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AMPSA

# 3 Day National Level Conference on ADVANCES IN MATERIALS AND PROCESSES FOR SUSTAINABLE APPLICATIONS

## AMPSA-2023

**23 to 25 March 2023**

**Organised by**
**Gharda Foundation's**
**Gharda Institute of Technology**
**A/P Lavel, Tal-Khed, Dist.-Ratnagiri, Maharashtra-415708**
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## Message from Trustee

It is my immense pleasure to greet you all at the national level conference on Advances in Materials and Processes for Sustainable Applications (AMPSA-2023) being organized by Gharda Institute of Technology. AMPSA-2023 provides an opportunity for the meeting of Researchers, Engineers, Scientists, and specialists in the various research and development fields of Material Science, Engineering and Technology. The conference offers a premise for the experts to gather and interact on the topics of related to material and material processing in civil, mechanical, chemical and other engineering sectors. I hope, eminent keynote speakers will cover the theme Green Challenges and Smart Material Solutions from different perspectives. I am privileged to say that this conference will definitely offer suitable solutions to the issues and problems related to sustainability with the help of participants and experts. The success of this Conference is solely on the dedication and efforts of innumerable people. Right from the Organizing Committee which started working on the preparations for almost 6 months, to the Student Volunteers who assisted in many ways to make this Conference become a reality. I wish the conference, a great success.

V. Satheesh

Trustee

Gharda Foundation

## Message from the Trustee Representative

I am delighted that Gharda Institute of Technology is organizing a national level conference on Advances in Materials and Processes for Sustainable Applications (AMPSA-2023). AMPSA-2023 aims at providing an excellent opportunity for interactions among experts in the field. Paper presentation by undergraduate (UG) students as a part of the conference agenda would go a long way in encouraging and inculcating a research culture among UG students, which is the need of the hour. Keynote talks by experts in the field will definitely enable young minds to gain knowledge about the various topics covered in the conference. I congratulate the organizers and wish all the very best for the conference.

**Satish Shenoy**

Trustee Representative

Gharda Foundation

## Message from Dr. A. B. Marathe

I am extremely pleased to know that Gharda Institute of Technology is organizing a national conference on Advances in materials and processing for sustainable applications, AMPSA 2023. For any engineering discipline, selection of material is an important aspect in the effective application of the ideas. Materials, let it be composite materials, polymers, nanomaterials, refractories, polymers construction materials, are part of our life and lifestyle. This conference will help in idea exchange among young minds. The keynote speakers from reputed organizations with decades of experience in research and industry will definitely inspire the investigators in the field. I wish the conference, all the very best.

**Dr. A. B. Marathe**

## Message from Principal

It is my great pleasure to extend my heartfelt congratulations to the organizers of the upcoming national level conference, "AMPSA 2023". The presentation of ideas and concepts is fundamental to research and innovation and I am confident that this conference will play a crucial role in the exchange of knowledge, wisdom, and ideas related to engineering materials, their synthesis, characterization, and applications.

I am particularly excited about the thoughts and ideas that will be shared by the keynote speakers. The insights that they bring to the table will go a long way in increasing knowledge sharing and exploring innovative thinking. I am confident that this conference will be a great success and will contribute significantly to the advancement of science and technology.

I wish the AMPSA 2023 team all the best in achieving its goals. Let us all work together to make this conference a grand success.

Best regards,

Dr. S. K. Patil

Principal, GIT

## From the organizers

It is matter of pride for us to present the proceedings of a national conference on 'Advances in Materials and Processes for Sustainable Applications (AMPSA-2023)', organized from 23rd to 25th March 2023 at Gharda Institute of Technology, Lavel. The conference aims at bringing experts working on material and material processing from various fields like Chemical, Mechanical, Civil and Geological etc. on one platform. The event is a step towards creating an amalgamation of fields and applications of interdisciplinary research for betterment of the society. This conference provides a platform for researchers working in various fields to showcase their work and interact with the eminent people from the field. The keynote addresses by eminent personalities in the field are organized for the participants to gain fruitful insights of the advanced topics. The organizing team is thankful to all the participants for their enthusiastic participation. Also we are grateful to the Gharda foundation's and Gharda Institute of Technology, Principal Dr S K Patil, volunteers and all the staff members for their support and co-operation.

Dr S J Kulkarni

Convener (AMPSA 2023)

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Through a vision of Padmashree Dr. K. H. Gharda, Gharda Foundation's Gharda Institute of Technology in typical rural region is a major step towards the social development. The institute is established in 2007. The 65 acres' lush green campus with state of art laboratories with advance equipment, dedicated staff thriving for advance teaching learning process and ICT facilities make the institute unique and keep high stature in Konkan region. Alumni working at reputed national as well as multinational companies, higher education at prestigious institutes is our strength. Collaborations with premier institutes and MOOC courses help us to growth of students and faculty.

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**Dr. D. D. Sarode**
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**Dr. Ranganayakulu Bodavala**
Founder, One Child One Light Foundation; CEO, Hoshang Patel Tech centre, GIT

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3. *Create awareness and understanding of continuous learning.*

Through a vision of Padmashree Dr. Keki Gharda, Gharda Foundation's Gharda Institute of Technology in typical rural region is a major step towards the social development. The 65 acres lush green campus with state of art laboratories with advance equipment, dedicated staff thriving for advance teaching learning process and ICT facilities make the institute unique and keep high stature in Konkan region. Alumni working at reputed national as well as multinational companies, higher education at prestigious institutes is our strength. Collaborations with premier institutes and MOOC courses help us to growth of students and faculty.

# CONFERENCE THEMES

- Advances in material science
- Material characterization, processes and testing
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- Chemical materials
- Granular materials
- Polymers and Biopolymers
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# Plastics Pyrolysis - A Renewable Energy Source

Sameer Pimpale [1], Abhishek Revgade [1], Manisha S. Gonate [2]

[1]Student, [2]Assistant Professor

SSJCOE, Dombiwali

**ABSTRACT**

The objective of the work to be presented is to find alternate energy sources for fossil fuel by thermal decomposing of waste HDPE plastic using the pyrolysis method and to find a possible method to alter the properties of pyro oil making it easier for combustion or as a heat transfer fluid. As pyro oil has high Carbon content and cannot be used as both an efficient and environmentally friendly fuel certain industrial methods are used to make changes in its physical properties. Proximate and Ultimate analysis is done to find Ash Content, Moisture Content, Sulphur Content, Liquid Content & Density of sample oil. It also includes various equipment and PFD of the pilot plant setup which is specifically designed to intensify the process, specifications such as Temperature for fast pyrolysis, Gross calorific value &Kinetic Velocity of performed process. This experiment gave promising results as the use of pyro oil as an efficient Heat transferring fluid. Temperature significantly Affects the yield and properties of products including the char, syngas and bio-oil, Thermogravmetrric analysis shows the biochar which is more stable. Gas chromatography and Mass spectrometry gives you Analysis of presence of phenol, ketones, Acids, Alkane, Alkenes. However, for an Effective Pyrolysis process with Relatively High Bio-oil yields. maximum Temperature should be approximately at 450 °C.

**Keywords:** Polymer, Pyrolysis, Gcv, Carbon Content, Oil.

# Pyrolysis of Waste Polyethylene Under Vacuum and Atmospheric Conditions

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**ABSTRACT**

Pyrolysis is the thermal cracking of organic and synthetic material, elevated temperature in the absence of oxygen. Pyrolysis is one of the most important methods for the disposal and treatment of waste plastics as waste plastics can be converted to three product slates viz. liquid, gas and solid. The experimental work on the pyrolysis of waste plastics under vacuum and atmospheric conditions in batch reactor has been thoroughly discussed in present study. The batch time was set to 1. 5 hours and maximum temperature reached was 287°C and 347°C under vacuum and atmospheric conditions respectively. The yield of most important product i. e. , pyrolysis oil was observed as 49. 28% in vacuum conditions whereas it increases to 66. 22% for the atmospheric conditions. Interestingly, the yield of uncondensed gases was found to be 44. 72% under vacuum against 27. 78% in atmospheric conditions. The char yield was similar for both conditions. The quality of pyrolysis oil obtained during atmospheric conditions was also found to be better than that under vacuum conditions. The insufficient residence time for the gas phase pyrolysis reaction during vacuum conditions may have caused decrease in oil yield. The composition analysis of liquid product using gas chromatography mass spectroscopy has also been discussed.

**Keywords:**Waste plastics, Pyrolysis, Atmospheric condition, Vacuum Conditions, Pyrolysis oil yield and composition

# Capturing Airborne Carbon dioxide

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**ABSTRACT**

After a long debate, the world has realized the impact of climate change and its consequences. Carbon dioxideemissions are majorly contributing to the effect. Some measures are being taken to reduce this impact such as, Afforestation (also, limiting deforestation), Increasing the use of green & renewable energy thus, lowering dependency on fossil fuels etc. But, just reducing the emissions won't help, we need to get rid of the $CO_2$ already emitted in the past. $CO_2$ is being produced in industries for various applications, and their products areundeniable parts of our lives. Majorly used in carbonated beverages, as food additive, MAG welding, Fire Extinguishers, Chemical synthesis (example- Urea) etc.

To meet this unending requirement, why can't we capture the Carbon dioxideback from the air. Various studies are being performed to capture $CO_2$ from atmosphere, initially NaOH & $Ca(OH)_2$ adsorbents were used, they proved to be good adsorbents, but their regeneration was not energy efficient. Aqueous solution of amines are the ones majorly used for adsorption of carbon dioxide, but the presence of water makes the regeneration highly endothermic, thus amines and polyamines supported on different solid bases are also being studied. One such study of polyethylenimines adsorbent produced promising results. Also, an Ion-exchange resin with $NH_4^+$ ligands was used for the purpose, in the form of electrodes as well as sorbent bed and gave positive results. These experimental studies once converted into plant scale can be very beneficial. Captured Carbon dioxide can be used in Cement, for producing Methanol, and also a Diamond (Sky Diamond). Capturing the airborne Carbon dioxide will help us reduce the impact of emissions on the environment and climate, thus benefitting us in the long run, and to achieve a unified aim of becoming Carbon neutral worldwide.

**Keywords: Climate change, Carbon dioxide, $CO_2$, Carbon neutral, Adsorbent.**

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3. Capture of carbon dioxide from ambient air K. S. Lackner1 Columbia University, New York, and NY GRT LLC, Tucson, AZ, USA- The European Physical Journal Special Topics

# Firefly Algorithm (FA) : Application to Optimization of Some Engineering Test Problems

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**ABSTRACT**

FA is a meta-heuristic optimization algorithm inspired by the social behavior of fireflies. It is based on a simulation of the flashing behavior of fireflies, which utilize the intensity of their light to attract one another in swarms. The algorithm mimics the behavior of fireflies to find the optimal solution to a given problem. The method operates by randomly placing a population of fireflies in the search space. Each firefly is then attracted to other fireflies in the population based on the brightness of their light. The brighter fireflies are more appealing and will attract other fireflies, whilst the dimmer fireflies are less appealing and will not attract other fireflies. This is used to update the locations of the fireflies in the search space. The method repeatedly searches the space for a global optimal solution, and after the search is complete, the best solution is selected. The technique has been used for a variety of chemical engineering challenges, including process optimization, design optimization, and defect diagnostics.

This study developed FA in a systematic manner to solve four benchmark test problems from the literature that are regularly utilized by researchers in this area. In order to determine the efficacy of FA, a comparison between the solution by FA and the traditional approach has been conducted. The results indicate that the convergence rate of FA is much higher than that of the other approach. Additionally, it has a cheap computational cost and can often identify suitable solutions fast and effectively, with minimum parameter tuning required. FA looks to be an interesting and possible technique for tackling engineering optimization challenges.

**Keywords -** Optimization, Firefly Algorithm (FA), Meta-heuristic, Evolutionary Algorithms, convergence

# Heat Transfer Enhancement

Samadhan Ravi Gajmal

**ABSTRACT**

Heat exchanger is a component which is used to transfer the heat from one medium to another efficiently. in this work an investigation was made on possibility of reducing the size of shell and tube heat exchanger by addition of swirl. This swirl was generated by using a twisted tape which inserted inside tube and the effects of these tapes on heat transfer rate and pressure drop were theoretically studied. In this experiment two types of tapes were used half-length twisted tape and full length twisted tape. it is found that addition of swirl into fluid flow should help to design compact and low cost heat exchangers with improved performance seeing pressure drop. studies are underway to investigate the overall effectiveness of use of twisted tape for enhancing the performance of heat exchanger.

**Keywords :** Swirl, Twisted tape, heat transfer rate, pressure drop, half length, full length.

# Review studies on synthesis of CNT and its Application

Shradha V. Kondalkar, A. K. Goswami

UICT, Jalgaon

**ABSTRACT**

In the field of nanotechnology, carbon nanotubes are one of the most unique invention and carbon nanotubes are significant material for future. The carbon nanotubes, synthesis, structure, properties, characterization technique, potential applications of CNT discussed Extensively. CNT have attracted great interest in multidisciplinary study since their discovery. CNTs is classified into two types:Single wall carbon nanotubes and multi-wall carbon nanotubes Single wall carbon nanotubes is mainly used in electrical feild such as sensors and wires due to twisting properties. Multi-wall carbon nanotubes provide greater mechanical strength because of the presence of many layers of graphene. The synthesis of CNT include the electrical arc discharge, laser ablation method, chemical vapor deposition. The CNT has its properties in numerous feild such as electrical, mechanical, chemical and biological.

# Performance Evaluation of Moving Bed Bio-Reactor (MBBR) for Domestic Wastewater Treatment

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**Abstract**

Wastewater may be disposed of in India by one of two ways: either onsite or via the public drainage system. In the process of discharging greywater into the drainage system, there was little thought given to the ramifications for either public health or the environment. The high initial and ongoing expenditures, in addition to the need for a large operational area, are usually stated as reasons for not establishing an appropriate wastewater treatment plant. Another common concern is the lack of available space. In recent years, biological wastewater treatment has emerged as one of the most promising methods for treating wastewater. The removal of organic elements from grey water is the primary focus of the present research, which makes use of a Moving Bed Biofilm Reactor (MBBR).

The performance of the MBBR reactor is measured by the percentage of BOD and COD that are removed from the effluents that are treated by the reactor. These effluents come from a broad variety of sources. The primary objective of this research is to investigate the potential for the removal of organic matter via the use of Moving Bed Bio-Reactor (MBBR) media as an attached media. The findings that we collected led us to the conclusion that the MBBR technology for the treatment of wastewater performed admirably in terms of the elimination of COD and BOD for low-cost medium. It has been established that MBBR works well as an attached medium for treating wastewater, including materials that may be broken down by biological processes. The findings of the laboratory portion of this research gave information that was helpful in constructing and assessing the long-term performance of a field-scale system.

**Keywords -**Moving Bed Biofilm Reactor (MBBR), Wastewater, Organic materials, Greywater, BOD and COD

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Authors are acknowledged to associated institutes and teammates for their valuable help, cooperation and support.

# Treatment of the Agrochemical industry effluent using hydrodynamic cavitation and its combination with process intensifying additives ( ozone and $H_2O_2$)

Aakash S. Velankar [1*], Pavan V. Prasad[1], Manoj K. Gawade[1], Dr. Sudesh D. Ayare[1]

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**ABSTRACT**

Treatment of Agrochemical industrial effluent is investigate using hydrodynamic cavitation (HC) and when it is combined with advanced oxidation reagents such as air, oxygen, hydrogen peroxide, and ozone to intensify degradation. The cavitating mechanism in the HC reactor consisted area contraction devices such as venturi and orifice. We optimize the effect of various parameters like inlet pressure, effluent concentration, air flow rate, H2O2 loading, and ozone loading on the basis COD reduction and decolorization. It was observed that the maximum reduction occurs at 5 bar inlet pressure and a constant temperature of 25℃. The results show that the combination of HC with ozone can be effectively used as a fast and highly efficient for wastewater treatment. Hydrodynamic cavitation is one of the best treatment method for reduction of Agrochemical industrial wastewater.

**Keywords:-**Hydrodynamic cavitation, Venturi, Dozing, COD reduction, Advanced oxidation process, Agrochemical

# Utilization and comparison of paper waste in combination with flyash, sand and cement to develop eco-friendly and lightweight bricks.

Prof. VikramsinghJadhav[1], Shubham Kamat[1], Yash Bhatkar[1], Dharmaraj Bhoi[1], Akhilesh Kalekar[1]

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**Abstract :** Brick plays very important role in the field of civil engineering. Bricks are used as an alternative of stones in construction purpose. Clay brick is the oldest building material in the field of construction industry. Now-a-days, brick is one of the most common masonry units used as building material in the construction industry. With growing industrialization and development of the country, the demand for bricks has increased to a large scale. India is thesecond largest brick manufacturer in the world after china. India produces bricks using the traditionalmethods. The traditional methods consume 350 million tons of fertile soil and 25 million tons of coal annually for production of bricks and burning process respectively. The waste paper produced are either incinerated or dumped in landfills and dumpsites. In terms of sustainable development and environment friendly production, the utilization of paper waste and fly ash in the manufacturing of eco-friendly and lightweight building materials has attracted attention in recent years. The intention of this research is to find out the weight, compressive strength, water absorption, thermal conductivity, cost of brick by using waste papers and fly ash in combination with cement and sand in order to verify their suitability for use as a building construction material. The self weight of bricks made by using paper pulp, cement, sand and fly ash is comparatively less than conventional clay bricks. Due to less weight of paper pulp bricks, the total dead load of the building will be reduced. The bricks cannot be used for load bearing walls because it absorbs more water. It can be used in interior location of structures like partition walls.

**Keywords:** Waste paper, Fly ash, Lightweight brick, Thermal insulation, Recycled material, Sustainable construction

# Study and Design of Flexible Pavement using Steel Slag

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**ABSTRACT**

This paper represents the use of steel slag in the bituminous mixtures. Steel Slag is the byproduct of various steel industries. The steel slag is chosen on the basis of its engineering properties and its utilization for road construction in different ways. In this study, steel slag was used, as a replacement for natural aggregates in various percentage in the bituminous mixture. The Marshall Stability Test was taken on the different grade specimens which having 0%, 25%, 50%, 75% and also 100% replacement of natural aggregates with Steel Slag. The 3 specimens where prepared of each percentile to get accurate reading and minimizing the errors. Then the results of each percentage specimens where compared with each other to see whether the steel slag fulfilled the characteristic of natural aggregate in the mixture and at what percent it shows the best result. At last the test provided the satisfactory results.

**Keywords :** Steel Slag, Bituminous Mixture, Aggregates, Stability, Utilization

**Acknowledgement:**

We would like to thank our HOD A. D. Bhosale for providing the labs for working on our project model and also providing tools and equipment's which where helpful in model making. We would also like to thank our Principal S. K. Patil for giving us opportunity to carryout our Project. We would also like to thank H. S. Pawar and R. S. Kelkar for supporting us during lab work.

# Degradation of COD of Boys Hostel Sewage Water at Gharda Institute of Technology, Lavel

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**ABSTRACT**

It is common practice to use hydrodynamic cavitation for the treatment (cleaning) of water and wastewater. However, it has only lately been proposed and used to use hydrodynamic cavitation as a stand-alone approach or in conjunction with other techniques like ultrasound. In the present study, we looked at a broad overview of methods that use hydrodynamic cavitation to clean the water and trash produced at the boy's hostel at the Gharda Institute of Technology in Lavel. We took 20–20 liters of sewage water per day from the chamber of the sewage water pipe line in the boy's hostel to test a sample. In this study, we focused on our own most recent work using hydrodynamic cavitation to remove all cleaning chemicals, surfactants, and pathogens from hostel waste water. For analysis, the Chemical Oxygen Demand method has been chosen. As according experimental data, the COD was reduced by 59. 5% using individual treatment of HC at the ideal conditions of 4. 5 bar inlet pressure, ambient temperature, and pH 4. As comparison to using solely HC, the implementation of various hybrid HC-based techniques, such as HC + H2O2, resulted in a larger COD reduction. The COD decrease reached a maximum of 87. 2%.

We will demonstrate that different contaminants must be successfully removed using a different sort of hydrodynamic cavitation and dosing, such as Ozon (different removal method). Although there is still a long way to go before hydrodynamic cavitation is used as a regular water cleaning technique, recent findings have already demonstrated considerable promise for optimization, which could result in a low-energy instrument for water and wastewater cleaning.

**Keywords -** Sewage water treatment, COD, $H_2O_2$ Dosing.

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# Calcium based egg-shell waste catalyzed biodiesel synthesis from waste cooking oil

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**ABSTRACT**

Being a renewable and environmentally benign alternative to traditional petroleum fuel, biodiesel has been called the best option. The amount of non-renewable energy consumed keeps rising. Most countries use a lot of biodiesel fuel because it is safe, environmentally friendly, and emits fewer greenhouse emissions (GHGs). The high cost of raw materials and processing due to the high cost of catalysts and biodiesel feedstocks is the drawback of marketing biodiesel. In order to lower the cost of raw materials, waste cooking oil (WCO) may be successfully utilized in the production of biodiesel. Also, it helps in lowering WCO disposal, which could otherwise lead to environmental damage. The purpose of this research is to evaluate the efficacy of the used eggshells as a heterogeneous CaO-based catalyst for the transesterification process that produces biodiesel. Waste eggshell may be removed using a straightforward heat treatment method since it includes the heterogeneous catalyst CaO. In this work, catalyst loadings of 1, 2, 3, 4, and 5 wt. % were utilized. The reaction's variables, such as the quantity of catalyst utilized, are influenced by the biodiesel yield. The results of this paper show that compared to other catalysts in the trials, the low-weight catalyst produced higher biodiesel (59% of yield). Previous tests demonstrated a biodiesel yield of 49. 48% using the same CaO catalyst with a 1 wt. % catalyst. Results showed that waste eggshells might be used as a powerful catalyst to turn spent cooking oil into biodiesel. This would greatly reduce the cost of biodiesel and improve product output and fuel characteristics.

**Keywords :** Catalyst, Egg-shell, Transesterification, Biodiesel.

# Hydrodynamic Cavitation : A New Technique for Milk Preservation

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**ABSTRACT**

A variety of bacteria can flourish well in raw milk as a culture media. As a result, within two to four hours of milking, many microorganisms thrive there and cause spoiling in raw milk. This makes it unfit for eating, as do the extended travel hours. Moreover, the existing preservation technique is both expensive and harmful. Also, the current procedure uses a lot of energy and is therefore not environmentally friendly. Technology for pasteurization, packaging, pasteurization, and storage is currently available. The cost of this procedure is high. Nutritional loss occurs as a result of pasteurization. This present work incorporates the use of cavitation technology rather than pasteurization, for food which is a revolutionary method. The microbial degradation of raw milk can be stopped by disinfection or a decrease in CFU count using cavitation as an application. Since it uses less energy and power and prevents nutrient loss, hydrodynamic cavitation is extremely economical in terms of commercialization. The process of vaporization, bubble production, and bubble implosion known as hydrodynamic cavitation occurs in a flowing liquid as a result of a fall and subsequent increase in local pressure. The bacteria are killed when shock waves from the intense pressure hit its nucleus. This event is what caused the CFU count to drop from 5. 6 ×106 to 6. 1×102. This tactic is distinctive because it has never been shown before.

**Keywords :** Cavitation, Food Preservatives, Milk Preservation, Pasteurization.

# Making Bio-Sanitary Pads Out of Cow Dung

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**ABSTRACT**

Due to societal, cultural, and religious limitations as well as a lack of information, menstrual hygiene is not properly practiced in rural India. Due to their ignorance about goods like tampons, menstrual cups, and sanitary napkins, women cannot adequately practice good menstrual hygiene during their periods. In India, sanitary napkins are a relatively accessible answer to this issue, but the price of these napkins is the largest obstacle to their use. Rural women often use dirty cloths, rags, and other items since sanitary napkins are so expensive. These items are extremely filthy and can spread serious diseases like cancer and vaginal infections. Ectopic pregnancy and infertility are caused by sanitary pads made of petroleum. The production of biodegradable sanitary napkins is the answer to this issue. Elderly women, as well as women in rural and tribal areas of several countries, utilize dried cow dung cakes for menstrual blood absorption, which is quite unhygienic. This gave us hope that cow dung can be effective at absorbing menstrual blood. Cow dung has substances that can absorb blood. When the cellulose from cow dung is removed, it is transformed into CMC (Carboxy Methyl Cellulose), which is mixed with Na Alginate (50%) to create drogels, a gel-like substance that serves as a superabsorbent component in sanitary napkins and is biodegradable. The sanitary pads were developed to be extremely absorbent by combining these two ingredients with extra absorbing agents. 34 ml of blood are absorbed. Cow dung manure is a reliable, easily accessible renewable resource that can be used to produce sanitary napkins that are cheap for women and, more importantly, disposable and biodegradable in comparison to other brands of pads.

**Keywords:** Women Hygiene, Biodegradable Hygienic sanitary Pads, Extraction of cellulose.

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https://www. researchgate. net/publication/343248417_Jute_Plant-_A_Bio-Degradable_Material_in_Making_Sanitary_Pad_for_Sustainable_Development

# Sustainable bio-diesel production using waste as feedstock : A Review

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**ABSTRACT**

The need for alternative renewable energy has increased due to the rising level of global warming and the depletion of fossil fuels. With a same cetane number and oxygen stability as regular diesel, biodiesel becomes a promising replacement. The use of edible oil in the production of biodiesel raises the cost of production and has an impact on food security. To reduce processing costs and waste deterioration, researchers are currently using various waste oils as feedstock. The purpose of this study is to shows the possibility of used cooking oil as a feedstock for the transesterification process that produces biodiesel Waste cooking oil, cotton seed oil, chicken fat, watermelon waste oil, and other types of waste oils have all been employed as feedstock. Many chemical catalysts, both homogeneous and heterogeneous, as well as biocatalysts, have been used to speed up reactions. Due to their affordability and environmental friendliness, bio-catalysts have gained major importance in recent years.

# Pyrolysis of Textile Waste Under Atmospheric Conditions

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**ABSTRACT**

Pyrolysis is the process to convert organic materials like plastics, biomass, textile waste through thermal degradation into the liquid product that can be further purified into oxygenated fuel additives, hydrocarbon biofuels, etc. This process is carried out in the absence of oxygen. Pyrolysis is very beneficial & important process in industry. This process helps to reduce solid waste pollution. Textile waste is one of the major solid wastes. Textile waste is a material which is unusable left after the finishing of any textile product. Every year worldwide 1. 92 million tons of textile waste is produced in which 52. 2% is polyester & 23. 2% is cellulose. The experimental study on the pyrolysis of textile waste i. e. , cellulose & polyester is discussed in current paper. To get the yield i. e. pyrolysis oil product, both textile materials (cellulose & polyester) requires the period of 2. 5 hours and the temperature reached upto 160 °C for cellulose & 179 °C for polyester. By feeding 25 gm of each material at initial stage of the process, results in 26% & 4% liquid product (pyrolysis oil) and 28% & 26% solid product (bio-char) for cellulose & polyester respectively. Due to high amount of uncondensed gases i. e. , 46% for cellulose & 70% for polyester, the quantity of product oil get affected. Cellulose found more superior than polyester in case of their liquid product purity just after the pyrolysis process.

**Keywords:** Pyrolysis, Textile Waste, Cellulose, Polyester, Pyrolysis oil, Bio-char, Uncondensed gases, Liquid product purity.

# Microencapsulation of Limonene by Using Polyurethane Melamine Formaldehyde

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Melamine formaldehyde microcapsules containing fragrant oil are produced using a technique that is widely utilised. Utilizing this technique, fabrics' olfactory performance can be improved. It is extremely difficult to disseminate in low levels of formaldehyde, improve olfactory advantages, and carry the fragrance in the capsule during storage. A Melamine Formaldehyde microcapsule known as MechacapsTM was created by Givaudan. According to Sofia N. Rodrigues, using the interfacial polymerization approach, they were able to create polyurethane-urea microcapsules with a solid content of roughly 41% and a pH of 7. 18 for the microcapsule solution after washing. After five dry cleaning cycles, up to 97% of the limonene is lost, ranging from 24% in the first cycle. We have developed many cores using substances like polyurethane at this time. In our research, we chose to combine polyurethane with melamine formaldehyde, adding a reaction scheme at various pH levels to extend the lifespan of the microencapsules and produce a solid free emulsion.

**Keywords:**Microencapsulation, Polyurethane, Perfume for cloths.

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# A Review : Recycling of rubber waste using Pyrolysis into Char, Liquid & Gases

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**ABSTRACT**

Solid waste is now very crucial problem now a days in the world, Rubbersare made by chemically cross-linking polymer-filler components, so, recycling of rubber waste is difficult. Pyrolysis is regarded as a potential recycling technology among the several rubber waste disposal options. With the use of the pyrolysis process, hundreds of tons of used rubber waste could be converted into gaseous, liquid, and black carbon char. Pyrolysis is a method that involves melting used rubbers without oxygen. Pyrolysis is used to liquify the rubber and prevent combustion, used rubbers can be converted to char, gas, and oil. Using rubber waste and recycling techniques can help to lessen environmental impact. Recycling helps to lessen all of these threats by reducing solid waste and producing products from waste materials at a reasonable cost. Used rubber products can be recycled and turned into valuable products using a variety of physical and chemical processes that seek to recover materials, energy, or chemicals from them. In this present work we studied different methods of utilization of rubber solid waste and its useful products obtained from rubber waste by pyrolysis. As per the study present work suggest that any mechanical or chemical process can be used to recover the rubber recycling powder. The high-grade reclamations that were found can be used by the rubber industry. The resulting reclaims can replace 15 to 35 percent of the virgin rubber without changing the essential chemical, physical, or mechanical properties of the rubber vulcanizates. It's feasible to save money. Overall, pyrolysis is less harmful to the environment. However, pyrolysis process innovations and research must be undertaken in order to increase conversion, particularly with regard to the environmental factor.

**Keywords:** Rubber Waste, Pyrolysis, Recycling, Solid waste.

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# Segregation of Plastic Bottles Using Artificial Intelligence

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**ABSTRACT**

Plastic waste management is a significant issue these days and it is only getting worse as cities grow in size. Plastic waste is frequently a combination of various types of materials. Management of solid waste may be an important demand in several countries for eco-friendly property development. It is critical to sort plastic so that waste can be properly disposed of at waste sites. Sorting plastic waste requires more work force and takes longer time. Plastic waste sorted and handled utilizing various methods, and yet all of them required prone to human error, making it difficult.

Biodegradable waste, whereas non-biodegradable waste does not decompose. It should be noted that many non-biodegradable waste materials are hazardous for the environment. In this paper, we attempt to design a system that only identifies a plastic bottle and categorizes and sorts it as recyclable or non-recyclable plastic waste.

We intend to create a system that only identifies a plastic bottle and classifies and sorts it as recyclable or non-recyclable plastic waste. The Arduino IDE is used to code the project. Before programming the ESP32 Microcontroller Board, it must be added to the Arduino IDE Software. Python is used to process images. The Anaconda Distribution is the primary setup for running Python code. OpenCV is used to distinguish between recyclable and non-recyclable plastic bottles. This system makes use of image datasets for learning and training.

**Keywords:** Recyclable plastic, non-recyclable plastic, OpenCV, Sorting.

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**Acknowledgements**

**Contribution:**

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# Potable Water Filter using coconut derived activated carbon char

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## ABSTRACT

Due to contaminated ground water, there is a severe problem with the availability of potable water everywhere. Some of the main impurities of ground water are heavy metals like lead, chromium (Cr), and metalloids like arsenic (As), which are dangerous to human health. The goal of the current effort is to develop a multipurpose, two-compartment integrated water filtration system for use in communities and to validate it on a lab and pilot scale. The elimination of flocculating contaminants and enhancement of the taste and odour of drinking water are the major purposes of the top compartment. Sand layers that have been functionalized to remove metal and microbiological impurities make up the second compartment. In this work, we took char from coconut shells, activated it, and formed an activated carbon cake. To increase porosity, we used jambha stones that were between 5-8 mm in size. Before and after filtering, the developed integrated water was tested for COD (Chemical Oxygen Demand) and BOD (Biological Oxygen Demand). Before filtering, the water's COD result was 55 ppm, while the BOD result was 9 ppm. The water findings for COD and BOD after filtering are 20 PPM and 2 PPM respectively. According to the results, this procedure is practical and secure for drinking. This filtration's material is readily available, fungus-free, easily replaceable, dependable, and secure.

**Keywords:** Potable Water Filter, COD, BOD, Activated Carbon, Drinking water.

# Automatic Sorting & Packaging of Moulded Parts through Conveyor

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**ABSTRACT**

This project is related to designing and manufacturing of Special Purpose Machine in which sealing and conveying is main system. This project is about the study and design of sorting and packaging system. In this project we design inclined type belt conveyor, Weighing System and Pneumatic Sealing System for injection moulded partseg. Click pencil cap, body, cone cap etc. The results comprise of Selection of optimum during designing, capability, energy calculations at the pulley, strain analysis on pulley power shaft, on additives of belt conveyor and its impact, superior heating temperature. Geometrical modelling has been carried out the usage of stable works 2018 and analysis using Ansys.

**Keywords :**

Special Purpose Machine, Automation

**Reference:**

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# Studies In Hydrogen Generation in Aluminium-Water Reaction

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**ABSTRACT**

Hydrogen is considered as a future fuel owing to its very high energy content (thrice of gasoline) and clean combustion products. Present study focuses on the in-situ/on-demand production of hydrogen gas using aluminium-water reaction in presence of sodium hydroxide. The waste aluminium obtained from food grade aluminium foil (10. 5-micron thickness) was utilized as the source of aluminium. The aluminium activation has been attained by using a strong base sodium hydroxide (NaOH). Hydrogen generation in the aluminium-water reaction has been parametrically studied at concentration of 0. 5N aqueous NaOH and at various temperatures of 30, 50, 70, and 90$^{o}$C. The near complete conversion of aluminium fed in the reaction was observed at all used temperatures in the reaction. The trends of rate of generation of hydrogen have been also presented and discussed in the present paper. The maximum rate of hydrogen generation was found to be **161. 8 ml/min/0. 1 g of Al** at **70$^{o}$C**. The obtained hydrogen generation data have been treated using Arrhenius equation for calculating activation energy of aluminium-water reaction which is found as **19. 2 kJ/mol**. The data obtained in the present study will be useful in designing a commercial system of hydrogen generation.

**Keywords:** - aluminium-water reaction, aluminium foil, activator, rate of hydrogen generation, commercial accessibility.

# Investigation On Factors Affecting Batch Drying

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**ABSTRACT**

In industries including medicines, agriculture, food, fertilizers, and chemicals, drying is among the most crucial processes. The product should always be dried in a less amount of space and time. The drying process lightens the product and lowers the transportation expense [1]. The most important factors for a successful drying operation are time needed for drying, drying rate, fresh air humidity, air velocity, and material thickness [2, 3]. In batch drying, pastes, lumpy solids, and other pasty materials that may be spread out on trays and dried by continually blowing hot air on their surfaces are commonly dried using tray dryers. As a result of hot air absorbing moisture from the solids, exhaust becomes humid. Depending on their function, efficiency, drying rate, and other factors, many types of batch dryer equipment are utilized in various sectors. The current investigations examine the impact of air velocity, cake thickness, and air temperature on the performance characteristics of the dryer. For various drying conditions, drying curves are plotted and explained. The amount of time needed for drying is theoretically determined and compared to actual time. Foods and vegetables that have been dried should be observed for changes in taste, colour, texture, and hardness in some cases [1, 2]. It was observed that the drying rate increased with increase in temperature and air velocity but decreased with time [3].

**Keywords:** drying time, velocity, temperature, drying rate, moisture.

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# Synthesis of bioethanol from sugarcane molasses

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**ABSTRACT**

In recent years, the usage of biofuels as fossil fuel alternatives has increased. Even more interest has been focused in recent years to the process of turning biomass into ethanol fuel, which is considered to be the cleanest liquid fuel that can replace fossil fuels. As India is a well-known agricultural country so that it is the largest producer of sugarcane. Now a days India produces a maximum amount of sugar and Jaggery from sugarcane. But, due to the large amount of sugar produced from sugarcane the sugar factories purchase sugarcane at low cost from farmers. So that farmers are going in to loss. So solution on that Indian government start a new project based in directly bioethanol production from sugarcane. This projects increases the cost of sugarcane and indirectly sugarcane farmers can get a well price in future. By product from sugar industry is molasses, from that molasses bioethanol is produces. Sugarcane contains large amount of sucrose and convert it into a glucose or fructose by fermentation reaction and then into a bioethanol. Ethanol has a good liquid fuel properties therefore the fuel cost can be reduced if the bio-ethanol is mixed with petrol and diesel. Manufacturers of automobiles recommend and even advise using 10% ethanol-enhanced fuel in all of their vehicles. E85—a combination of 85% ethanol and 15% petroleum the fuel type intended for flexible fuel cars. As ethanol biodegrades, it won't impact groundwater if there is a spill. A renewable fuel with a clean burn, ethanol. Fuel with 10% ethanol content can minimize carbon monoxide emissions by as much as 30% as opposed to pure gasoline. So, utilizing fuel supplemented with ethanol is good for the environment. Therefore Bio-ethanol production from sugarcane is an attractive feedstock. From GC analysis the purity of bioethanol is analyzed.

**Keywords:** sugarcane, Bio-ethanol, fermentation, yeast, molasses.

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# Amino Acid Extraction Through Human Waste hair

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**ABSTRACT**

India produces a lot of human hair waste from its temples and saloons; in 2010, India alone exported almost 1 million kilograms of hair. Human hair waste is burned and degraded, raising environmental issues. Considering human hair is a material that is often seen as being useless, it has been found in basically every city and village in the world's municipal waste streams. Human hair is made up of a protein known as keratin which is made up of 18 different amino acids such as Alanine, Arginine, Aspartic acid, Cystine, Cysteic, Citrulline, Isoleucine, Glycine, Glutamic acid, Histidine, Leucine, Lysine, Methionine, Ornithine, Phenylalanine, Proline, Serine, Tyrosine, Threonine, Tryptophan, and Valine etc. These amino acids are extracted by hydrolysis process in presence of acidic catalyst. This combination of amino acids is used as a plant booster to promote plant growth, metabolism, protein synthesis, and insect protection. The most promising fertilizer sources among alternatives are amino acid-based bio fertilizers made from keratin waste since they are environmentally friendly and renewable. The protein that is present in the greatest amount in hair is alpha keratin, which is fibrous and contain low Sulphur. Human waste hair is one of the available raw materials, and because it is less expensive and simpler to gather than other keratin waste, it may be the best raw material for the manufacturing of amino acids because the cost of production will be lower.

**Keywords:**Amino Acids, Human Hair Waste, Keratin, Hydrolysis.

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# Bioplastics from Biomass: future scope and prospects

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## ABSTRACT

Bioplastics are derived from agricultural resources and biomass raw materials which are renewableand therefore sustainable and eco-efficient materials. Bioplastics are the materials that are bio- based, biodegradable, or both. Bioplastics made from natural and environmentally friendly biopolymers, such as cellulose, starch, proteins, lactic acid, hydroxyalkanoates or other materials derived from plants or microorganisms. Low cost or wasted biomass, bio-colloids, water- soluble biopolymers, polymerizable monomers, and nutrients are provided as viable components for biotechnological transformation into bioplastics. Multifunctional bioplastics are introduced considering the structural, chemical, physical properties also it is high abundance, low cost, and the renewability. Recently natural and renewable materials have started to be used in industry, suchas and vegetable oils, gluten, egg whites and sago starch in plastic production for bioplastic production. Bioplastic production saves fossil fuels, reduces carbon dioxide emissions and plasticpollution in the environment. Demand for bioplastic in a packaging is growing among retailers andthe food industry. Bioplastic packaging materials are alternatives to conventional plastic materials. It already plays an important role in various fields of application. Bio-based bioplastics have the same properties as regular plastic and offer additional benefits as they have a lower ecological footprint on the environment. The main points of attention for packaging materials in the future arereduced (lightweight), renewable and recyclable. Currently, many scientists and engineers aroundthe world are very interested in bioplastics due to its fragility and exposure to water, lack of goodratio, low melting point compared to plastic oil. This article attempts to briefly explain recent developments in the field of bioplastic packaging applications such as food and beverage, healthcare, cosmetics, and pharmaceuticals.

**Keywords:** bioplastic, biomass, biodegradable, composites.

# Synthesis of Furfural Oil from Biomass of Corn Cobs

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## ABSTRACT

Solid agriculture waste which contents pentosan has economic values to be convert in various furfural products. Furfural making process uses semi-batch process and hydrolysis is the mainreaction catalysed by sulfuric acid. In current study, one of the agri-waste, corn cobs were usedfor furfural production. The experimental conditions were set to T= 127°C to 162°C and P= 2kg/cm² to 7 kg/cm². Yield of furfural was reported as a function of reaction temperature, particle size, acid concentration and liquid/solid ratio. The concentration of furfural produced was analysed by gas chromatography (Agilent 6820, Palo Alto, CA, USA) with FID and Innowax polarity column (30m x 0. 32nm x 0. 5µm). Final yield of furfural was found to be **170gm** from **9kg** of corn cobs and **400gm** of sulfuric acid was consumed. Produced furfural was purified by azeotropic distillation and dehydration column to gain maximum purity.

**Keywords** : Furfural, Sulfuric acid, Corn Cobs, Distillation

# Impact of metals and alloys, its merits and demerits

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**ABSTRACT**

Metals are natural substance found in earth crust in form of metallic ores. Its property is considered with some merits and demerits. It is mainly lustrous, malleable, ductile, sonorous, shiny in nature. Metals are classified according to its deleterious effects, medicinal purposes, preciousness. also, metals are available in various forms such as liquid, transition, and trace. Whereas, alloys defined as heterogenous combination of metals. Alloys gain its popularity due to use in medical implants and aircraft. Alloys exhibit properties like toughness, non-corrosive, malleability and ductility. Overall major drawback subjected to metals and alloys is its corrosiveness and its treatment cost is more.

**Keywords :** Metals, Alloys, Malleability, Medicinal purposes, Treatment cost.

# Valuable Products from Agro-Waste Cashew (Anacardium Occidentale) Nut Shell : A Review

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**ABSTRACT**

Agro waste utilization can serve twin purposes of providing renewable feedstock and minimization of solid waste. Various products can be synthesized from wastes. The agricultural waste includes rice husk, coconut shell, cashew nut shells, leaves of banana, mango, pineapple etc. Cashew nut shells can be used as a sustainable source for the production of oil, chemicals, adsorbents, materials and energy. A very large number of products are produced by making use of cashew nut shell liquid oil such as friction linings, laminating resins, rubber compounding resins, cashew cements, polymers, surfactants, epoxy resins, foundry chemicals, paints and varnishes.

**Keywords:** sustainable synthesis, cashew nut shell, anacardium occidentale, activated carbon, agro waste.

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# Development of Triboelectric Nanogenerator for Storing Energy

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**ABSTRACT**

In today's fast growing world, an external power source may become indispensable to the electronic devices due to the limited capacity of batteries. As one of the possible solutions for the external power sources, the Triboelectric Nanogenerator (TENG) provides a novel idea to the increasing need of energy. It is used for the acquisition and conversion of mechanical energy to other forms of energy through the principle of electrostatic induction. Our aim is to design and manufacture a prototype model of a Triboelectric Nanogenerator. It will store electrostatic charge generated by our daily life movements and we can further use the stored energy according to our needs in different applications. In this project, we are using the energy in the application of textiles (fabrics) or polymers.

We are focusing on a specific application of TENG i. e. trying to fit it in a shoe. Basically the aim of this application is to generate energy using the leg and foot movements of a human body with the help of the mechanized shoe. The shoe consists of a special customized insole made up of oppositely charged triboelectric materials. The two layers of the insole consist of transducers in between them for the effective transformation of mechanical (electrostatic) energy to electrical energy. This energy acquired can further be stored in some kinds of storage devices (e. g- capacitor) and can be used in any applications according to the user's needs.

**Acknowledgements**

Contribution: Use of workshops, 3D printers, research lab and also guidance from professors and research scholars at Pillai College of Engineering, New Panvel

# Rubber Nanocomposites: The future prospects and opportunities

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## ABSTRACT

Additive materials are necessary to modify the materials in order to improve the properties that aredesirable, and to eliminate or mitigate those which are undesirable. For the production of high- performance elastomeric materials, the integration of various types of nanoparticles such as carbonnanotubes, nanosilica, nano clay and carbon nanostructures particles in an elastomeric matrix are currently a booming field in rubber innovation studies. The properties and performance of the reinforced elastomeric composite mainly depend on the cross-linking chemistry of the rubbers, thenature of the fillers, the physical and chemical interaction of the fillers with the rubbery matrix. Nanocomposite materials have become an important class of structural elements. These materials are lightweight, flexible, and highly resistant to corrosion, impact, fatigue, etc. Due to these properties, nano composite materials are considered as replacements for traditional materials used in medical, chemical, civil mechanical, aerospace, automotive and other industries. Linkage of nanocomposites were also sorted using polymer nanoclay mixing, expanding the capabilities of thenanoclay to provides improved mechanical and thermal properties. The polymer nanocomposite represents a new method to improve the properties of polymers and their utility can be extended from macro scale to nano scale. This article attempts to briefly explain recent developments in thefield of nanofillers and their rubber nanocomposites. study concludes with new applications of rubber nanocomposites and future prospects in this field.

**Keywords:** nanocomposites, additives, nanofillers, rubber compounding, Rubber Matrix.

# A Critical Review on Incredible Properties and Applications of Carbon Nanotubes

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**ABSTRACT**

Carbon nanotubes are a future-oriented, cutting-edge material that is also one of the most novel discoveries made in the field of nanotechnology. Researcher has invested heavily in deciphering the futuristic element over the years. Carbon nanotubes (CNTs) are incredibly useful in many fields, including electronics and medicine, they can be formed into both single- and multi-walled varieties by rolling sheets of graphene in varied contexts. Carbon nanotubes are employed in a wide range of fields due to their unique capabilities, such as their high stiffness, enormous length-to-diameter ratio, and extraordinary resilience. Modifying carbon nanotubes diameter, chirality, wall structure, and length can alter their amazing capabilities. Finally, this concise review covered the environmental consequences and potential strategic implications of carbon nanotubes in commercial applications.

**Keywords :** Nanotechnology, Carbon Nanotubes, Single Wall Carbon Nanotubes (SWCNT's), Multiwall Carbon Nanotube (MWCNT's).

# A Review on Energy Devices from Natural Resources and Waste Materials

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**ABSTRACT :** Fuel emission's to environment is highly concerned to Global warming and its prior needs to control the same by different way of methodologies. Clean Energy has a big role in world environment transformation. Presently researchers are aiming to develop cheap electrode material to form a energy storage devices from natural resources and waste materials which will not have any impact on environment. The priority is given on carbon source finding from natural available resources and carbon potential waste materials. It contains different type of processes along with technological methodology approach, different properties study and its application as electrodes in energy storage devices. The objective is to know the different type natural resources and waste material for carbon base.

**Keywords:** Natural resources, Waste, Clean Energy, Electrode

# Synthesis of Lithium Iron Phosphate by Using Hydrothermal Autoclave Reactor

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**Abstract**

$LiFePO_4$ is a potential candidate for the next generation of secondary lithium Batteries as it is capable of storing more energy in small size. In this paper the experimental work is done on synthesis of $LiFePO_4$ , $LiFePO_4$ was synthesized by hydrothermal process by using four different types of capering agents. The compound has Olivin like structure. This structure is a useful contributor to the cathode of lithium rechargeable batteries. The reaction principles for synthesis of $LiFePO_4$ composite were analyzed, suggesting the most effective capering agent. The structural and compositional properties of $LiFePO_4$ were characterized by X-ray diffraction (XRD). The further research will be proceed on development of lithium Iron Phosphate Battery.

**Keywords:** Synthesis, Hydrothermal, $LiFePO_4$, XRD

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# Synthesis And Processing of Composites

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**ABSTRACT**

Composites are simply a combination of two or more constituent materials with different physical or chemical properties. They are mainly classified into two types namely ceramic composites and metal composites. Fiber and matrix materials are reinforced to produce a new material which has higher chemical stability, excellent corrosion resistance, light weight, higher durability and strength. Composites are ideal for applications in corrosive environments. They are widely used in mechanical equipment, chemical processing plant equipment, storage tanks, infrastructure and household equipment.

Ceramic matrix composites are made by processes such as 1) slurry infiltration where slurry percolates into a porous material further forming composite. The driving force for this process is capillary effect but it can also be enhanced by applying vacuum or pressure. 2)Chemical vapors infiltration (CVI) is a process where a matrix material is infiltrated into fibrous layers by using reactive gases at high temperature to form fiber reinforced composites.

Metal matrix composites are mainly classified as particle reinforced, short fibers or whiskers reinforced and continuous fibers or sheet reinforced metal matrix composites. Mostly the matrix used is Aluminum, Steel, Magnesium, titanium, cobalt, and cobalt-nickel. And reinforcement used is Alumina, Zirconia, SiC, TiN, cBN (cubic boron nitride) etc. In-situ fabrication of mmc dispersed phase is formed in the matrix because of precipitation from the melt during its cooling and solidification. Particulate in-situ mmc e. g. -aluminum matrix reinforced by titanium boride ($TiB_2$) particles. Short fiber reinforced in situ mmc e. g. -Titanium matrix reinforced by titanium boride ($TiB_2$) whiskers. Long fiber reinforced in situ mmc e. g. -Nickel aluminum matrix reinforced by long continuous fibers of (Mo)

**Keywords:** Slurry infiltration, Chemical vapour infiltration, mmc-(metal matrix composite)

# Preparation of herbicidal nano composites and their characterization

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**ABSTRACT**

Chitosan, a Natural polymer have shown good results in pharmaceutical field and nano composites of chitosan may minimize the leaching of herbicide and protect ground water contamination. Many herbicides which used in agrochemicals. They protect the crops from herbicides etc. These are reported to have leaching potential to contaminate the ground water. Chitosan clay-based composite can reduce the leaching of herbicide and save the ground water contamination. Chitosan clay nano composites has been made with various ratio of chitosan and clay. Bentonite clay is used for the investigations. The optimum ratio of bentonite clay and nanocomposite was 10:1 and 5:1. Thermal Gravimetric analysis and Fourier-transform infrared spectroscopy technique has been used to characterize the nano composites.

**Keywords:** Chitosan, Bentonite, Nanocomposite, Biopolymer, Herbicide

# Artocarpus heteropyllus lam. leaf extract as a green corrosion inhibitor for mild steel

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**ABSTRACT**

Corrosion is a spontaneous process that adversely affects the strength and quality of economically vital materials including steel. Artocarpus Heteropyllus Lam. as a non-toxic plant contained different phytochemicals. Leaf extract of Artocarpus Heteropyllus Lam could be used as an inhibitor to reduce corrosion rate. To better understand the corrosion properties, corrosion studies on Mild Steel MS-105 were carried out in 1M HCl and 1M H2SO4 solution with Artocarpus Heteropyllus Lam Leaf extract as an inhibitor. The tests were run for 72 hours at 30 °C. The corrosion rate and weight loss of alloys owing to corrosion were estimated. To comprehend the mechanism underlying the corrosion inhibition, the phytochemical screening of the inhibitor was carried out. To investigate the effects of inhibitor concentration, exposure period, and various media, experiments were carried out. For each of the experimental circumstances, the corrosion efficiency was identified. The results demonstrate that the leaf extract effectively inhibits mild steel from corroding in an acidic medium.

# Utilization of Crumb Rubber (Tyre) For Water Proofing

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**ABSTRACT**

This paper shows the experimental study on the consumption of refuse Tyre crumb rubber in mortor in replacement of fine aggregate in different percentages. It focuses on determining the engineering properties of the rubber water proofing. Decomposition of waste Tyre rubber can take longer year, and every year the variety of discarded Tyre is rapidly growing. We describe that the use trying out of recycle rubber Tyre crumb as chance production cloth with waterproofing capacity that would function as a excessive chance to the present waterproofing products. This accumulate waste material may be utilized in Civil Engineering construction production. The check approaches on these studies made use of tests like water absorption, compression strength making use of exceptional sieves sizes of rubber crumb, cost compression etc. The end result of check for waterproofing capacity of rubber concrete aggregate the use of the those check approaches had been in compression with a number of the waterproofing product to be hadwith inside the market. for the assessment reason 5 baskets (samples) are casted as compatible with exceptional ratio 1:4 with rubber crumb was taken on different proportion of 20% , 7. 5% , 10% , 12. 5 % and 15% . The 5 baskets (Samples) had been organized examined end result had been were discussed.

**Keywords :** Rubber crumb, Compressive strength , Mechanical Properties, Fine Aggregate, Waste Tyre.

**Acknowledgement :** We would like to express our special thanks of gratitude to our HOD of Civil Engineering Department Ms. A. D. Bhosale. We would like to thank our Principal S. K. Patil for giving the guidance and their valuable views about project . We would like to thank R. S. Kelkar for helped us during the work .

# Emerging Technology: Foamed Polymer Concrete

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**ABSTRACT**

The concrete is an important part of construction industry. The field of concrete technology has under gone several changes in past few decades. One of them is addition of foaming agent in concrete. Foam concrete is a type of aerated concrete, having properties like light weight, fire and water resistant. The foamed concrete, which is a lightweight concrete having more strength-to-weight ratio with density varying from 300 to 1850 kg/m$^3$. This reduces the dead load on the structure, cost of production and labour cost involved during the construction and transportation. The structure becomes appropriate for all climatic conditionsdue to its pores nature which makes it thermal reducer and sound absorber. The paper reports a review of foamed concrete in terms of components, casting, mixing and proportion of ingredients. The foam concrete made using fly ash, Epoxy resin and Epoxy hardener, aluminum fine powder as foaming agent. Further, various mix proportion design discussed. The tests work performed for mechanical properties like compressive strength, density, impact sustaining nature and flexural strength.

**Keywords :** Concrete, Foaming Agent, Epoxy, Strength

**Acknowledgements**

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# Conversion of PET to Alternative Feed Stocks

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**ABSTRACT**

Polyethylene Terephthalate referred as PET Commonly used in Packaging Industries for Soft drink and water bottles. After usage these PET remain as it is in Environment as it do not decompose naturally which has caused for its huge accumulation on Earth Surface. These PET can be effectively converted into at feed stock for various materials, by simultaneous Glycolysis and Hydrolysis process. Consumed PET bottles are cleaned andgrinded then in Presence of constant volume of ethylene glycol and varying Water volumewith addition of zinc acetate, xylene and emulsifier reaction is carried out at 170-180°C for 3 hours in Stainless steel reactor resulting in esterification reaction. Product is filtered, distilled, dried and collected in Powder form obtained is oligomeric intermediates which is tested by conducting pyridine test. The product formed are being used in resin production for Paints, clothing, coatingindustry, etc.

**Keywords :** Alkyd resin, Polyethylene terephthalate, Glycolysis, Hydrolysis, Chemical recycling

# Solvent Extraction of Kokum Butter from Garcinia indica choisy seeds

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**ABSTRACT**

Garcinia indica is commonly known as Kokum, is a plant native to certain regions of India. Kokum is a slender but very sturdy evergreen tree and does not need elaborate irrigation or use of fertilizers, pesticides, or herbicides. This tree yield fruits annually in the summer during the months of March to May. Kokum fruit is use to make pickles, juice and as acidulant in curries. Kokum butter is prepared from the seeds inside this fruit and is of both commercial and medicinal use e. g. , soaps, balms, lotions for body and foot care, raw material for cosmetics, wound and scar healing creams, and other emollient skin treatments. In this paper we have used the leaching method to extract the kokum butter from Garcinia indica choisy seeds. We have used different solvents like $CCl_4$, $C_6H_{14}$, $C_2H_5OH$, $CH_3OH$ for the process. We have also found out which is the best solvent for extraction of Kokum butter from Garcinia indica seeds. Soxhlet apparatus has been used for the process of extraction, it is a very popular method and is being considered as a reference for several existing modern extraction techniques like Multistage cross current extraction. Extraction using Soxhlet apparatus is a slow process and requires separation methods like Distillation to get the analyte. Distillation is the preferable method so to recover the solvent used for extraction.

# Modelling and Simulation of Multi-tank Liquid Level Control System

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**ABSTRACT**

Industrial control problems are usually multivariable in nature and highly non-linear. The design of Multiple Input and Multiple Output(MIMO) system is very essential in any process industries. The two tank system is one of the benchmark that can be used to demonstrate various control concepts. The various disturbances are responsible for the controller performance. The steady state analysis and model linearization is done using mathematical operations. The performance of the system is done by conventional Proportional-Integral(PI) controller.

This project paper analyses the proportional-Integral controller's performance for a two-tank process. Basically, it is level control problem based on two tanks interconnected with two pumps. The input to the process is voltage applied across the pumps and output is the water level in the tanks. In the industries the chemical or mixing process are carried out but always the level of liquid fluid in the tank must be controlled.

**Keywords :** Proportional-Integral controller, PI controller, MIMO, multivariable

# Degradation of Dyes Using Hydrodynamic Cavitation

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**ABSTRACT**

The organic waste water discharged from various industries consists of large amounts of dyes and cyanides and other toxic carcinogenic pollutants which are harmful to human health and ecosystem. Therefore, it is undoubtedly important to treat the dye wastewater prior to its discharge into a water body. There are various methods available for the treatment of wastewater containing dyes such as conventional biological treatment (aerobic and anaerobic), adsorption, coagulation and flocculation. The problem associated with the most commonly used and cost-effective biological treatment methods is that these methods are not able to completely degrade the dye effluent because of the complex and refractory nature of the dye molecules. Degradation of dyes by Hydrodynamic cavitation (HC) is a very efficient and economical technique, which depends on geometrical arrangement of orifice plate; cavitation number (CV) and various other parameters namely initial concentration, pH, temperature, and inlet pressure. This project focuses on the application of hydrodynamic cavitation in dye treatment and provides an overview of studies on dye degradation using hydrodynamic cavitation alone without using any oxidizing agents. The dyes used in the experiments were Alizarin Red and Reactive Black. The experiment was conducted at different concentrations of dyes (100ppm and 200ppm) and using different types of orifice plate (single hole and multi-hole) and was run for 4 hrs. The absorbance of the dye was measured using colorimeter. It was observed that absorbance of dye was decreasing with time. The Absorbance of Alizarin red at 100 ppm and 200 ppm concentrationusing single hole orifice platewas decreased from 0. 3 to 0. 1and 0. 98 to 0. 68respectively and using multiple hole orifice plate was decreased from 0. 3 to 0. 1 and 0. 98 to 0. 6 respectively. The Absorbance of Reactive blue at 100 ppm and 200 ppm concentration using single hole orifice plate was decreased from 0. 69 to 0. 5 and 0. 85 to 0. 71 respectively and using multiple hole orifice plate was decreased from 0. 69 to 0. 42 and 0. 85 to 0. 62 respectively. At some point the absorbance of dye was increased that was because of the lone radicals formed during the cavitation. These lone radicals tend to act on dye and hence absorbance increases but after sometimes they are also degraded and hence we can see

decrease in the absorbance. It was concluded that single hole orifice meter takes more time for dye degradation as compared to multiple hole orifice meter and also consumes more energy. Hence, multiple hole orifice meter is better than single hole orifice meter.

**Keywords:** Hydrodynamic cavitation, Dye degradation, Wastewater treatment, Reactive Black, Alizarin Red

# Removal of Chromium by Adsorption with Optimization of Affecting Parameters

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**ABSTRACT**

Waste water released from industrial activities is, loaded with toxic heavy metals like chromium, copper, lead, cadmium, nickel, zinc, arsenic, etc. which pose an increasing risk to not only human health but also the environment. These toxic metals can enter drinking supplies as the industrial waste water is introduced in the water streams, thus resulting in harm to aquatic and animal lives. These metals can get accumulated in the soil causing the agricultural damage. Therefore, it is essential to treat the waste water before releasing into waterways. In this current investigation, hexavalent chromium (Cr-VI) is removed using activated carbon derived from coconut shell by adsorption process. The experimental investigations have been carried out using activated carbon by varying the different parameters namely contact time for adsorption, pH of sample, initial chromium concentration in sample and adsorbent dosage. Batch experiments were carried out with the above parameters to determine the optimum conditions for removal of chromium. Increase in contact time of adsorption increases the removal to a certain time, beyond which it slows down and gradually it ceases. Similarly, increase in adsorbent dosage increases the adsorption until the adsorbent gets overcharged. The optimum pH for adsorption is in the acidic range as large number of $OH^-$ ions can from metal precipitate. Increase in initial concentration of chromium favors the adsorption. Analysis for chromium removal after the adsorption was carried out by the UV spectrophotometer.

**Keywords :** Adsorption, Activated Carbon, UV Spectrophotometer, Hexavalent Chromium, Optimization.

# Activated Carbon from Coconut Shell

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**ABSTRACT**

Water treatment processes such as sedimentation, filtration, clarification, coagulation, flocculation, chemical oxidation and adsorption Nowadays, carbon is one of the excellent element which have changed all over material sciences. A good and porous activated carbon is taken from carbon with better properties for wide range of industrial applications such as cosmetics. Activated carbon is the usual name used for a group adsorbing substance of crystalline form having a wide internal pore structures that makes the carbon more adsorptive. Material of the future is also known as activated carbons, because of their excellent performance in a number of process applications including water purification, decolourization , deodorization , coffee decaffeination, and removal of ammonia, drinking water treatment, air condition and industrial flue gas cleaning.

For this we used the equipment like electric furnace, crusher, sand paper and having raw materials coconut shells and CaCl2. Firstly we separate and clean coconut shell from other materials, such as coconut fiber or soil. Later sun dry Burn dried coconut shell at burning sink or drum at 300-500 °C for 3-5hours. After that soak charcoal in chemical solution (CaCl2 or ZnCl2) 25% V/V with water. And wash charcoal with distilled/clean water. After that spread on tray at room temperature to be drained. Dry in oven at temperature 110 C for 3 hours. And lastly crush or refine activated charcoal with crusher wood/iron into size of 100 mesh. Store the activated carbon for testing purpose.

The size range of granular activated carbon (GAC) is usually expressed as the sieve sizes. For example; an 8x30 US Mesh activated carbon means at least 93% of the granules by weight are larger than 30 Mesh (0. 60mm) and at least 90% of the granules by weight are smaller than 8 Mesh (2. 36mm). 12x40 US Mesh

We got results comparison with standard 1. Iodine number: 863 mg/g (500 to 1200 mg/g)

2. Surface area: 1189 $m^2/g$ (950 to 2000 $m^2/g$)3. Mesh: 1240 or 830

The procedure begins with bar screen which traps large size plastic, wrappers, plastic bottles etc. Stored in an inlet well and suck with the help of 60 hp 6 pumps, grid separator cleans the

mud and allows water for aeration and filling which is an aerobic reaction where air blower and diffuser are taken into action. Followed by Settling which is anaerobic reaction where bio-mass develops and metabolises organic impurities in the absence of air. Decanting takes place with the help of decanter and clean water is separated. Parameters studied are pH, BOD, COD, TSS, TDS

**Keywords :** Absorption , Water Treatment, Activated Carbon, Coconut Shell

# Comparison between Geosynthetic Clay Liner and Bentonite clay for Water Retention in Laterite soil

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**ABSTRACT**

In Konkan region, the high annual rainfall is around 3500 – 5000mm , but still most of the part of region faces scarcity of water during non-monsoon seasons as maximum part of Konkan belt have present of laterite soil. In this red coloured soil, due to the porosity and high sand content resulting high rate of percolation and infiltration of water. In-other hands we are using Bentonite clay and Geosynthetic clay linear to prevent the infiltration of water in soil.

After absorbing water, the sodium Bentonite dry particles have a lamellar and compact structure, and the number and size of the pores gradually decrease to spread the water evenly. (ParabChandrashekhar - 2021)

In current trends, bentonite clay and Geosynthetic Clay Liners (GCLs) are widely used in different kinds of anti-seepage projects. Hence in our research we are utilizing Bentonite clay as a admixture in Lateritic soil and application of Geosynthetic Clay Linear for the prevention of seepage loss. After Completion of experimental work around 30% to 40% of water retention is achieved.

**Keywords:** Geosynthetic Clay Linear , Bentonite Clay, Laterite Soil, Water Retention Capacity.

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**Acknowledgements**

We would like to express our special thanks of gratitude to our H. O. D of CIVIL Engineering Department Ms. A. D. Bhosale. We would like to thank our Principal S. K. Patil for giving the guidance and their valuable views about project. We would like to thanks our project guide Prof. N. H. Koppa who inspired us and gave us the golden opportunity to do the wonderful project on topic ‘Comparison between GCL and Bentonite clay for Water Retention in Laterite soil ”

# Extractive Distillation Unit Using Siphon Arm Principle

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**ABSTRACT**

Our work is concerned with the extraction of Cashew nut shell liquid (CNSL) production for the obtained CNSL many types of processes are used. For the experimentation, we used Soxhlet extraction and the Cross-Current leaching process. Soxhlet extractor and Cross-Current leaching give the best recovery of the product. It gives a good quality product and the best recovery of the solvent. For separating the product and solvent in both cases it is necessary to do the distillation separately, it takes much more time to get the product.

This paper's approach is to combine the extraction and distillation processes together and reduce the time which is required for the distillation process. For that, we modified the Soxhlet apparatus and combine the distillation, and design the new Extractive Distillation Unit Using Siphon Arm Principle. This unit process is reduced the distillation time. In this new process within the time of extraction, the distillation process is also done and saves time. This new process also gives a good quality product and the best recovery of the solvent.

**Keywords:** CSNL, Soxhlet, Siphon

# Preparation of Wine from Mix Fruit and it's Characterization

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**ABSTRACT**

The production of wine from mixed fruits is an interesting area of research with potential implications for small-scale wine production. The use of fruit mixtures for wine production has the advantage of producing a unique blend of flavors that can result in a unique and distinct taste. The use of the yeast strain saccharomyces cerevisiae for wine production is a well-established practice that has been shown to yield high-quality wine. This study aimed to produce wine from mixed fruits using the yeast strain saccharomyces cerevisiae and to test the physical and chemical characteristics of the resulting wine. The researchers conducted the production and testing of the wine in a simple laboratory setting, using basic lab utensils and instruments to reduce production costs. As more sugar is consumed by the yeast, the alcohol content of the wine increases, while the sugar content decreases, leading to a decrease in the total dissolved solids. The decrease in total suspended solids may be due to the settling of yeast and other solids during the fermentation process. The increase in total acidity may be due to the production of organic acids by the yeast during fermentation. These changes in physical and chemical characteristics are important factors that determine the quality and taste of the final wine product.

**Keywords :** Mix Fruits, Saccharomyces Cerevisiae, Wine, Fermentation, alcoholic beverage.

# Manufacturing of Calcium Oxide from Waste EggShells

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**ABSTRACT**

Chicken eggshell is household waste and its use is still relatively small, such as used as handcraftor art purpose. The amount of eggshell waste generation is expected to grow year by year and thiswill result in an environmental issue. Eggshell contain maximum amount of calcium carbonate which can be converted into calcium oxide. Calcium oxide (CaO) is also used as a catalyst. Manycommercial industries use Calcium Oxide as a catalyst in the reaction to increase their rate. The use of commercial Calcium Oxide is more expensive and has high cost of manufacturing. Eggshellis seen as an origin to produce Calcium Oxide which is one of the renewable material resources. Calcium Oxide from eggshell scraps is being considered to replace commercial Calcium Oxide asit is cheaper and reduces production cost, so we will replace the use of Calcium Oxide from nonrenewable resources with sustainable Calcium Oxide. The purpose of this study was to characterize Calcium Oxide from discarded/waste eggshells. This study, which focuses on the calcination, hydration, dehydration process is a satisfactory method for preparing CaO from chicken eggshells containing calcium carbonate as the main component. The manufacturing of calcium oxide (CaO) from chicken eggshell has been obtained by decomposition of shells at various temperatures 400, 700, 900 and 1000$^{o}$C. The product formed is metal oxide (CaO) whichis then analyzed by using SEM analysis and XRD analysis.

**Keywords :** Egg shell, Calcination, Hydration, Dehydration, Calcium carbonate, Calcium oxide.

# Extraction of Cashewnut Shell Liquid

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**ABSTRACT**

Cashew Nut Shell Liquid (CNSL) has many applications such as friction linings, paints, laminating resins, rubber compounding resins, cashew cements, polyurethane based polymers, surfactants, epoxy resins, foundry chemicals, and intermediates for chemical industry. Liquid from Cashew Nut shell is generally extracted by three methods viz. mechanical, roasting and solvent extraction which contains oil of about 20 to 25%. Solvent extraction (expeller) process of oil extraction is more feasible than other methods. The solvent ethanol was used as extracting agent in the present study. CNS to ethanol ratio of 1:3, 1:4 and 1:5 resulted in the yield of 29. 34 %, 37. 096 % and 40. 92 % respectively. Ethanol can be easily separated from the CNSL and resulted into the high yield with low cost. The effect of particle size on the yield of extraction was also studied. The average recovery of CNSL at shell moisture content of 8-10% on wet basis was found to be 80 – 85 %. The ratio of feed to solvent also important factor for extraction process which affect the yield of CNSL. The optimum value for feed to solvent was observed as 1:4 on the basis of maximum yield of CNSL extraction.

**Keywords:** - Cashew Nut Shells Liquid (Oil), Solvent Extraction, Ethanol, Moisture content, Shell Size and solvent to feed.

# Study of Co-Pyrolysis Behaviorof Groundnut Shell andPolyurethane Using TGA

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**ABSTRACT**

Biomass and organic industrial waste are being used as alternative energy sources due to the need for environmental protection and the depletion of fossil fuel reserves. The main composition of biomass consists of Cellulose or lignin and Polyurethene refers to a class os polymer composed of organic units joined by Carbamate (urethane). Biomass can be converted to a solid product called biochar, a condensable liquid called bio-oil, or a mixture of gaseous products that includes CO2, Co, H2, CH4, etc. Much work has been put into studying the conversion of biomass using pyrolysis in recent years. However, because polyurethane is a petrochemical-based polymer, it is important that we recycle them whenever possible to prevent precious raw materials from going to waste. One such issue is the deleterious properties of bio-oil, including the low heating value and the high instability at elevated temperatures. We studied TGA and experimentally perfomed pyrolysis and Co-pyrolysis of groundnut shell and polyurethane at atmospheric condition. We got the yield of oil that is 52%. wetry to increase the yield of oil.

**Keywords :** Pyrolysis, Co-Pyrolysis, Thermo gravimetric Analysis, Groundnut shell, Polyurethane, Pretreatment

# Wastewater Treatment by Cavitation

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**ABSTRACT:**

Water has been treated in a conventional way which is not possible to set up for small-scaleplants due to its economic value. The use of Hydrodynamic cavitation for water and wastewater treatment (cleaning) is a well-known procedure. The present work aims to know about the use of hydrodynamic cavitation for wastewater treatment in industries. To improve the system various trials have been carried out using different water samples under different conditions. We present the result of experimental studies Conducted at various times. These tests result in the plan of microbiological wastewater purification via Hydrodynamic cavitation and show a huge range of events for applying this method in different industrial fields. The fundamental criterion that supports our statement is the large drop in the bacteria number by increasing the cavitation treatment period. Cavitation alsoaffectsthe Hardness of water. Various have been used to study cavitation. This paper presents an overview of Hydrodynamic cavitation and its effects. The construction of the cavitation model and various parameters affecting them are studied. Orifice is used in this model. We aim to address the issue of wastewater treatment in an economical way.

**Keywords :** Cavitation, wastewater treatment.

# Flow of Granular Material Through Hopper

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**ABSTRACT**

In the field of mining, Pharma industry, mineral processing flow of granular material through hopper is crucial. In industries lots of problems happening related to the flow of granular material through hopper like rat-holing, arching, bridging, erratic flow, segregation etc. Granular material liberally exiting hoppers under gravity is one of the oldest and most studied problems in granular flow. Particulate matter is made up of distinct solids or particles that move like liquids. . Material flow through the hopper is a matter of basic industrial unit operation and granular flow, the material flows under gravity and exits the storage bin through the bottom outlet of the bin. Such funnels are very useful in the food, biopharmaceutical, and agricultural industries. It is crucial to comprehend and model such granular fluxes in terms of the variables that have an impact on them, including grain size, solid percentage, wall roughness, particle-particle interactions, and others.

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**Keywords:**Granular material, Hopper, Rat-holing, Arching, Bridging, Erratic flow

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# Experimentation on Cooling Tower to Study Factors Affecting on its Performance

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**ABSTRACT**

The cooling towers are broadly used for temperature control in various industries. as an experimental data obtained from actual laboratory scale induced draft cooling tower. In this experiment we are going to figure out which type of factors are experimentally on its performance. For this experiment a lab scale cooling tower was used where experiments performed with different wet bulb temperature, water flow rate and air inlet flow rate after completing one trial 2 to 3 sets of reading were noted down . From these readings we observed changes in effectiveness. We maintained inlet water temperature at 45°c to 47 °c. After these process we got 60% to 80% of effectiveness. After that we convert lab scale induced draft cooling tower into forced draft cooling tower. Then we operated it at different flow rates. After taking sets of readings. We compared calculations of these readings with the previous ones, then we conclude that when we operate forced draft cooling tower at high air flowrate it is slightly effective than the induced draft cooling tower.

**Keywords :** Cooling Tower, Factors affecting, Wet bulb temperature

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# Degradation of Sunset Yellow Dye Using Hydrodynamic Cavitation and Combination of Advanced Oxidation Process

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**ABSTRACT**

The main source for water pollution is the industrial wastewater is contain more amount of organic compounds such as chlorinated hydrocarbons aromatic compound, textile dyes, and phenolic compounds. The conventional biological processes are not able to completely degrade these compounds there are new technologies is advanced oxidation processes Advanced oxidation processes are the technologies that generally use the hydroxyl radicals. . There are various degradation technique like cavitations (acoustic And hydrodynamic ) photocatalytic oxidation. Amoung all AOP techniques, treatment of wastewater by cavitations is one of the finest alternative technique Degradation of sunset yellow dye is carried using one of the advanced oxidation processes is hydrodynamic cavitation. The effect of various operating parameters such as concentration of dye, pressure, pH of solution, Addition of $H_2O_2$ will be studied with the aim of maximum degradation. In industrial wastewaters such as dyes are not easy to conventional physical, biological and chemical purification process. Cavitation is the technique we study for treatment of wastewater by generating highly reactive free radicals. Hydrodynamic cavitation is the capable to generating hydroxyl radicals.

**Keywords :** Hydrodynamic cavitation, Degradation, Dye, Advanced oxidation processes,

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# Preparation of Microencapsulation using Melamine-Formaldehyde using Fragrant Oil

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**ABSTRACT**

Microencapsulation is a technique in which chemicals are released in a control manner. In this study melamine formaldehyde microencapsulation prepared by the situ polymerization method using fragrant oil as a core material and wall material is Melamine Formaldehyde. Tween 20 as emulsifier. It can be evaluated on their structure, thermal properties, and release behavior. The emulsion was carried with Melamine Formaldehyde at room temperature. Polymer are prepared atwith continue heating and adjusting Ph 8-9. The microencapsulation carried with emulsion and polymer with adjusting Ph 5-6. The process for making Melamine Formaldehyde microcapsules containing fragrant oil is well-known. Recently, this technology has been used to enhance the olfactory performance on fabrics. However, keeping the fragrance in the capsule during storage, improving the olfactory benefit and releasing a low amount of formaldehyde is highly challenging. Melamine Formaldehyde (MF) resin was synthesized by the reaction between Melamine and Formaldehyde with 1:3 Melamine to Formaldehyde molar ratio.

It can be characterized by Differential Scanning Calorimetry (DSC), Fourier Transform Infrared Spectroscopy (FTIR), Thermal Gravimetric Analysis (TGA), Gas Chromatography (GC).

**Keywords :** Microencapsulation, Fragrant Oil, Melamine Formaldehyde, in situpolymerization, paper mint oil.

# Water Characterization for Design of WTP

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**ABSTRACT**

Water is the main element that sustains life. The population explosion increased the demand for water, leading to water scarcity. Many places in rural areas of Maharashtra are severely affected by water problems due to lack of efficient water supply system. It can be overcome by careful monitoring of water sources and proper treatment of water with efficient water supply systems. In this project, it is planned to set up an efficient water treatment plant suitable for drinking water. This project deals with the design of various water features of water treatment plant at Velneshwar village, Ratnagiri, Maharashtra. Water from the Wadadai village will be directed to the WTP near the site and by building an intake structure into which the water from the well will be drawn i. e. constructing a well-intake, the water is properly treated by other components before being sent. In this project focused on the objectives like to understand and identify the different types of process , study the different sources of water in selected area and also identify the quality of water with considerations of different methods and standard for characteristics of the water. After water quality analysis designing wtp units like intake structure, sedimentation tank, coagulation and flocculation tank, filtration and disinfection unit and also elevated water tank.

In this study for characterization of the water , Primary Survey conducted for site selection and selected site is Velneshwar village. The area of Velneshwar village is about 847. 99 hectares. There are about 727 houses in Velneshwar Village. The forecasted population for the year 2032 is 4170. Present maximum daily water demand of Velneshwar village is found as 105 litres/day/capita. The medical survey done in Velneshwar village. During the medical survey, the doctor informed that 60% to 70% of the diseases are due to poor water quality in Velneshwar village. At the selected site there is no any proper waste and sewage management. The local people throw the garbage into the nearest natural vessel so that the source of natural water is polluted. The average ranges of characteristics of raw water quality are experimented and found out Turbidity- 4 NTU and pH- 7. 5, Total hardness- 200 mg/L, chlorides- 85 mg/L, Total

alkalinity- 107. 25 mg/L. Some of the characteristics of raw water were found to be greater than permissible limit. It is important to have clean drinking water available, so it is better to design a proper water treatment plant. In this aspect design of water treatment plant for Velneshwar village according to necessity.

**Keywords -** water, water treatment plant, intake structure, Quality, Characterization of water

# Impact And Applications of Carbon & Nanomaterials in Environment

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**ABSTRACT**

Carbon and Nanomaterials are the most extensively studied materials because of their unique characteristics. In general they provides high specific surface area , high carrier mobility , high electrical conductivity flexibility and optical transparency which is increase their uses in sensing applications with the aim of being very good and succesful prospect in different advances application such as electronics, batteries capacitors, waste water treatment, membranes, heterogeneous catalysis and medical sciences. In the field of environmental fate and behaviour of nanomaterials different nanoforms of a chemical may behave differently in the environment. In next coming years it is expected that improved techniques to measure and evaluate the fate of nanoparticles in the environment which will be available with high accuracy.

Keywords : properties, different advance applications, behaviour of nanomaterials and their nanoforms.

# Performance Evaluation of Moving Bed Bio-Reactor (MBBR) for IndustrialWastewater Treatment

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**ABSTRACT**

In India, wastewater is disposed of either onsite or through the public drainagesystem. While releasing industrial wastewater into the drainage system, no consideration was paidto the public health or environmental implications. The high capital and operating costs, as well as the need for a big operational area, are frequently cited as reasons for not installing a suitable wastewater treatment plant. Recently, biological wastewater treatment appears to be one of the most effective wastewater treatment approaches. The current study focuses on the removal of organic materials from industrial wastewater using a Moving Bed Biofilm Reactor (MBBR). Moving bed biofilm reactor (MBBR)incorporates benefits provided by both attached and suspended growth systems. It is an advanced high-rate wastewater treatment technology with hightreatment efficiency; low capital, operational, maintenance, and efficiency; low capital, operational, maintenance, and replacement cost; single reliable, and robust operation replacementcost; single reliable, and robust operation

The impacts of different factors such as aeration rate, hydraulic retention time, and flow rate are explored in order to evaluate the reactor's effectiveness in terms of organic matter removal. MBBR treats a wide range of effluents from various sources, and the reactor's performance is determined by the % removal of BOD and COD. The current study focuses on evaluating the removal possibilities of organic matter using Moving Bed Bio-Reactor (MBBR) media as an attached media.

**Keywords :** Moving bed biofilm reactor (MBBR), industrial wastewater, BOD and COD

# Removal of Organic Matter from Waste Water by Adsorption

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**ABSTRACT**

Adsorption is a process in which the pollutant (adsorbate) is adhered on the solid surface (adsorbent). The purpose of the work is to analyses the adsorption of organic matter from wastewater through activated carbon and coconut coir by varying various parameters. The phenomenon occurs due to van der Waals forces which exist between the molecules. Coconut Coir and Activated Carbon were used as adsorbents for wastewater treatment. Due to the high porosity of Activated Carbon and Coconut Coir they act as an excellent adsorbent for adsorption. Coconut shells were crushed up to 50mm and heated in a Hot Air Oven at 300℃ for about 45 min which removes its moisture and increases its porosity. Effluent used for the project was collected from an industry whose COD was 440 ppm with a pH of 4. 36. Batch adsorption with different parameters like dosage of adsorbent, concentration and pH were studied. Adsorption increases with an increase in the amount of adsorbent. Effluent was treated with adsorbent for 90 min on a mechanical rotary shaker. 4gm of coconut coir and 5 gm of activated carbon was the optimum weight required for 50ml of effluent for the maximum removal of matter. Percentage removal for 4 gm of coconut coir was 89. 09% and 5 gm of activated carbon was 90. 90%. 7. 1 pH was found out to be suitable for maximum adsorption for both coconut coir and activated carbon. To evaluate adsorption data for activated carbon and coconut coir Langmuir and Freundlich Isotherm models were used. The experimental results shows that the adsorbent prepared from Coconut Coir is found to be a promising adsorbent for the adsorption of organic matter as compared to Commercial Activated Carbon due to its high surface area and micro-porous structure. Maximum COD removal was obtained at 4 gm and 5 gm of CC and CAC which was found to be 89. 09% and 90. 9%. Freundlich adsorption isotherm shows good fit for the adsorption data as compared to Langmuir adsorption isotherm. Effluent without dilution was found to be optimum for adsorption. 7 pH is the optimum pH required for the removal of COD 77. 77% for both CC and CAC. 15 and 60 min was the optimum time required for the treatment of effluent with CAC and CC.

**Keywords:** Absorption, Wastewater, effluenttreatment, COD

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