,

apples, pears, etc. but this is to overcome the conventional sources and obtain best from waste. The project is based on extraction and separation of Anthocyanin and other by products. It basically consists of 2 methods i.e. Vessel method and Soxhlet Apparatus method. We are mainly interested in getting the maximum yield from either of the two methods

mentioned above. Extraction of Anthocyanin is the major motive as it serves as a major component of pharmaceuticals and cosmetic industry.

Keywords: Anthocyanin, flavonoid, therapeutic, extraction, anti-oxidant

ENERGY GENERATION FROM A MOVING VEHICLE'S BY WIND TURBINE

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Abstract: The present energy situation with global population swelling and industrialization on the rise in developing nations, humanity hunger for energy has reached unprecedented levels. Which leads to unconventional sources of Energy Generation. In this paper, we come up with a solution for energy generation by using wind energy created by heavy vehicles. When heavy vehicles passed through any road with high velocity it creates kinetic energy in the form of wind energy. We use that wind energy created by vehicles using a small wind turbine to create a better energy source. This energy we can use

for charging electric car, laptops, homes, etc. this idea most sustainable and green for the environment.

Keywords: Wind Energy; vehicle speed; electrical energy

PROCESS INTENSIFICATION OF BIOACTIVE COMPOUNDS

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Abstract: Karanjin, is a type of flavonoid. It is obtained from the leaves of the Karanja tree which is growing wild in south India. The study gives an insight into the effect of ultrasonic enhancement of solvent extraction of karanjin from Karanja leaves (*Pongamia pinnata*) in comparison to conventional methods of extraction i.e. direct reflux or soxhlet extraction. A series of experiments were carried out to study the effect of various parameters, i.e., solvents, ultrasonic power, solute to solvent ratio and reaction time etc. on the yield of karanjin. Identification of extracted karanjin was assessed by high performance liquid chromatography

(HPLC). Thus, developed ultrasound extraction method resulted in higher extraction yield in a shorter time, thereby making it an interesting alternative for down-stream processing. This study approved that; karanjin can be a promising biopesticide or bioinsecticide material in a wide range of applications. The highest yield of karanjin (0.546%) has been achieved by ultrasound assisted extraction method.

Keywords: Process intensification, Ultrasonication, Extraction, Karanjin

STUDY ON WASTE DISPOSAL, RECYCLING AND PUBLIC HEALTH WITH STRATEGIC DEVELOPMENT.

Abstract:- This article adopts a novel approach of two-level comparison: baseline and strategic plans. It analyses the state of municipal solid waste (MSW) from the perspective of governmental institutions, the main obstacles in low- and middle-income cities seem to be the lack of regulations and, most noticeably, the inefficient structure of the waste management sector. Technically, the main challenges are low collection rates, land scarcity, and high transportation costs, as well as the lack of diversified management options. The latter renders the waste sector vulnerable and increases its instability. The second-level comparison addresses the strategic development plans, this includes - Key nutrients in wastewater such as phosphorus (P). Phosphorus in wastewater comes from the human metabolites of food, resulted from crop uptakes of fertilizer that ultimately derived from phosphate rock (PR). PR, however, could be depleted in this century, which would lead to a global food crisis. To address the question whether nutrient recovery is indeed a more efficient strategy from a system perspective and provides more benefits to society, this research compares fertilizer production from struvite to the traditional commercial fertilizers (e.g., diammonium phosphate, DAP). Also Promoting access to safe drinking water or access to nutritious food, each independently contribute uniquely to positive gains in human health.

MANUFACTURING OF GERMICIDE FROM POLYSTYRENE WASTE

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Abstract: Polystyrene is completely non biodegradable and the number of polystyrene waste is increasing day by day. Unlike organic or plant waste, polystyrene waste cannot just be dumped in landfills or incinerated to get rid of it. The polystyrene waste can be dissolved in organic solvents to make adhesives, but the amount of adhesive required as compared to amount of polystyrene waste created on daily basis is too less. Thus the method we use is to dissolve the polystyrene waste in the solvents, but to make a germicide out of it. The polystyrene is readily soluble in few organic solvent namely petrol, toluene, acetone, etc. The maximum amount of polystyrene soluble in pure toluene solvent is 0.4861 gm/ml while that in petrol and acetone is

0.326 and 0.49gm/ml respectively. One of the very few solutes soluble in toluene is coal tar, if half amount of total soluble polystyrene is dissolved in toluene proceed with addition of coal tar extract until the saturated solution is obtained gives a homogeneous mixture. From this mixture toluene can be separated simple distillation giving us a solution of polystyrene and tar extract which doesn't effectively affect the properties of the coal tar extract. The germicidal properties of coal tar extract are boosted up by the emulsifier. The concentrated germicide when added to water in a proper quantity gives a pale yellow or off white solution of germicide which can be used for the cleaning purpose. The demand of the germicide is Everlasting and thus the polystyrene waste is consumed and brought to effective use. The cost required

to make this germicide is far cheaper than the other germicide is used.

Keywords—(Germicide; Polystyrene; Coal tar; Toluene; Emulsifier.)

SMI - SMART IRRIGATION SYSTEM

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Abstract: An extensive usage of water assets in ventures, farming, and groundwater utilization by people for different purposes has ruined the water levels. An emphasis on viable usage of water sources with easy water irrigation crosswise over various rural homesteads is required with the

development in innovation. This paper displays a structure dependent on cloud and Internet of things for actualizing a smart irrigation system framework. In view of the well-defined structure, a use case for smart irrigation system framework is created and a skilled component is definite for successful use of ample amount of water produced from showers to expand the groundwater levels. The utilization case gives a room to farmers to check the homesteads continuously utilizing the farmer's feasibility. Here, heterogeneous gadgets are immovably incorporated to enable brilliant water system and to track the framework continuously. This case's activation and unmanned chores are done, dependent on certain fixed values to react according to date intake and output yielded by different sensors embedded in smart irrigation system.

Keywords—Internet of Things; Cloud Computing; Smart Irrigation

EXTRACTION OF OLEORESINS FROM PLANT MATERIAL

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Abstract:- Oleoresins the essential oil extracted from various plant material which are semi-solid extracts composed of a resin in solution in an essential and fatty oil obtained by the evaporation of the solvent used for their production. In contrast to essential oil obtained by steam distillation, oleoresins abound in heavier, less volatile and lipophilic compounds such as resins, waxes, fats and heavy oils. Oleoresins extracted from various plant materials like basil, chilli, capsicum (paprika), cardamom, celery seed, cinnamon bark, clove bud, fenugreek, ginger, jambu, mace, turmeric etc. The solvents used are non aqueous and may be polar (Alcohols) or non polar (hydrocarbons, carbon dioxide). By using ginger, green capsicum (paprika) and turmeric extract different components from it. And it is useful in various food products. The final products are analysed by using different analytical techniques like UV spectroscopy, GC, HPLC.

Keywords: - Oleoresins, UV spectroscopy, resins, essential oil.

“BEST WASTE MANAGEMENT OF HOUSEHOLD/RESTAURANT USED COOKING OIL FOR PRODUCTION OF BIOFUEL”

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Abstract: The use of used cooking oil from extended household and restaurants was considered as a suitable feedstock for biodiesel production in this paper. Used cooking oils, which contain large amounts of free fatty acids produced in restaurants, are collected from different restaurants and houses. Biodiesel production from was studied in this paper through experimental investigation of reaction conditions such as methanol/oil molar ratio, alkaline catalyst amount, reaction time and reaction temperature which are deemed to have main impact on reaction conversion efficiency. Experiments have been performed to determine the optimum conditions for this transesterification process. Methanol/oil molar ratio 9:1, with 1.0 wt% sodium hydroxide, temperature of 50⁰c and 90min Verified experiments showed methanol/oil molar ratio 6:1 was more suitable in the process, and under that condition conversion efficiency led to 89.8% and the physical and chemical properties of biodiesel sample satisfied the requirement of relevant international standards. Biodiesel is safe and effective diesel replacement with some operational advantages over petro-diesel.

Keywords: fatty acids, alkaline catalyst, transesterification, blend-fuels.

REMOVAL OF HEAVY METAL IONS LIKE MERCURY USING POLYMERIC

EXTRACTS AND VARIOUS BIOMATERIALS FROM INDUSTRIAL WASTE WATER

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Abstract:

Mercury, a heavy metal ion whose deposition in ecosystem is often represented as a threat. This project puts forth effective ways to treat industrial waste water for heavy metal ion extractions using various biomaterials like bentonite clay, attapulgite clay, etc. Various polymeric extracts like polymeric beads, chitosins were used for removal. The effectiveness of using such polymeric extract was found considerably more than normal techniques. The biomaterials provided an environment friendly approach for mercury extraction. Since many clays form stable colloids with water, they were magnetised for effective separation using Fe₂O₃. The adsorption data for clays was successfully simulated using Langmuir adsorption isotherm and adsorption capacity was found to be 26.6 mg g⁻¹. As for the case of polymeric beads and extracts the adsorption capacity was found to be 27 mg g⁻¹ (approximately).

Keywords-Wastewater, Mercury, Bentonite clay, Attapulgite clay, polymeric extracts.

PRODUCTION OF BIODIESEL AND GLYCERIN FROM WASTE VEGETABLE OIL

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Abstract: This project shows the details of the study on the production of biodiesel and glycerin. The production of biodiesel and glycerin is from waste vegetable oil. Trans-esterification reaction takes place between waste vegetable oil and methanol by using sodium hydroxide as a catalyst. The trans-esterification reaction was done by taking two different molar ratios (1:4 and 1:6) of methanol and vegetable oil and taking 1 wt% of the catalyst sodium hydroxide. The ester value was calculated in both the cases. The study concluded that by taking the molar ratio of 1:4, optimized biodiesel and glycerin can be produced. The value of boiling point of biodiesel was 270°C was calculated and the refractive index of glycerin was calculated to be 1.463 which is commercially available. The optimized reaction conditions for one stage trans-esterification of vegetable oils were a 1:4 molar ratio of methanol to oil, the addition of 1% NaOH catalyst, 80 °C reaction temperature and about 30 minutes of reaction time. The values of assay of the glycerin and

the ring test result were same as of commercial glycerin. The assay of the glycerin comes to be 70.2 and the ring test shows the identification of glycerin.

Keywords: Biodiesel, Trans-esterification reaction, Waste Vegetable Oil, Glycerin, Methanol.

RECYCLING OF WASTE ENGINE OIL

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Abstract: Engine oils cost millions of dollars to manufacture and represent a high pollutant material. Disposing of used oil in wrong way has the potential to pollute the environment. Roughly one gallon of oil can contaminate about one million gallons of water. Hence for Sustainable Development and to reduce Engine oil costs recycling is important. This work addresses recycling of waste engine oil by using acetic acid. The recycling process takes place at room temperature. Upon adding acetic acid to the waste oil, two layers were separated: transparent brown colored oil and the acidic sludge. The filtered oil was later treated with bentonite and activated charcoal followed by neutralization. The properties were compared with fresh oil and showed excellent results. The physical properties of the recycled oil were found reasonably close to the fresh oil which clearly indicates that acetic acid is not affecting the original structure of oil. This process of recycling does not emit harmful gases like sulphur dioxide. The acidic sludge formed can be further used for the production of ink.

Keywords— Sustainable Development, Recycling, Layers separation, Physical property

CAPACITIVE DEIONIZATION AS A RECENT TREND IN PURIFICATION OF DRINKING WATER AND ITS APPLICATIONS

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Abstract: Developing an energy efficient technology for the treatment of water is globally important because of great demand of clean water. Capacitive deionization (CDI) has attracted a great attention as a promising technology for desalination, softening and selective removal of certain ions which has to be removed for safe and clean drinking water. Studies on CDI have increased significantly in the last ten years. It generally shows the advantages of low energy consumption, simple operational conditions, and electrode materials of long cycle life. CDI is considered as an energy efficient method for the desalination of brackish water because CDI removes the salt ions from the water whereas other methods extract water from the salt solution.

Therefore, the amount of waste water discarded after the CDI technique will be less than that of the waste water discarded after reverse osmosis. In this paper we are discussing mainly on industrial applications such as desalination of brackish water along with softening and selective removal of heavy metals and nutrients (nitrate/phosphate). Lastly, recent improvements on the energy efficiency of CDI processes are delineated, specifically focusing on energy recovery and hybridization with energy producing technology, such as reverse electrodialysis (RED) and microbial fuel cells (MFC). This paper is expected to share the practical experience of CDI

applications as well as to provide guidelines for electrode material development for each specific application.

Keywords: Capacitive deionization, Desalination, Softening.

GRAPHENE : A FUTURE FILTER

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Abstract:- Graphene is a two-dimensional, tightly packed layer of carbon atoms that bond together in a hexagonal honeycomb lattice:

At just one atom thick, graphene is both the thinnest compound and the lightest material known to man. Scientists have been aware of this material for a long time but were unable to find a way to extract it from graphite until 2004. That year, two researchers working at the University of Manchester – Professor Andre Geim and Professor Kostya Novoselov – made a significant breakthrough that had the potential to revolutionise every part of everyday life.

Graphene has some incredible qualities: it is around 200 times stronger than steel, it has unique levels of light absorption, it is the best-known conductor of electricity and the best-known conductor of heat at room temperature. Despite its incredible strength, graphene is also remarkably flexible: the bonds between its carbon atoms allow it to bend and stretch with enormous pliability. It is no wonder that scientists believe this abundant and low-cost miracle material could spark a graphene-led revolution with diverse applications ranging from protective coatings to spray on solar panels.

Graphene may not immediately seem like the perfect candidate as a water filter. Despite being just one atom thick, it would appear to be impervious to practically every liquid and gas. However, scientists have been working on the creation of a membrane that will allow water to filter through the graphene, removing impurities along the way.

Graphene oxide membranes have been shown in the laboratory to be effective at removing contaminants from water to an exceptional level. The research conducted on graphene membranes today is bringing the possibility of delivering clean, safe drinking water to millions in developing countries ever closer.

Due to the extraordinary properties of graphene it can be widely used for filtration of water as well as some organic compounds.

Keywords:- Membranes, Graphene, Absorption, Impurities, Filtration, Organic compounds.

DIRECT CAPTURE OF CO₂ FROM AIR AND ITS CONVERSION TO FUEL

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Abstract: Fossil fuel sources currently constitute for about 85 % of energy demand world over and burning of these fuels release huge quantities of carbon dioxide into the atmosphere. Being a greenhouse gas, removal of emitted CO₂ is pertinent considering significant damage already done to environment owing to global warming. Captured CO₂ then could be converted subsequently into various fuels. Atmospheric air containing 400 ppm of CO₂ (0.04 % wt/wt) is pumped into a cross-flow ‘Air Contactor’. High molarity NaOH solution (3-6 mol/lit) is contacted with the atmospheric air to absorb the low concentrated CO₂ present in the air. A pulsed input of NaOH is provided in a cross-flow manner which is incorporated to reduce the maximum air velocity and the overall energy. The carbonate salt (Na₂CO₃) is causticized to recover NaOH and obtain CaCO₃ (s). Recovery of NaOH is similar to ‘Caustic recovery’. A fuel-fired kiln is operated at 1073 K to procure pure CO_{2(g)}. A compressor compresses the separated CO_{2(g)} up to 10 MPa and is stored. The stored carbon dioxide is reacted with hydrogen following the Sabatier’s Methanation process and is converted to methane.

Keywords: Fossil fuel; air contractor; caustic recovery; methanation.

“BEST WASTE MANAGEMENT OF HOUSEHOLD/RESTAURANT USED COOKING OIL FOR PRODUCTION OF BIOFUEL”

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Abstract: The use of used cooking oil from extended household and restaurants was considered as a suitable feedstock for biodiesel production in this paper. Used cooking oils, which contain large amounts of free fatty acids produced in restaurants, are collected from different restaurants and houses. Biodiesel production from was studied in this paper through experimental investigation of reaction conditions such as methanol/oil molar ratio, alkaline catalyst amount, reaction time and reaction temperature which are deemed to have main impact on reaction conversion efficiency. Experiments have been performed to determine the optimum conditions for this transesterification process. Methanol/oil molar ratio 9:1, with 1.0 wt% sodium hydroxide, temperature of 50^oc and 90min Verified experiments showed methanol/oil molar ratio 6:1 was more suitable in the process, and under that condition conversion efficiency led to 89.8% and the physical and chemical properties of biodiesel sample satisfied the requirement of relevant international standards. Biodiesel is safe and effective diesel replacement with some operational advantages over petro-diesel.

Keywords: fatty acids, alkaline catalyst, transesterification, blend-fuels.

A REVIEW ON ALKYL POLYGLUCOSIDES AS A BIODEGRADABLE SURFACTANT

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Abstract: Surfactants are cleaning agents that work on the principle of surface tension. However, some of these surfactants have harmful effects on the environment once released into the water bodies without proper treatment. People have become cognizant of the detrimental effects that certain surfactants have on the environment. This review focuses on a specific new class of non-ionic surfactant called alkyl polyglucoside, which is derived from lignocellulosic polysaccharide; highlighting its properties, aquatic toxicity and biodegradability. Alkyl polyglucosides are a mixture of homologues, anomers and isomers. This surfactant's excellent ecotoxicological profiles, dermatological mildness and high compatibility to skin gives it an advantage over anionic surfactants. They also have good environmental compatibility with aquatic ecosystems. The longer chains of alkyl polyglucoside biodegrade faster than the shorter ones. The measure of the extent of biodegradability of APG depends mainly on the values of biochemical oxygen demand (BOD), dissolved organic carbon (DOC), high performance liquid chromatography (HPLC) and gel permeation chromatography (GPC). Since APGs are completely based on natural resources, they ultimately biodegrade to carbon dioxide and water under aerobic conditions. They have numerous applications in detergents, food emulsifiers, pharmaceutical granulating agents and cosmetic surfactants.

Keywords: surfactants, non-ionic, APG, aquatic toxicity, biodegradability, aerobic condition

REVIEW ON EMISSIONS FROM DIESEL ENGINE AND EXHAUST AFTER TREATMENT TECHNOLOGIES

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Abstract: Diesel engines, with their low-operating cost, have high efficiency, reliability and durability. This is because diesel engines are especially used for heavy-duty vehicles. The diesel motors are considered as the principle donor to ecological contamination these days. They are the main cause of several health problems. They contribute to global warming through Particulate Matter, Hydrocarbons (HC), Nitrogen Oxides (NO_x) and Carbon Oxides (CO_x) emissions. Their presence causes a number of respiratory diseases. Various effective techniques are currently available for reducing PM, HC, CO_x and NO_x. In this paper it is desired to review that various types of diesel engine emissions and their control technologies such as diesel oxidation catalyst, diesel Particulate filter, exhaust recirculation, selective catalytic reduction etc. Each type of diesel engine emissions and control technologies is broadly studied.

Keywords—Diesel engine; Emissions; emission control technologies; DOC; EGR; SCR; DPF.

RE-REFINING OF USED LUBRICATING OIL

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Abstract: Lubrication is the most important factor in many industries. Likewise lubricating oil is one of the most crucial and indivisible part of machines and automobiles which is used widely. Though we need energy to produce power, we need lube oil to make proper and desired motion in automobiles and machines. The main responsibility of lube oil is to increase the working efficiency for excellent industrial progress. During normal use impurities such as metal scrappings, dirt, chemicals, etc can get mixed in with the oil due to thermal degradation. Hence the fresh lube oil gets contaminated after a particular interval of time and has to be replaced again because the quality of the oil gradually decreases. If the used lube oil is not treated properly, it affects both health and environment. It can pollute the groundwater as well as land if not handled effectively. At some point in future the supply of oil in Earth's crust will be exhausted. To overcome this problem Solvent Extraction process is an innovative technique of re-refining used lubricating oil. We have discovered that when 25 litres of used oil recycled effectively, 10 litres of fresh lubricating oil was obtained. In case of crude oil the case is totally different; we get 10 litres of lubricating oil from 220 litres of crude oil. This project describes the process of extraction of usable lubricating oil by Solvent Extraction method.

Keywords—Lubricating oil; Re-refining; Environment friendly; Solvent Extraction

ENHANCEMENT IN HEAT TRANSFER EFFICIENCY OF DOUBLE PIPE HEAT EXCHANGER BY TUBE INSERTS.

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Abstract: Heat Exchanger is commonly used device in every chemical industry. Heat transfer rate can be increased by changing operating parameters like flowrates, temperatures but it affects largely on the other operations in industry. Also it is been increased by increasing heat transfer area. But the manufacturing cost increases due to this. Therefore increase in heat transfer rate with same heat transfer area is major concern. Double Pipe heat exchanger with fixed heat transfer area is used for the trials. This study mainly focuses on how to increase heat duty in same heat transfer area by using *Tube Inserts* method. Reduction in heat transfer area for fixed duty is also studied in this paper. It is been taken care that pressure drop should not exceeds its optimum value.

EXTRACTION AND ISOLATION OF URSOLIC ACID FROM TULSI PLANT

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Abstract: Extraction entails the removal of solute from its sample matrix and passing into the phase required for identification and quantification. When the sample is a solid and the required phase for analysis is a liquid, the process is called solid-liquid extraction. Ursolic acid is a pentacyclic triterpenoid compound, it is the major constituents of the Tulsi leaves. It is mainly used for the treatment of heart disease, high blood pressure, asthma hyperhidrosis, palpitation insomnia, edema, cough, bronchitis, lung abscess, and other diseases. In this project, the work is carried out using a batch extraction and Soxhlet extraction method. Solvents like methanol, acetone, ethyl acetate, acetonitrile etc. are used in Soxhlet extraction setup with fixed grams of Tulsi particles (leaves, stem and Manjula) having size less than 0.03mm followed by UV spectroscopy and came to know that Ursolic acid is more soluble in methanol. Using batch extraction, the effect of rpm, solid loading and temperature are studied to optimize the process. Analysis of sample has performed using UV spectroscopy and Gas chromatography. Isolation has performed by filtration followed by passage through polymeric hollow fibre membrane. The isolation is based on particle size of the solute, charges, solubility and pressure. The pore size range of membrane lies between 0.005 to 0.1nm. It can sustain pressure up to 2.0 to 10 bars. Hollow fibre membrane setup is like a small shell & tube heat exchanger we can pass liquid through tube and air pressure from shell and vice versa.

Keywords— Tulsi, Ursolic acid, extraction, UV spectroscopy, Gas chromatography, Hollow-fibre membrane

WIND MILL WATER PUMP

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Abstract: As, we deficient to non-renewable resources, we came up with an idea of pumping water without using electricity, for the same, we have given a thought of utilizing mechanically operated machinery. In India, there are lots of villages where there is no electricity which is a foremost concern. They need to pump water from lakes, ponds, wells where there is need of continuous supply of water for daily needs as well as for irrigation purpose. Wind energy can be used in different way to overcome this issue. Our project deals with the same issue in which, pumping of ground water can be done to generate electricity with the help of wind turbines. The water pumping through wind mill can be also used for irrigation as well as for livestock. A water pumping wind mill is a simple, but rather an efficient method to be implemented. Our project basically involves the blades, also known as sails, of the windmill wheel that catches the wind which turns the rotor, the wheel assembly is attached to a hub assembly by long arms, and the hub assembly drives a geared mechanism that converts rotary motion to an up-and-down motion, that up-and-down motion drives a long sucker rod, also known as a pump rod, which creates an up and down motion inside of a pipe in the well. Attached to the end of the pipe is a cylinder with a sealed plunger going up and down, which forces the water up in the pipe. Each upstroke pulls water into the cylinder. On the down stroke, a check valve in the bottom won't let the water be pushed out, so the water is forced up in the pipe with the next upstroke. We have focused on project which can help us to save and conserve the non-renewable resources which is a prime concern to be taken care of.

Keywords—Blades, Water pump, Cylinder, Gear mechanism

REVIEW OF CARBON NANOTUBES PRODUCTION METHOD FROM CO₂ WITH CRITICAL ANALYSIS OF DIFFERENT METHODS

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Abstract: Carbon Dioxide (CO₂) is colourless gas which consists of a carbon atom covalently double bonded to two oxygen atoms. It occurs naturally in Earth's atmosphere as a trace gas. It also plays a critical role in the Energy Balance of our planet. Due to human activities, the amount of CO₂ has been increased in the world. CO₂ causes global warming, acidification of the ocean, misbalance in ecosystems. CO₂ from the Earth's atmosphere into a different energy form, i.e., carbon nanotubes. Carbon nanotubes (CNTs) are one of the most wonderful discoveries of modern science. It has been the stiffest and hardest material developed with mechanical strength, high flexibility, good thermal and electrical conductivity. CNTs are used for energy storage, thermal material, structural application fiber, and fabrics. In this paper it is desired to review different methods of production of nanotubes such as plasma arcing, laser methods, chemical vapour deposition and Ball Milling. Also, to examine the method of preparation of CNTs from CO₂ using molten electrolysis, and compare the traditional method of preparation of CNTs from carbon with the preparation of CNTs from CO₂. Comparison on the basis of material used and energy required. Product quality testing on the basis of mechanical strength, flexibility and

breaking strength of nanomaterial. It mainly focuses on the conservation of energy and production of the desired product.

Keywords— Carbon Dioxide; Carbon Nanotube; Electrolysis; Preparation; Energy.

CORPORATION WASTE DISPOSAL MACHINE

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Abstract:

As we all know there is a tremendous amount of municipal waste produced because of urbanization and increasing population day by day.

So, to reduce this waste we come up with solution that we will design a waste disposal machine which dispose waste and convert it into usable form. In this project we mainly focused to produced manure from municipal waste, and we will try to reduce the time require for conversion of waste into manure using this machine.

In this project we focus to design a suitable system by using **CAD; CFD; LSDYNA analysis;** for check out that our design will meet expected results.

NATURAL DRAFT COOLING TOWER PERFORMANCE EVALUATION

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Abstract:Cooling towers are used extensively for numerous, residential, commercial and industrial applications. The heat rejected and water evaporated in natural draft cooling towers are critically evaluated by employing the Merkel and e-number-of-transfer-units (e-NTU) methods of analysis, respectively, at different operating and ambient conditions. The importance of using a particular method of analysis when evaluating the performance characteristics of a certain fill material and subsequently employing the same analytical approach to predict cooling tower performance is stressed. The effect of ambient humidity and temperature on the performance of cooling towers employing the Merkel and e-NTU methods of analysis are evaluated

NATURAL DRAFT COOLING TOWER PERFORMANCE EVALUATION

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Abstract: Cooling towers are used extensively for numerous, residential, commercial and industrial applications. The heat rejected and water evaporated in natural draft cooling towers are critically evaluated by employing the Merkel and e-number-of-transfer-units (e-NTU) methods of analysis, respectively, at different operating and ambient conditions. The importance of using a particular method of analysis when evaluating the performance characteristics of a certain fill material and subsequently employing the same analytical approach to predict cooling tower performance is stressed. The effect of ambient humidity and temperature on the performance of cooling towers employing the Merkel and e-NTU methods of analysis are evaluated

Cooling Tower Model Design

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Abstract: The cooling tower will be designed to dissipate heat absorbed from the water. N number of parallel thin metal tubes with fins connected to each other in series will be dissipating heat from water to the air in the surrounding and generating a natural cooling effect. It will be constructed to pass water in tubes which will provide large contact area to the atmosphere. As water will pass down through the tubes it will lose its heat to the air stream passing around the outside of tube.

Keywords—Cooling tower; Cooling effect; Dissipation of heat; Atmosphere; metal tubes.

COOLING TOWER DESIGN

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Abstract: A cooling tower is a heat rejection device that rejects waste heat to the atmosphere through the cooling of a water stream to a lower temperature. Cooling towers are used in all heat producing industries. There are two shapes of cooling tower rectangular and circular cooling tower. In our project we are going to design rectangular cooling tower. We will do some modifications to increase the efficiency of cooling tower (combination of induced draft and

forced draft cooling tower type).

Keywords— cooling tower; induced draft; forced draft; design; efficiency

ANALYSIS AND DESIGN OF COOLING TOWER

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Abstract –

A cooling tower is a heat rejection device that rejects waste heat to the atmosphere through the cooling of a water stream to a lower temperature. Cooling towers are used in all heat producing industries. There are two shapes of cooling tower rectangular and circular cooling tower.

In our project we are going to design rectangular cooling tower named as induced draft cooling tower. Induced draft towers are typically mounted with a fan at the top of the cooling tower, which allows hot air out and pulls air throughout. The high exiting air velocities reduces the chance of re-circulation. Design and analysis of induced draft cooling tower is made, with consideration of different loads. Various loads such as wind load, temperature load, self-weight, seismic loads. In our cooling tower we have used V bar (splash fills). These fills are newly introduced for cooling tower. These fills makes our cooling tower maintenance free. Unlike film fills, V-bars require practically zero maintenance since they are completely clog-free. They can also be used for salt water applications. The splash fills can withstand temperatures of more than 95 degrees C. Any solids that get deposited on the V-bars are automatically dislodged by the motion of the water. Hence, this makes this the ideal solution for high TDS solutions, salt water or any liquid other than water.

COOLING TOWER

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Abstract: Most air conditioning systems and industrial processes generate heat that must be removed and dissipated. A cooling tower is a heat rejection device .It is used to dissipate heat into the atmosphere .In many power plants, hot water directly released into the ground without being recalculated. This necessitates the development of cooling tower to cools the water. The hot water stored in a tank is supplied to the cooling tower for cooling by the use of motor pump. The cooling effect is obtained by the natural air which is entering in the gap provided by the louvers. After the water is cooled it gets collected in another tank which is kept at the bottom of the cooling tower.

Design parameters for cooling tower:

- i. Cooling range.
- ii. Mass flow rate of water.
- iii. Hot and cold water temperature.
- iv. Materials used for construction.
- v. Total heat rejection.
- vi. Mass flow rate of water.
- vii. Wet bulb temperature.

About School of Chemical Engineering

- The School of Chemical Engineering was established in the year **1999** with intake of **60 students**.
- The course syllabus of the school has been designed by keeping in mind the Chemical Engineering syllabi of various international institutions. This inculcates a habit of relating observations to fundamentals.
- The undergraduate program of **Chemical Engineering** is accredited thrice by **National Board of Accreditation (NBA)**.
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- The Ignited Minds - Club conducts social, cultural and technical events for the students and club members alike. These activities help in nourishing qualities like organizing skills, leadership quality, social awareness, entrepreneurship quality among students.

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