



K.K. Wagh Education Society's

K.K. Wagh Institute of Engineering Education and Research, Nashik.

Chemical Engineering Department

Vol.: 3, Issue:2

TECHNICAL NEWS LETTER

July 2022 - December 2022

The Department of Chemical Engineering was established in 1999 with the objective of creating a center of excellence in Chemical Engineering, with an annual intake of 60 students. The department has been accredited twice by the National Board of Accreditation (NBA), AICTE, New Delhi and got the NBA extension for 3 years from July 2022 to June 2025. The department boasts experienced faculty members with several years of academic expertise and veteran supporting staff with strong research interests in both conventional and emerging areas of Chemical Engineering. Emphasizing continuous knowledge enhancement, the department has been sponsoring faculty members for postgraduate and research programs in recent years. It is equipped with state-of-the-art infrastructure and laboratories designed to meet the requirements of the university syllabus. Additionally, the department has an adequate number of computers with the latest configurations and internet facilities. To support teaching and learning, the department provides advanced computational tools, including professional software such as UNISIM, DWSIM, BricsCAD, and MATLAB. It also maintains an in-house library with reference books for all subjects and a comprehensive Chemical Engineering encyclopedia. The department has an excellent track record of academic results. Students have secured top ranks in university examinations and achieved success in competitive exams such as GATE, GRE, and others. They have also been recruited by leading national and international Chemical industries. In addition to focusing on basic sciences and engineering subjects, the department encourages students to participate in various national events such as project exhibitions, paper presentations, model-making competitions, and sports activities. Association of Chemical Engineering Students (ACES), a student's association, functions in the department and provides strong platform for overall development of the students. The students get a chance to interact in Seminars, Workshops, Cultural Programmes, Expert Lectures on various topics like Personality Development, Preparation for competitive examination, study abroad etc. through ACES. The department is proactive for good industry institute interaction. Department has signed MoUs with various industries for mutual benefit. Industry experts are regularly invited, and industrial visits are organized each year to bridge the gap between theory and practice. The department organizes internships for third-year students every year in various renowned industries in the region.

■ Details of Faculty of Chemical Engineering:

S.N.	Name of Faculty	Qualification	Area of specialization	Designation
1.	Prof. Dr.Venkat S. Mane	Ph.D.	Chemical Engineering	Professor & H.O.D.
2.	Prof. Dr. Suyog N. Jain	Ph.D.	Chemical Engineering	Assistant Professor
3.	Prof. Vijay N. Mawal	Ph.D. Pursuing	Chemical Engineering	Assistant Professor
4.	Prof. Dr.Gaurav B.Daware	Ph.D.	Chemical Engineering	Assistant Professor
5.	Prof. Sandeep N. Derle	Ph.D. Pursuing	Chemical Engineering	Assistant Professor
6.	Prof. Piyush P. Joshi	M.Tech.	Chemical Engineering	Assistant Professor
7.	Prof. Zameer K. Deshmukh	M.Tech.	Chemical Engineering	Assistant Professor
8.	Prof. Tejmal B. Mahale	M.Tech.	Chemical Engineering	Assistant Professor
9.	Dr. Yennam Rajesh	Ph.D.	Chemical Engineering	Assistant Professor
10.	Prof. Priyanka Shivde	M.Tech.	Chemical Engineering	Assistant Professor
11.	Dr. Neha B. Gautam	Ph.D.	Chemical Engineering	Assistant Professor

■ IChE Chapter Activities

- IChE Chapter established by the department.
- Approval has been received from IChE Head Quarter, Kolkata. (Approval Letter No. Ref: AG / C-2 /2020 / 375 Dated 08th November 2021)
- Prof. P. P. Joshi is nominated as coordinator of the chapter.
- Various activities conducted through IChE student Chapter:
 - Lecture Series by Experts from Reputed IITs, NITs, Central Universities and Industrial Experts etc.
 - ChemFests (Technical Quizzes, Poster and Paper Presentations etc.)
 - Students Interactions with Industrial Experts.
 - Online Start-up Training Program: An Internship (at IChE).

■ Details of activities conducted through IChE student Chapter:

Sr. No.	Date	Activity Title	Resource Person with address
1	27/07/2022	Guidance of Abroad Education	Mr. Manya Group, Chennai
2.	30/07/2022	Alumni Interaction	Mr. Sham Tade, Process Engineer, Techno force India Pvt.Ltd., Nashik
3.	17/08/2022	Cost-effective and Eco-friendly ceramic membranes for waste water treatment	Dr. K. Suresh, Assistant Professor MANIT, Bhopal
4.	27/08/2022	Career Opportunities in Chemical Engineering	Mr. Ganesh Sapariya, Process Engineer, Emerson Export Engineering Centre, Nashik
5.	30/08/2022	Process&Process control (IA- Intelligent Automation)	Mr. C .R. Mohikar, Petro-Project Consultant, Nashik
6.	01/09/2022	Counselling Session on Career Opportunities	Dr. Pratibha Chandak, Counsellor, K.K. Wagh Institute of Engineering Education and Research, Nashik
7.	03/09/2022	Piping Design - Layout Design and scope of piping	Parag Palve, Piping Department Head, Praj Industries Ltd., Pune
8.	17/09/2022	Entrepreneurship	Mr.Amol Kashid, Founder & CEO, ABK Wealth Management Services, Nashik
9.	7/10/2022	Career Opportunities in Chemical Engineering	Sachin Holkar (Alumni-2009)

10.	19/10/2022	Recent Trends in Packed Tower Design	Dr.V.G. Pangarkar, Rtd. Professor and Head, Institute of Chemical Technology, Mumbai
11.	04/11/2022	Utilization of Propylene: Hydroformylation- Oxo Synthesis.	Dr. V. V. Mahajani, Rtd. Professor, Chemical Engineering Department, ICT, Matunga, Mumbai, Maharashtra, India
12.	1/12/2022	Role of Counsellor in Academic Performance.	Dr. Pratibha Chandak, Counsellor, K.K. Wagh Institute of Engineering Education and Research, Nashik
13.	13/12/2022	The Water Conundrum	Dr.V.G. Pangarkar, Rtd. Professor and Head, Institute of Chemical Technology, Mumbai

■ Detailed Information of IChE Lecture Series

Topic Name: Cost-effective & Eco-friendly ceramic membranes for waste water treatment.

Expert Details: Dr. Kanchapogu Suresh, Assistant Professor, Department of Chemical Engineering, MANIT Bhopal, INDIA



IChE Lecture Series

Expert Talk on

Cost-effective & Eco-friendly ceramic Membranes for wastewater treatment

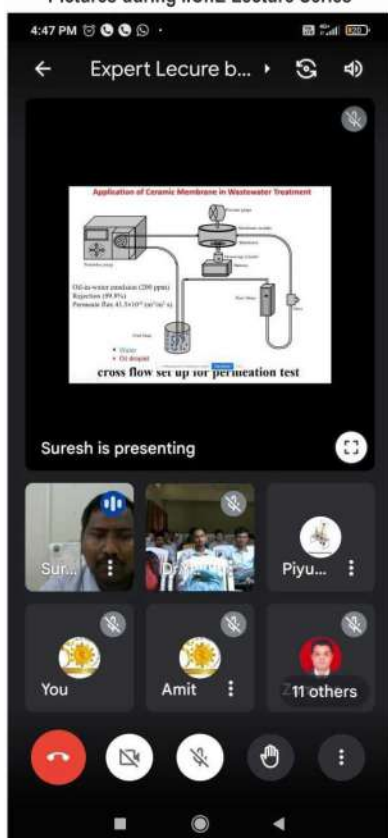
Dr. Kanchapogu Suresh
 Assistant Professor
 Department of Chemical Engineering
 MANIT Bhopal, INDIA

Google Meet joining info:
 Video call link: <https://meet.google.com/mdm-ijss-psx>
 Or dial: (US) +1 917-310-3928 PIN: 991 419 157#



Date and Time: 17.08.2022 & 03.30 PM onwards...
Organized by
Department of Chemical Engineering
K.K. Wagh Institute of Engineering Education and Research, Nashik-Maharashtra-422003

Pictures during IChE Lecture Series



■ **Topic Name :** Career Opportunities in Chemical Engineering.

Expert Details : Mr. Ganesh Sapariya, Process Engineer, Emerson Export Engineering Centre, Nashik

Pictures during IChE Lecture Series



■ Expert Lectures and Career Guidance Sessions Organized:

- Expert talk on "The Water Conundrum" was delivered by Dr. V. G. Pangarkar, Rtd. Professor and Head, Institute of Chemical Technology, Mumbai on 13th December 2022.
- Expert talk on "Role of Counsellor in Academic Performance" was delivered Dr. Pratibha Chandak, Counsellor, K. K. Wagh Institute of Engineering Education and Research, Nashik on 1st December 2022.
- Expert talk on "Utilization of Propylene: Hydroformylation- Oxo Synthesis" was delivered by Dr. V. V. Mahajani, Rtd. Professor, Chemical Engineering Department, ICT, Mumbai on 4th November 2022.
- Expert talk on "Recent Trends in Packed Tower Design" was delivered by Dr. V. G. Pangarkar, Rtd. Professor and Head, ICT, Mumbai on 19th October 2022.
- Expert talk on "Career Opportunities in Chemical Engineering" was delivered Sachin Holkar (Alumni-2009) on 7th October 2024.
- Expert lecture on "Entrepreneurship" was delivered by Mr. Amol Kashid, Founder &CEO, ABK Wealth Management Services, Nashik on 17th September 2022.
- Expert lecture on "Piping Design -Layout Design and scope of piping" was delivered by Parag Palve, Piping Department Head, Praj Industries Ltd., Pune on 3rd September 2022.
- Expert lecture on "Counselling Session on Career Opportunities" was delivered by Dr. Pratibha Chandak, Counsellor, K. K. Wagh Institute of Engineering Education and Research, Nashik on 1st September 2022.
- Expert lecture on "Process & Process control (IA- Intelligent Automation)" was delivered by Mr. C. R. Mohikar, Petro-Project Consultant, Nashik on 30th August 2022.
- Expert lecture on "Career Opportunities in Chemical Engineering" was delivered Mr. Ganesh Sapariya, Process Engineer, Emerson Export Engineering Centre, Nashik on 27th August 2022.

continued on page 3

- Expert lecture on "Cost-effective and Eco-friendly ceramic membranes for wastewater treatment" was delivered by Prof. Dr. K. Suresh, Assistant Professor MANIT, Bhopal on 17th August 2022.
- Expert lecture on "Alumni Interaction" was delivered by Mr. Sham Tade, Process Engineer, and Techno force India Pvt. Ltd., Nashik on 30th July 2022.
- Expert lecture on "Guidance of Abroad Education" was delivered by Mr. Manya Group, Chennai on 27th July 2022.

Industrial Visits :

S.No.	Class	Name of Industry	Date
1.	B.E.	Cata-Pharma Pvt. Ltd., Sinnar	13/08/2022
2.	B.E.	United heat transfer, Nashik	24/08/2022
3.	T.E.	Abeline Polymer, Ambad Nashik	06/09/2022
4.	T.E.	Hydrology Water Quality Lab, Nashik	13/10/2022
5.	S.E.	R and D Therm Pvt. Ltd. Nashik	01/12/2022
6.	S.E.	Children Traffic Educational Park, Nashik	07/10/2022

FDP/ Workshop/STTP attended by Faculty:

- Dr. V.S. Mane, Dr. S. N. Jain, Prof. V. N. Mawal, Dr. G.B. Daware, Prof. S. N. Derle and Prof. P. P. Joshi completed Udeemy Course (15 Hours) on "Gas Absorption & Stripping in Chemical Engineering" on 09th December 2022, organized by Udeemy Platform.
- Prof. Tejmal B. Mahale, Prof. P.P. Joshi and Prof. S. N. Derle completed a two-week Patent Course from 1st to 11th December 2022, organized by Turnip Innovations.
- Dr. Yennam Rajesh completed a fourteen Days Online Faculty Development Program on "Sanitization on innovation & cutting Edge Technologies" from 14th to 29th November 2022, organized by Viswakarma Institute, Pune
- Prof. Shivde Priyanka completed online Faculty Development Program on "Recent advances in chemical Engineering -2022 (RACE)" from 8th to 12th November 2022, organized by Rajalakshmi Engineering College, Tandalam.
- Prof. S. N. Derle completed a one-week Faculty Development Program on "Sustainable Technologies and application of Computational Software (STACS-2022)" from 12th October 16th October 2022, organized by SVNIT, Surat
- Dr. Yennam Rajesh completed a Five Days Faculty Development Program on "Embedded Product design" from 18th to 22nd July 2022, organized By AICTE IDEA Lab at KKWIEE&R., Nashik.

Papers Presented in Conference by Staff and students :

Title of Paper: An efficient removal of Indigo Carmine dye (IC) from aqueous medium using environmental friendly synthesized $ZnAl_2O_4$

Name of Conference: 1st International Conference on Advances in Water Treatment and Management (ICAWTM-22)

Organized by: Pandit Deendayal Energy University

Date of Conference: 25th to 26th March 2022

Names of Authors: Dr. Yennam Rajesh, Dr. G. B. Daware

Abstract: In recent years, materials have not only shown significant application in human life but also have a very important role in various industries. Over the last few decades, metal oxide and mixed metal oxide (MMO) have been acknowledged as efficient and environment-friendly alternatives to present-day available materials for different chemical, food, dye, and pharmaceutical industries along with environmental treatments. In view of the significant use of MMO in different fields, in the current work, nanocrystalline zinc aluminate ($ZnAl_2O_4$) has been successfully synthesized by the eco-friendly, cost-effective solid-state Mechanochemical (MCh) method, and it is used for the photocatalytic degradation of Indigo Carmine (IC) pollutant present in the wastewater of different industries. Numerous appropriate techniques, like Fourier-transform infrared spectroscopy (FT-IR), Ultraviolet-Visible Diffuse Reflectance Spectroscopy (UV-DRS), Scanning Electron Microscopy (SEM), and Transmission Electron Microscopy (TEM), were used for its characterization. It is revealed that $ZnAl_2O_4$ exhibits a pronounced photocatalytic activity under the influence of UV-visible light exposure. The present study also reveals a possible pathway for photocatalytic degradation of IC using liquid chromatography-mass spectrometry (LC-MS).

Title of Paper: Ecofriendly synthesis of pure and modified $CuMnO_3$: It's application as gas sensor

Name of Conference: 1st International Conference on Advances in Water Treatment and Management (ICAWTM-22)

Organized by: Pandit Deendayal Energy University

Date of Conference: 25th to 26th March 2022

Names of Authors: Dr. G. B. Daware, Dr. Yennam Rajesh

Abstract: Recently, novel materials like gas-sensing metal oxides, mixed metal oxides, and modified mixed metal oxides have attracted great attention owing to their key roles in monitoring environmental pollution, security in hospitals, homes, and public places, and hazardous emissions from industries and automobile exhaust. Initially, the mechanochemical (MCh) method was employed for the synthesis of the $CuMnO_3$ catalyst and then the modification of $CuMnO_3$ through the hydrothermal route. These synthesized catalysts were characterized by Ultraviolet Violet-Diffused Reflectance (UV-DRS) spectroscopy, Fourier Transform Infrared Spectroscopy (FTIR), and Scanning Electron Microscopy (SEM). The average particle size obtained for 3 % Fe/ $CuMnO_3$ was found to be 14–28 nm. The present work proclaimed that among all the synthesized 1,3,5 % Fe/ $CuMnO_3$ materials, the 3 % Fe modified $CuMnO_3$ material shows significant gas sensing properties towards highly toxic H_2S gas released from sewage plants, oil, and natural gas industries, among NH_3 , CO_2 , H_2S , H_2 , CO_2 and Cl_2 with moderate temperature requirements and excellent selectivity.

Title of Paper: Role of cationic surfactants in palladium adsorption of commercial ion exchange resins using electroless plating solutions

Name of Conference: 1st International Conference on Advances in Water Treatment and Management (ICAWTM-22)

Organized by: Pandit Deendayal Energy University

Date of Conference: 25th to 26th March 2022

Names of Authors: Dr. Yennam Rajesh, Dr. G. B. Daware

Abstract: This work investigates the role of cationic surfactants in the adsorption of palladium ions from synthetic electroless plating solutions using a commercial resin, Lewatit TP-214. This would also help us in determining the batch adsorption experiments elaborated on the optimal parameters such as surfactant concentration, pH, dosage, initial metal ion concentration for the development of an ion-exchange resin with high metal removal efficiency. Critical micelle concentration (CMC) appears to be an important parameter in determining the adsorption behavior of ion-exchange resins with palladium ions. Equilibrium models were measured for their fitness with the obtained Pd (II) batch adsorption characteristics and Freundlich isotherm confirms the heterogeneous Pd (II) adsorption on Lewatit TP-214. FTIR analysis confirmed that the Pd (II) metal uptake of Lewatit TP-214 resin largely depends on amine groups ($-NH_3^+$ and $-NH^+$) and the donor atoms attached to cationic surfactant. The optimized choice of adsorption parameters (pH of 8, dosage of 1 g/L, and contact time of 300 min) of Lewatit TP-214 adsorbent provided the highest metal uptake and removal efficiency as 201.7 mg/g and 90.16%, respectively, for the lowest Pd concentration of 300 mg/L.

■ **Papers Published by Staff/Students in SCI/Scopus Journal**

Title of Paper: Investigation of Geranium Oil Extraction Performance by Using Soxhlet Extraction

Name of Journal: Materials Today Proceedings, (Elsevier)

ISSN Number: 2610-2617

Names of Authors: Yennam Rajesh, Nabeel M Khan, Abdul Raziq Shaikh, Venkat S Mane, Gaurav Daware, Ganesh Dabhade

Abstract: Geranium oil (*Pelargonium graveolens*) is widely used as main ingredient in the production of perfumes as well as cosmetics etc. The essential oil is also used in aromatherapy treatment in various health issues occurred in rural areas. In literature, several authors are used the different traditional extraction methods; such as steam distillation, hydro distillation and solvent extraction etc. In this work, author used the novel technique as soxhlet extraction of geranium oil extraction. The purpose of this work is to investigate the suitable method for getting the higher yield with lower cost and limited facilities. To investigated the performance of soxhlet extraction technique by using different organic solvents like n-Hexane, Methanol, Chloroform, Toluene and Water. Among all the solvents, n-Hexane and Toluene are provided the satisfactory results with soxhlet

extraction of geranium oil yield as 0.08–0.1 %. The operating conditions of soxhlet extraction as Temperature (60–12 °C) and time (120–240 min). Also, the author calculated the Mass & Energy balances of soxhlet extraction are 6 (V/W) and 75 KW-Hr, whereas for steam distillation Mass & Energy balances are 0.5 (V/W) and 42 KW-Hr. Even though the yield is small compared to steam distillation, but this work will be applicable for lab scale extraction of geranium oil as well as essential oils with lower cost.

■ **Title of Paper:** Drag reduction in a gravity-driven flow system using polyethylene oxide solutions

Name of Journal: Modelling Earth Systems and Environment (Springer Nature)

ISSN Number: 2363-6211

Names of Authors: Yennam Rajesh

Abstract: The current study describes the use of a mathematical formula based on macro-scale balances to calculate the efflux time for gravity draining a Newtonian liquid from a large conical tank through an exit pipe at the bottom of the tank when the flow in the pipe line is turbulent. The least amount of time required to drain the tank will be calculated using the efflux time equation, which has been modified using experimental data. When the flow is mixed, that is, partially laminar and partially turbulent, gravity-driven, and once through the system, the percentage reduction in efflux time that the addition of water-soluble polyethylene oxide polymer has on drag reduction is displayed. Therefore, the efflux time equation provides the shortest amount of time needed to acquire the liquid draining from the tank.

■ **Title of Paper:** Eco-friendly synthesis of pure and modified $CuMnO_3$: It's application as gas sensor

Name of Journal: Materials Today: Proceedings, (Elsevier)

ISSN Number: 2214-7853

Names of Authors: Yennam Rajesh, Gaurav Daware

Abstract: Recently, novel materials like gas-sensing metal oxides, mixed metal oxides, and modified mixed metal oxides have attracted great attention owing to their key roles in monitoring environmental pollution, security in hospitals, homes, and public places, and hazardous emissions from industries and automobile exhaust. Initially, the mechanochemical (MCh) method was employed for the synthesis of the $CuMnO_3$ catalyst and then the modification of $CuMnO_3$ through the hydrothermal route. These synthesized catalysts were characterized by Ultraviolet Violet-Diffused Reflectance (UV-DRS) spectroscopy, Fourier Transform Infrared Spectroscopy (FTIR), and Scanning Electron Microscopy (SEM). The average particle size obtained for 3 % Fe/ $CuMnO_3$ was found to be 14–28 nm. The present work proclaimed that among all the synthesized 1,3,5 % Fe/ $CuMnO_3$ materials, the 3 % Fe modified $CuMnO_3$ material shows significant gas sensing properties towards highly toxic H_2S gas released from sewage plants, oil, and natural gas industries, among NH_3 , CO_2 , H_2S , H_2 , CO_2 and Cl_2 with moderate temperature requirements and excellent selectivity.

continued on page 5

■ **Title of Paper:** Novel-supported ionic liquid membranes for an effective removal of pentachlorophenol from wastewater

Name of Journal: Journal of Molecular Liquids (Elsevier)

ISSN Number: 1873-3166

Names of Authors: Yennam Rajesh

Abstract: Recently ionic liquids (ILs) have been useful in many areas of wastewater treatment and separation processes in environmental engineering, such as supported ionic liquid membranes (SILM) based separations and solvent extraction applications. In this work novel ILs, namely 1-butyl-2,3-dimethyl imidazolium hexafluorophosphate [$C_4DMIM][PF_6]$, tetrabutyl-phosphonium hexafluorophosphate [TBP][PF_6] were immobilized on PVDF (polyvinylidene fluoride) membrane for the removal of organic pollutant such as pentachlorophenol (PCP) from the water phase by SILM. Operating conditions like pH, feed and permeate concentration, membrane flux, and the mechanism was also studied. The interactions of H^+ bonding, hydrophobic interactions, and carbon- π bonding interactions are explained via the SILM transport mechanism. The membranes were characterized by SEM, EDX, and FTIR analysis. In the experimental study, a high zeta potential of -93.24 mV was achieved, which is an indication of the excellent stability of SILM. At a pH of 4, [TBP][PF_6] had the highest penetration rate of 87%. In contrast, [$C_4DMIM][PF_6]$ yielded 79% after 30 h of experimentation at the feed pH 4. Similarly, after 30 h, [TBP][PF_6] got the highest rate of permeation (80.50%), followed by [$C_4DMIM][PF_6]$ (73.00%). The 0.1 M NaOH was used as a stripping agent in this study. PCP was successfully separated from the aqueous phase using two different hydrophobic ionic liquids as [$C_4DMIM][PF_6]$ and [TBP][PF_6]. This SILM technique has the potential in the future for further developments and for extracting organic contaminants from wastewater on a laboratory or industrial scale.

■ **Title of Paper:** Role of cationic surfactants in palladium adsorption of commercial ion exchange resins using electroless plating solutions

Name of Journal: AQUA - Water Infrastructure, Ecosystems and Society (IWA Publishers)

ISSN Number: 0975-0991

Names of Authors: Yennam Rajesh, Gaurav Daware

Abstract: This work investigates the role of cationic surfactants in the adsorption of palladium ions from synthetic electroless plating solutions using a commercial resin, Lewatit TP-214. This would also help us in determining the batch adsorption experiments elaborated on the optimal parameters such as surfactant concentration, pH, dosage, initial metal ion concentration for the development of an ion-exchange resin with high metal removal efficiency. Critical micelle concentration (CMC) appears to be an important parameter in determining the adsorption behavior of ion-exchange resins with palladium ions. Equilibrium models were measured for their fitness with the obtained Pd (II) batch adsorption

characteristics and Freundlich isotherm confirms the heterogeneous Pd (II) adsorption on Lewatit TP-214. FTIR analysis confirmed that the Pd (II) metal uptake of Lewatit TP-214 resin largely depends on amine groups ($-NH_2^+$ and $-NH^+$) and the donor atoms attached to cationic surfactant. The optimized choice of adsorption parameters (pH of 8, dosage of 1 g/L, and contact time of 300 min) of Lewatit TP-214 adsorbent provided the highest metal uptake and removal efficiency as 201.7 mg/g and 90.16%, respectively, for the lowest Pd concentration of 300 mg/L.

■ **Title of Paper:** An efficient removal of Indigo Carmine dye (IC) from aqueous medium using environmental friendly synthesized $ZnAl_2O_4$

Name of Journal: Materials Today Proceedings (Elsevier)

ISSN Number: 2214-7853

Names of Authors: Yennam Rajesh, Gaurav Daware

Abstract: In recent years, materials have not only shown significant application in human life but also have a very important role in various industries. Over the last few decades, metal oxide and mixed metal oxide (MMO) have been acknowledged as efficient and environment-friendly alternatives to present-day available materials for different chemical, food, dye, and pharmaceutical industries along with environmental treatments. In view of the significant use of MMO in different fields, in the current work, nanocrystalline zinc aluminate ($ZnAl_2O_4$) has been successfully synthesized by the eco-friendly, cost-effective solid-state Mechanochemical (MCh) method, and it is used for the photocatalytic degradation of Indigo Carmine (IC) pollutant present in the wastewater of different industries. Numerous appropriate techniques, like Fourier-transform infrared spectroscopy (FT-IR), Ultraviolet-Visible Diffuse Reflectance Spectroscopy (UV-DRS), Scanning Electron Microscopy (SEM), and Transmission Electron Microscopy (TEM), were used for its characterization. It is revealed that $ZnAl_2O_4$ exhibits a pronounced photocatalytic activity under the influence of UV-visible light exposure. The present study also reveals a possible pathway for photocatalytic degradation of IC using liquid chromatography-mass spectrometry (LC-MS).

Title of Paper: Title of Paper: 4-picoline adsorption from aqueous solution by using baggage fly ash (BFA): Parametric, kinetic and thermodynamic aspects

Name of Journal: Water Practice & Technology (IWA Publishers)

ISSN Number: 2386-2395

Names of Authors: Gaurav Daware

Abstract: Numerous harmful characteristics of wastewater containing pyridine chemical have a significant negative impact on human health. Therefore, it is preferred to remove it from effluent. The derivatives of pyridine are 2- and 4-picoline. In this work, an adsorption technique was used to remove 4-picoline from the effluent. Wastewater was treated to remove 4-picoline using the natural adsorbent

baggage fly ash (BFA). 4-picoline adsorption rate of 82% was reported at pH 6.22, BFA adsorbent dosage of 4 g/L, and contact time of 6 h. The current investigation found that 85.83% of 4-picoline could be removed at its maximum with BFA at a temperature of 333 K. Investigations were also carried out into how the starting concentration and temperature affected the elimination of 4-picoline. According to the kinetic analysis, the process uses pseudo-second-order rate kinetics. The thermodynamics study also demonstrated that all temperatures could be predicted using the Freundlich and Langmuir equilibrium adsorption isotherm models. It further demonstrated that 4-picoline adsorption on BFA is an endothermic process

Title of Paper: Intensified removal of 4-Methylpyridine by ultrasonication in presence of advanced oxidants

Name of Journal: Journal of the Indian Chemical Society (Elsevier)

ISSN Number: 0019-4522

Names of Authors: Gaurav Daware, Yennam Rajesh, Piyush P. Joshi

Abstract: Water contamination is a big issue in every part of the globe. In response to the rising demand for wastewater with lower pollutant levels, a unique enhanced oxidation technique called ultrasound assisted irradiation has been developed. In the current study, advanced oxidising technology is used to accelerate the breakdown of 4-Methylpyridine (4 MP) utilizing ultrasound at a rated frequency of 22 ± 2 KHz. In the presence of ultrasound, the effects of advanced oxidising agents as well as the effects of different operational factors like pH, time, and power were evaluated. The kinetics for degradation of 4 MP were evaluated by second order model. The combined strategy of ultrasound assisted degradation in the presence of various advanced oxidising agents like hydrogen peroxide (H_2O_2), peroxy mono sulphate (PMS), potassium per sulphate (KPS) and Fenton reagent was investigated at optimal operating conditions, with the starting concentration of 50 mg/L at pH 9, and temperature $45^\circ C$. When applying ultrasound at its highest rated power of 120 W while the Fenton reagent was present, the maximum degradation was recorded to be $99 \pm 1\%$. The scavenger effect of $\bullet OH$ free radical and ions was evaluated on degradation of 4 MP. The synergetic index for all combination approaches was determined, for US/Fenton maximum synergetic index 10.8 established. The tentative degradation pathway was studied for degradation of 4 MP.