GHARDA INSTITUTE OF TECHNOLOGY

A/P: LAVEL, TAL.KHED, DIST.RATNAGIRI.
Tel.: 02356 - 273134, Fax: 02356 – 262980
Website: www.git-india.edu.in, Email: principal@git-india.edu.in

Technical Magazine

CHEMICAL ENGINEERING

(AY-2023-24)

A/P: LAVEL, TAL.KHED, DIST.RATNAGIRI.
Tel.: 02356 - 273134, Fax: 02356 – 262980
Website: www.git-india.edu.in, Email: principal@git-india.edu.in

Technical Magazine - CHEMICAL ENGINEERING
Academic Year 2023-24

****

Editorial Team

Student Editor: Miss. Vaishnavi Deshmukh
Faculty Editor: Prof. Nitish D. Galande

****

Vision of the Chemical Engineering Department:

"Produce employable graduates through a multidisciplinary approach, equipping them with chemical engineering knowledge and research skills, for the welfare of society."

Mission of the Department

M1: Impart knowledge and understanding of the diverse fields of chemical engineering profession through curriculum.

M2: Develop chemical engineering professional and research skills to become technically competent professionals.

M3: Inculcate the importance of social and life-long learning.

Program Educational Objectives (PEOs)

PEO1: Graduates of the program will apply chemical engineering principles in engineering practice.

PEO2: Graduates of the program will have technical or professional careers in chemical engineering or in the diverse fields of chemical engineering such as biochemical engineering, energy and environmental engineering etc.

PEO3: Pursue higher study and / or continuously upgrade the knowledge with Personal and professional growth for collective advancement of society.

A/P: LAVEL, TAL.KHED, DIST.RATNAGIRI.
Tel.: 02356 - 273134, Fax: 02356 – 262980
Website: www.git-india.edu.in, Email: principal@git-india.edu.in

Programme specific outcomes (PSOs)

POS1: Create Chemical Engineering solutions for problems and processes while taking into account separation operations, reaction kinetics, environmental issues, and waste treatment and, modelling and simulation.

PSO 2: Foster the industrial chemical production process through efficient design and modifications by applying the principles of Chemical Engineering.

PSO 3: Demonstrate responsible professional behaviour by integrating ethical considerations, promoting safety, communicating effectively, and engaging in lifelong learning for societal and Environmental well-being.

A/P: LAVEL, TAL.KHED, DIST.RATNAGIRI.
Tel.: 02356 - 273134, Fax: 02356 – 262980
Website: www.git-india.edu.in, Email: principal@git-india.edu.in

Program Outcomes (POs) as per NBA

Program Outcomes (POs) are as follows:

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, and engineering fundamentals to solve complex chemical engineering problems.
2. **Problem Analysis:** Identify, formulate, and analyze complex engineering problems to reach substantiated conclusions using principles of mathematics, natural sciences, and engineering sciences.
3. **Design/Development of Solutions:** Design solutions for complex engineering problems that meet specified needs with appropriate consideration for public health, safety, and environmental concerns**.**
4. **Investigation of Complex Problems:** Conduct research-based investigations, including designing experiments, analyzing data, and synthesizing information to provide valid conclusions.
5. **Modern Tool Usage:** Select, apply, and adapt appropriate techniques, resources, and modern engineering tools, including prediction and modeling, to solve complex engineering activities.
6. **The Engineer and Society:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal, and cultural issues relevant to professional engineering practice.
7. **Environment and Sustainability:** Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice.
9. **Individual and Team Work:** Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and society at large through reports, presentations, and documentation.
11. **Project Management and Finance:** Demonstrate knowledge of engineering and management principles to manage projects in multidisciplinary environments.
12. **Life-long Learning:** Recognize the need for, and engage in, independent and lifelong learning in the broadest context of technological change.

A/P: LAVEL, TAL.KHED, DIST.RATNAGIRI.
Tel.: 02356 - 273134, Fax: 02356 – 262980
Website: www.git-india.edu.in, Email: principal@git-india.edu.in

Message from the Principal

It is my great pleasure to extend my heartfelt congratulations to the entire team involved in preparing this Technical Magazine. The exchange of ideas and knowledge is fundamental to research, innovation, and professional growth. I am confident that this newsletter will serve as an important platform to showcase the outstanding achievements of our faculty and students in research, industrial collaborations, and academic excellence.

I am particularly excited about the initiatives undertaken by the department and the continuous efforts in fostering innovation, sustainability, and industry-driven learning. The dedication displayed by the faculty and students in advancing the field of Chemical Engineering is commendable, and I believe this newsletter will serve as a valuable record of our collective accomplishments.

I extend my best wishes to the entire Chemical Engineering team and encourage all stakeholders to continue striving for excellence in education, research, and industry partnerships. Let us all work together to achieve even greater milestones in the future.

****

A/P: LAVEL, TAL.KHED, DIST.RATNAGIRI.
Tel.: 02356 - 273134, Fax: 02356 – 262980
Website: www.git-india.edu.in, Email: principal@git-india.edu.in

Message from the Head of the Department

Dr. Shyam Tekade

It is an honor to present Technical Magazine, capturing the accomplishments of the Chemical Engineering Department. This Maagzine reflects the dedication, hard work, and collaborative efforts of our students, faculty, and industry partners in advancing academic excellence, research, and professional growth.

We continue to focus on bridging the gap between academia and industry by fostering research collaborations, innovative teaching methodologies, and hands-on training programs. The remarkable achievements in publications, industrial tie-ups, and student development activities showcased in this edition are a testament to our commitment to excellence.

I express my sincere appreciation to all faculty members, students, and collaborators who have contributed to making this semester a success. Let us keep striving for innovation, learning, and excellence in all our endeavors.

****

A/P: LAVEL, TAL.KHED, DIST.RATNAGIRI.
Tel.: 02356 - 273134, Fax: 02356 – 262980
Website: www.git-india.edu.in, Email: principal@git-india.edu.in

Message from the Faculty Editor

Prof. Nitish D. Galande

It is with immense pride that we present Technical Magazine of the Chemical Engineering Department's Newsletter for the Academic Year 2022-23. This edition highlights the department's achievements in research, industry collaborations, student activities, and faculty accomplishments over the last six months. As a department, we have always focused on academic excellence, technological innovations, and professional growth. The dedication of our faculty, staff, and students continues to elevate our standing in the academic and industrial communities. I extend my heartfelt gratitude to everyone who has contributed to these initiatives and look forward to more remarkable milestones in the future.

****

A/P: LAVEL, TAL.KHED, DIST.RATNAGIRI.
Tel.: 02356 - 273134, Fax: 02356 – 262980
Website: www.git-india.edu.in, Email: principal@git-india.edu.in

Message from the Student Editor

Miss. Vaishnavi Deshmukh

It is an absolute honour to be a part of this edition of the Magazine as the Student Editor. This Magazine is not just a document; it is a testament to the dedication, achievements, and perseverance of the students and faculty of the Chemical Engineering Department. It provides a platform to showcase the research breakthroughs, academic milestones, and industry collaborations that contribute to the growth of our department.

The past semester has been an enriching journey, full of opportunities for learning, innovation, and personal growth. From research publications and technical competitions to industrial visits and placements, every achievement is a reflection of our collective efforts. I extend my sincere gratitude to our faculty members, students, and industry partners who have worked tirelessly to make this possible.

I hope this newsletter inspires every student to strive for excellence, embrace challenges, and continue contributing to the field of Chemical Engineering. Let's work together to achieve greater heights!

****

A/P: LAVEL, TAL.KHED, DIST.RATNAGIRI.
Tel.: 02356 - 273134, Fax: 02356 – 262980
Website: www.git-india.edu.in, Email: principal@git-india.edu.in

Index

Sr No.	Name of the Topic	Author
1.	TREATMENT OF THE AGROCHEMICAL INDUSTRY EFFLUENT USING HYDRODYNAMIC CAVITATION AND ITS COMBINATION WITH PROCESS INTENSIFYING ADDITIVES”	Mr.Manoj Krushana Gawade Mr.Pvankumar Vinodkumar Prasad Aakash Sadanand Velnkar
2.	BIOSORPTION OF DYES BY USING BAMBOO BASED MATERIAL	Mr. Adhatrao Jayesh Dipak Mr. Barate Mahesh Machhindra Mr.Shinde Krishna Netaji. Ms. Jadhav Monika Mahendra
3.	SYNTHESIS OF BIODIESEL FROM WASTE COOKING OIL USING BENTONITE CATALYST”	Mr.Prashant Subhash Chaudhari Mr. Rutik Ramesh Panchal Mr.Anurag Ravindra Patil Mr.Karan Namdev Patil
4.	DEGRADATION OF SUNSET YELLOW DYE USING HYDRODYNAMIC CAVITATION AND COMBINATION OF ADVANCED OXIDATION PROCESSES”	Mr. Kamble Parichay Shankar Mr. Koli Gaurav Ravindra Mr. More Rahul Pravin
5.	CO-PYROLYSIS OF TETRA PACK PLASTIC WITH BIOMASS	Mr. Nikhil Sandip Chandlekar Mr. Kunal Dipak Mr. Kailas Rajesh Lale
6.	“PHOTOCHEMICAL DEGRADATION OF SYNTHETIC POLLUTANTS	Mr. Pranay Prakash Kate, Mr.Hitesh Suyog Khatate , Mr. Mandar Manohar Rahate, Mr. Vivek Santosh Jangam.

GHARDA INSTITUTE OF TECHNOLOGY

A/P: LAVEL, TAL.KHED, DIST.RATNAGIRI.
Tel.: 02356 - 273134, Fax: 02356 – 262980
Website: www.git-india.edu.in, Email: principal@git-india.edu.in

Technical Magazine - CHEMICAL ENGINEERING
Academic Year 2023-24

****

Editorial Team

Student Editor: Miss. Vaishnavi Deshmukh
Faculty Editor: Prof. Nitish D. Galande

****

A/P: LAVEL, TAL.KHED, DIST.RATNAGIRI.
Tel.: 02356 - 273134, Fax: 02356 – 262980
Website: www.git-india.edu.in, Email: principal@git-india.edu.in

TREATMENT OF THE AGROCHEMICAL INDUSTRY EFFLUENT USING HYDRODYNAMIC CAVITATION AND ITS COMBINATION WITH PROCESS INTENSIFYING ADDITIVES

Mr.Manoj Krushana Gawade,Mr.Pvankumar Vinodkumar Prasad, Aakash Sadanand Velnkar

ABSTRACT

Agrochemical pollution is a serious threat to environmental safety. Exposure to agrochemicals had deleterious health effects such as nervous system damage and cancer. Biological magnification of persistent agrochemicals also occurred. Hence, remediation approaches for agrochemical pollution must be a holistic approach, including environment and crop produces. The advent of nanotechnology helped to formulate highly efficient methods for the remediation of agrochemicals. High reactive surface area and very small packing space requirements made usage of nanoparticles as a popular agent in agrochemical remediation. Hydrodynamic cavitation has a significant application to treat the industrial wastewater. Cavities are produced due to the pressure variation in the flow line, which generates the cavities that produce the OH radicals. In this case, hydrodynamic cavitation reactors have been applied for the reduction of Agrochemical pollutants with process intensification studies based on different additives. The effect of various operating parameters such as concentration, inlet pressure, temperature and initial pH has been investigated using a venturi meter as a cavitating device. It was observed that hydrodynamic cavitation carried complete mineralization of agrochemical effluent in all the cases at optimized values of process intensifying parameters. These all-operating parameters are highly responsible for

efficiency of hydrodynamic cavitation. The Study Has Enabled Establishing the Optimum Operating Conditions for The Ph (5.85), Inlet Pressure (4 Bar), Temperature (30 °C) And with Treatment Time Of 120 Min in The Hydrodynamic Cavitation and Maximum Reduction Was 34%. For The Combination Approaches of Oxidants With HC, The Optimum Conditions Established Were 75 ppm As the H2O2 Loading (60%) and for FeSO4 of 100 ppm concentration get 90% Reduction .

Keywords : Cavitation , Agrochemical, Venturi, Orifice, Advanced Oxidation Processes

A/P: LAVEL, TAL.KHED, DIST.RATNAGIRI.
Tel.: 02356 - 273134, Fax: 02356 – 262980
Website: www.git-india.edu.in, Email: principal@git-india.edu.in

BIOSORPTION OF DYES BY USING BAMBOO BASED MATERIAL

Mr. Adhatrao Jayesh Dipak, Mr. Barate Mahesh Machhindra, Mr.Shinde Krishna Netaji, Ms. Jadhav Monika Mahendra

ABSTRACT

Biosorption process has been found to be one of the best treatment methods for ethylene blue (MB) removals. As the control of water pollution has become an increasing importance in recent years, the use of physical/chemical treatments such as membrane filtration, reverse osmosis, coagulation/flocculation and Fenton reagents are not economically feasible. The use of different bio sorbent as an alternative low cost adsorbent in the removal of methylene blue has been extensively studied and compiled, together with their adsorption capacities and experimental conditions such as adsorbent dose, pH of the solution, temperature and equilibrium time. But, there are issues as regards to draw back in the use of activated sorbents which were also discussed briefly. However, it is evident from the results of experiments in the literatures surveyed that various low-cost adsorbents have shown good potential for MB.

Keywords: Methylene Blue Dye, Biosorption, Bamboo waste materials

A/P: LAVEL, TAL.KHED, DIST.RATNAGIRI.
Tel.: 02356 - 273134, Fax: 02356 – 262980
Website: www.git-india.edu.in, Email: principal@git-india.edu.in

SYNTHESIS OF BIODIESEL FROM WASTE COOKING OIL USING BENTONITE CATALYST

Mr.Prashant Subhash Chaudhari, Mr. Rutik Ramesh Panchal, Mr.Anurag Ravindra Patil, Mr.Karan Namdev Patil

ABSTRACT

This project is based upon synthesis of biodiesel from waste cooking oil (WCO) from heterogeneous catalyst. Demand for diesel continues to increase due to rapid population growth, which could contribute to fossil fuel exhaustion. Biodiesel has been widely developed as a replacement for conventional diesel to resolve the issue. Biodiesel production from waste cooking oil (WCO) was carried out via the trans-esterification process using of bentonite powder catalyst. Here in this project, we aimed to map the effect of use of catalyst on the effective carriage of reaction. Various papers have been published in the synthesis of catalyst from various sources, and variation of other conditions. There is extensive research carried out in this field. Here we will also check the effect of regenerated catalyst on the reaction. We study the reaction with catalyst, without catalyst and reuse of catalyst. Study of the catalyst is made on Trans-esterification reaction at different Molar Ratios.

Key Words: Catalyst, Bentonite powder, Trans-esterification

A/P: LAVEL, TAL.KHED, DIST.RATNAGIRI.
Tel.: 02356 - 273134, Fax: 02356 – 262980
Website: www.git-india.edu.in, Email: principal@git-india.edu.in

DEGRADATION OF SUNSET YELLOW DYE USING HYDRODYNAMIC CAVITATION AND COMBINATION OF ADVANCED OXIDATION PROCESSES"

Mr. Kamble Parichay Shankar, Mr. Koli Gaurav Ravindra, Mr. More Rahul Pravin

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, photo catalytic oxidation. Among 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 CuO was 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: Cavitation, Hydrodynamic cavitation, Degradation, Advanced oxidation process.

A/P: LAVEL, TAL.KHED, DIST.RATNAGIRI.
Tel.: 02356 - 273134, Fax: 02356 – 262980
Website: www.git-india.edu.in, Email: principal@git-india.edu.in

CO-PYROLYSIS OF TETRA PACK PLASTIC WITH BIOMASS

Mr. Nikhil Sandip Chandlekar, Mr. Kunal Dipak Jadhav, Mr. Kailas Rajesh Lale

ABSTRACT

The pyrolysis is the process of heating the waste organic/inorganic material in absence of oxygen for converting it into the valuable products. The three product slates viz. liquid, solid and gas can be obtained using pyrolysis. In the current project work we have studied the pyrolysis of waste tetra pack plastic material in presence of biomass. Further the effect of addition of waste printed circuit (PCB) board was also studied for pyrolysing the tetra pack plastics. The biomass used for co-pyrolysis of waste tetra pack plastics was waste rice husk. The experiment is performed at 50% rice husk biomass and the yield of bio-oil obtained was 15%. The presence of waste PCB resulted in the yield of bio-oil of around 19%. The catalytic bed of PCBs was also employed which resulted into the conversion of bio-oil of 16%. The maximum temperature reached was around 306 oC and time of pyrolysis batch was 1.5 hrs.

Keywords: Pyrolysis, Waste tetra pack plastics, Biomass, Waste PCB.

A/P: LAVEL, TAL.KHED, DIST.RATNAGIRI.
Tel.: 02356 - 273134, Fax: 02356 – 262980
Website: www.git-india.edu.in, Email: principal@git-india.edu.in

PHOTOCHEMICAL DEGRADATION OF SYNTHETIC POLLUTANTS

Mr. Pranay Prakash Kate, Mr. Hitesh Suyog Khatate, Mr. Mandar Manohar Rahate , Mr. Vivek Santosh Jangam.

ABSTRACT

This study explores the photochemical degradation of synthetic pollutants using Continuous ultraviolet (UV) Reactor, focusing on its potential as an effective and sustainable solution for environmental remediation. Synthetic pollutants, ubiquitous in various industrial effluents and wastewaters, pose significant ecological and health risks. The utilization of UV light, particularly in the UV-C range, presents an innovative approach to initiate photochemical reactions for pollutant breakdown. This research delves into the underlying mechanisms and
pathways involved in UV-induced degradation, emphasizing the generation of reactive species like hydroxyl radicals. Factors affecting the degradation process, including pollutant properties, UV dosage, reactor design, and environmental conditions, are investigated. The study also discusses the applications of UV- based photochemical degradation in treating diverse synthetic pollutants, outlining its potential for sustainable water and air purification systems. Additionally, challenges and future directions for optimizing this technology to
enhance efficiency and scalability are outlined.

Keywords: Photochemical degradation, UV dosage, wastewater treatment, industrial effluents, sustainable purification, reactive species, degradation pathways, scalability.

A/P: LAVEL, TAL.KHED, DIST.RATNAGIRI.
Tel.: 02356 - 273134, Fax: 02356 – 262980
Website: www.git-india.edu.in, Email: principal@git-india.edu.in

Editorial Team

- **Editor-in-Chief:** Prof. Nitish Galande
- **Student Coordinators:** Mr. Prashant Chaudhary

Department of Chemical Engineering
Academic Year 2024-25.