K K Wagh Education Society's
K K Wagh Institute of Engineering Education and Research, Nashik.
Chemical Engineering Department
Vol.: 7, Issue:2 July 2025- December 2025 TECHNICAL NEWS LETTER

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 June 2025 to June 2028. 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 industries. 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 Design, Ansys Fluent, 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 Programs, Expert Lectures on various topics like Personality Development, Preparation for competitive examination, study abroad etc. through ACES.

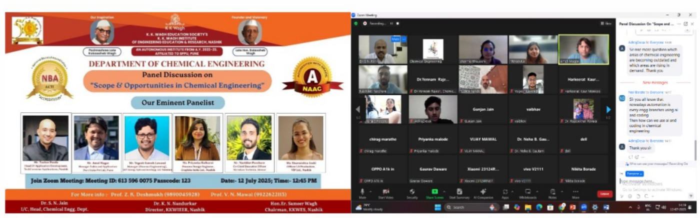
The department is proactive for good industry institute interaction. Department has signed MoUs with various industries for mutual benefit. Industry experts are regularly invited, and industrial visits are organized each year to bridge the gap between theory and practice. The department organizes internships 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.	Dr. Suyog N. Jain	Ph. D	Chemical Engg.	Associate Professor & Head of Department
2.	Prof. Vijay N. Mawal	Ph.D Pursuing	Chemical Engg.	Assistant Professor
3.	Dr. Gaurav B. Daware	Ph. D	Chemical Engg.	Assistant Professor
4.	Prof. Sandeep N. Derle	Ph.D Pursuing	Chemical Engg.	Assistant Professor
5.	Prof. Piyush P. Joshi	M. Tech	Chemical Engg.	Assistant Professor
6.	Prof. Zameer K. Deshmukh	M. Tech	Chemical Engg.	Assistant Professor
7.	Prof. Tejmal B. Mahale	M. Tech	Chemical Engg.	Assistant Professor
8.	Dr. Yennam Rajesh	Ph. D	Chemical Engg.	Assistant Professor
9.	Dr. Neha B. Gautam	Ph.D	Chemical Engg.	Assistant Professor
10.	Dr. Prashant Kumar	Ph. D	Chemical Engg.	Assistant Professor
11.	Dr. Rajsekhar Ravula	Ph. D	Chemical Engg.	Assistant Professor
12	Prof. Ritul M. Chaudhari	M. Tech	Chemical Engg.	Assistant Professor

Panel Discussion – "Scope & Career Opportunities in Chemical Engineering"

The Chemical Engineering Department hosted a panel discussion on 12th July 2025 for B. Tech admission aspirants. Dr. S. N. Jain, Head Chemical Engineering delivered an informative presentation on the facilities and remarkable highlights of Chemical Engineering Department. Distinguished alumni — Mr. Tushar Pande (TechConverse Applications, Nashik), Mr. Amol Magar (Dürr India Pvt. Ltd., Pune), Mr. Yogesh Suresh Lawand (L&T Energy Hydrocarbon Engg. Ltd., Vadodara), Ms. Priyanka Kulkarni (Graphite India Ltd., Nashik), Mr. Nachiket Parchure (Meridian Technics, Sinnar), and Ms. Sharmishta Joshi (VIP Ltd., Nashik) — shared their insights on career opportunities, industry expectations, and emerging trends in Chemical Engineering, representing diverse domains such as process design, energy, production, application development, sales, and entrepreneurship. This interactive event inspired students to explore wide-ranging career avenues in manufacturing, energy, environment, and research, reinforcing the bright future that lies ahead for Chemical Engineers.



View of online panel discussion by Chemical Engineering Dept.

Expert Lectures and Career Guidance Sessions Organized :

- Mr. Tushar Pande (Head of Application Development, TechCovers Applications, Nashik) conducted an interactive session on “Piping Layout and Pump Selection: Field Practices” on 3rd July 2025.
- Mr. Rahul Patil (Process Engineer, CataPharma Pvt. Ltd., Nashik) delivered a technical talk on “Hydrogen Generation” on 4th July 2025.
- Mr. Pramod Daspute (Certified Energy Auditor, Nashik) presented a session on “Renewable Energy and Its Importance in Chemical Process Industries” on 12th July 2025.
- Mr. Rahul Mane (Engineering Manager, Emerson Industrial Software, Pune) conducted an insightful session on “Role of Chemical Engineers in Global Automation and Technology Firms” on 24th July 2025.
- An expert session on “Overview of Unit Operations used in Chemical Process Industries” by Dr. Rajeev Parmar, Faculty, Department of Chemical Engineering, MANIT Bhopal on 14th August 2025.
- An expert session on “Hydrogenation of Eugenol to 4-propylcyclohexanol using Ru-based catalyst and to study the reaction kinetics” by Dr. Satyam Naidu Vasireddy, Sr.Scientist, CSIR-NCL Pune, on 26th August 2025.
- Study Smart Professionals, Nashik has conducted an expert talk on “Higher Education & Career Opportunities Abroad” on 3rd September 2025.
- Mr. Niraj Kulkarni (Director, Catharsis F&V, Pimpri Chinchwad, Maharashtra) has conducted an expert talk on “Innovation and Start-up” on 11th September 2025.
- Mr. Ishwar Pardesi (Head of Project and Technical Services, Graphite India Ltd., Nashik) has conducted an expert talk on “Project Engineer Role in Chemical Process Industries” on 15th September 2025.
- Mr. Sohil Shah, Director, Career Launcher, Nashik conducted an expert talk on “Career Guidance Session for SY and TY Students” on 18th September 2025.
- Mr. Avinash Ekhande, Founder & CEO, Ekhande Agro, Nashik conducted an expert talk on “Start-up and Entrepreneurship” on 26th September 2025.
- Mr. Dattatraya Aher, Motivational Speaker, delivered an expert session on “Self-Reliance for Youth Development” for first-year engineering students on 8th October 2025.
- Mr. Chetan V. Patil delivered an expert lecture on “Process Modeling in Chemical Industries Using ANSYS Fluent” on 9th October 2025.
- Ms. Hetansha Boricha, Alumna of batch delivered expert talks on GATE Awareness and, Research Prospects in CO2 Capture on 14th October 2025.
- Prof. V. G. Pangarkar, delivered an expert lecture on “Process Intensification” on 16th October 2025.
- An expert session on “The Evolving Role of Chemical Engineers in the Hydrogen Technology Sector” by Ms. Swapnali Wagh, Senior Manager – Hydrogen & Carbon, Reliance Industries Limited, Mumbai, on 3rd November 25.
- An expert session on “Overview of CO_2 Capture and Emissions from Chemical Industries” on 17th November 2025 by Dr. S. A Misal, Head, Chemical Engineering, PREC Loni.

Training and Placements :

Sr. No.	Name of Students	Name of Industry
1.	Pagare Akshat Siddharth	Burns and McDonnell Engineering India, Mumbai
2.	Gupta Khushi Vivek	Chemisight Consulting, Thane
3.	Bodake Abhimanyu Hanumant	Chemisight Consulting, Thane
4.	Kulkarni Deven Sandip	Chemisight Consulting, Thane
5.	Rajgire Harshada Shankar	JNK India Ltd., Thane

Industrial Visits :

Sr. No.	Class	Name of Industry	Date of Visit
1.	SY	Sewage Wastewater Treatment Plant, Pimpalgoan, Khamb, Nashik	29/09/25
2.		Sunshine Paints Pvt. Ltd., MIDC Ambad Nashik	19/08/25
3.		ND Wines Pvt. Ltd., Dindori, Nashik	01/11/25
4.	TY	United Heat Transfers Pvt LTD Plant-2, Dindori, Nashik	30/07/2025
5.		Agrisearch Pvt. Ltd., Dindori, Nashik	16/10/2025
6.	Final Year B Tech	CataPharma Pvt. Ltd., Muslgoan, Sinnar.	19/07/2025
7.		Godavari Bio-refinery, Kopargaon	07/10/2025
8.		VSCL, Vadivarhe, Nashik	09/10/2025

FDP/ Workshop/STTP/TTP attended by Faculty:

- Dr. Prashant Kumar successfully completed Five-Day Faculty Development Program ‘AI in Chemical Engineering: Industry, Curriculum and Research Perspectives’ from 1-5 December 2025 organized by Dept of Chemical Engineering, Dr. Vishwanath Karad MIT World Peace University, Pune.
- Dr. Prashant Kumar successfully completed the Twelve Week Faculty Development Program on “Machine Learning for Core Engineering Disciplines” from July to October 2025 organized by NPTEL-AICTE.

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- Dr. Yennam Rajesh successfully completed the National Level One-Week Online Faculty Development Program (FDP) on "Integrating AI & ML for Sustainable Chemical Process Industries: A Paradigm Shift Towards Industry 5.0" organized by the Department of Chemical Engineering (NBA Accredited), HIT Haldia in association with the Internal Quality Assurance Cell (IQAC), HIT Haldia and the Departmental Students Chapter, IIChE from 24th to 28th November 2025.
- Prof. Z. K. Deshmukh, Prof Tejmal Mahale, and Dr N B Gautam successfully completed a 3 days Faculty Development Programme (FDP) on Outcome Based Education (OBE) in association with NITTTR, Chandigarh from 10th September to 12th September 2025 organized by K. K. Wagh Institute of Engineering Education & Research, Nashik
- Prof. Piyush Joshi, completed a Week Indian Society for Technical Education (ISTE) approved Online STTP on "Role of Engineering Professionals in Fulfilling Sustainable Development Goals", scheduled from 19th to 26th August 2025, organised by the Department of Chemical Engineering, Gharda Institute of Technology, Lavel, Dist: Ratnagiri.
- Dr. Prashant Kumar successfully attended a seminar on "Next-Gen Chemical Engineering: Digital Skills for Tomorrow's Innovators" from 8th to 9th July 2025 organized by Mathworks.

Paper Publications/Presentations:

1. Paper Title: Design and development of digital sensors for monitoring dyes concentration

Name of Authors: Ravula Rajasekhar, Kanchapogu Suresh, S. N. Jain, Pawar Neha Santosh; Ghorpade Shubham

Journal Name: Indian Chemical Engineer (Taylor and Francis)

Publication Date: 03rd Aug 2025

Abstract: The synthetic and natural dyes are used in food, textiles, and pharmaceuticals. They contaminate and cause damage to biodiversity and human health when released into water. The majority of dyes, especially azo dyes, are toxic and can be converted into carcinogenic amines. The conventional detection techniques such as chromatography and spectrophotometry are effective but expensive, time-consuming, and involve sophisticated apparatus, thus real-time analysis is not convenient. This paper addresses the design and construction of a low-cost digital sensor system for on-site measurement of dye concentration. The system employs an Arduino Uno R3 and an LED/LDR sensor, thus being very sensitive, portable, and user-friendly. These sensors facilitate quick detection, thus continuous monitoring of dye contamination in wastewater and aquatic environmental systems. Digital sensors, in comparison to conventional systems, provide real-time data acquisition and analysis, thus allowing industries to respond to environmental needs better. Real-time on-site monitoring by sensor technology enhances pollution management and facilitates sustainability in production. Cost-effectiveness renders it suitable for wastewater treatment plants, textile production, and organisations that combat dye pollution. Environmental monitoring is enhanced, and water resource management and public health are supported by this technology.

Keywords: Digital sensors; dye concentration monitoring; LED/LDR sensors; real-time detection; environmental pollution

2. Paper Title: Graphene-based Nanomaterials for Wastewater Treatment – A Review on Advances, Optimization, and Future Perspectives

Name of Authors: Suparna Bhattacharyya, Rijin Raju, Uttariya Roy, Prashant Kumar

Date of Publication: 12th July 2025

Journal Name: Progress in Engineering Science

DOI: https://doi.org/10.1016/j.pes.2025.100107

Abstract: The increasing contamination of aquatic ecosystems attributable to industrial and anthropogenic endeavours necessitates the development of innovative methodologies for the effective treatment of wastewater. Nanomaterials, including graphene, which is comprised of graphene oxide (GO) and reduced graphene oxide (rGO), have demonstrated significant efficacy as adsorbents due to their remarkable surface area, diverse functional groups, and substantial capacity for adsorption of both organic and inorganic pollutants. In this review article we analyse and optimize using RSM current developments of graphene-based nanomaterials for adsorption of wastewater toxics. Since graphene oxide has many functional groups and an extremely acidic nature. This critique diligently reviews recent innovations in graphene-cantered adsorbents, emphasizing their fabrication, functionalization approaches, and the dynamics of contaminant removal (including π-π interactions, electrostatic attraction, and hydrogen bonding). We underscore the superior efficacy of graphene derivatives in comparison to conventional adsorbents, such as activated carbon and biochar, particularly in the context of heavy metals, dyes, pharmaceuticals, and emerging pollutants. Furthermore, the assessment of the unification of machine learning (ML) and response surface methodology (RSM) for the improvement of adsorption processes is presented, in alignment with pilot-scale case studies and thoughts on the circular economy. Notwithstanding their promise, challenges pertaining to scalability, environmental hazards, and cost-effectiveness are discussed, thereby offering a strategic framework for future research endeavours in sustainable wastewater treatment.

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3. Paper Title: Development of high performance activated carbon from soap nut shell for Indigo Dye removal

Name of Authors: Yennam Rajesh*, Shweta Chaudhari, Uday Bharitkar, Aditya Gunjal, Gauri Vidhate

Organizer: Energy Cluster, UPES, Dehradun, India

Date: 11-12th November 2025

Conference Details: International Conference on Sustainable and Affordable Energy (ICSAE 2025)

Abstract:
This project focuses on the synthesis of activated carbon using Soap Nut (Sapindus mukorossi) fruit shells as a precursor. Soap Nut shells contain high lignocellulosic, rich in carbon, and have low ash content, making them a suitable and cost-effective precursor for activated carbon production. Additionally, they contain saponins and natural resins, which can enhance the adsorption capacity of the final product. The project explores the potential of converting Soap Nut shell waste into value-added activated carbon adsorbents for the removal of Indigo dye from textile industrial wastewater. Activated carbon is synthesized using chemical activation with activating agents such as KOH which helps to create a highly porous structure with a large surface area. Key synthesis parameters are optimized, including impregnation ratios 1:1, activation temperature (500 °C) and activation time (90 min). The surface properties of the prepared adsorbent, including functional groups (Hydroxyl (–OH), Carbonyl (C=O), Carboxylic (–COOH), Aromatic (C=C), Ether (C–O–C), and Amino (–NH).) and Surface Area(2.217 m2/gm), Pore volume(0.0155 cc/gm), Pore radius (13.95 nm), are characterized using FT-IR spectroscopy and BET surface area analysis. Batch adsorption studies are conducted to remove the Indigo dye by varying conditions, including initial dye concentrations (10–50 mg/L), adsorbent dosages (10–90 mg/L), contact times (10–120 min), and solution pH (2–12). Under optimized conditions, the Soap Nut shell–derived activated carbon achieves high dye removal efficiency (over 90%), demonstrating its effectiveness as an eco-friendly adsorbent. The optimum adsorption conditions obtained from the batch studies are an initial Indigo dye concentration of 10-50 mg/L, contact time of 90 min, adsorbent dosage 90 mg and solution pH of 5, under which the highest dye removal efficiency (90.27%) was achieved. The experimental data validate with theoretical models like Langmuir, Freundlich models and kinetic models such as pseudo first order, second order and intraparticle diffusion, respectively. Based on the capacity of adsorbent can be used for CO_2 Capture from petrochemical industries.

Keywords: Adsorption; Soap Nut; Chemical Activation; Indigo Dye; Textile Industry Effluents

4. Paper Title: Utilization of water hyacinth (Eichhornia crassipes) for bioethanol production: A comprehensive approach from hydrolysis to purification

Name of Authors: Piyush Joshi, Prashant Kumar*, Suyog N. Jain, Yennam Rajesh*, S. N. Derle, Z. K. Deshmukh, Gaurav Daware, Nilesh Thakare & Prasad Musale

Journal: Indian Journal of Chemical Technology (Scopus)

Paper details: Vol. 32, November 2025, pp. 749-754,

DOI: 10.56042/ijct.v32i6.17258

Abstract: Water hyacinth (WH) is a widely available invasive aquatic plant, making it a promising resource for sustainable bioethanol production. In the present study, WH has been utilized for bioethanol production through a sequential process involving pretreatment, ultrasonic-assisted hydrolysis, fermentation, and final purification. Hydrolysis is carried out employing 1N NaOH, succeeded by fermentation through the yeast species Saccharomyces cerevisiae, culminating in the synthesis of bioethanol. The produced bioethanol is subsequently recovered following the purification step. The presence of ethanol in the sample is confirmed by gas chromatography analysis, which is validated by comparison with a standard ethanol reference. The ceric ammonium nitrate test has further verified the presence of alcoholic groups in the prepared bioethanol. Additionally, the dinitrosalicylic acid (DNS) test has revealed a free sugar content of 18% post-hydrolysis. The bioethanol yield is determined to be 9.36%, which aligns with values reported in existing literature for WH-based bioethanol production.

Keywords: Bioethanol, Fermentation, Lignocellulosic biomass, Water Hyacinth, Yeasts

Book Chapter Title: Advancement in Machine Learning-Aided Advanced Oxidation Processes for Water Treatment

Name of Authors: Prashant Kumar, Suparna Bhattacharyya, Biswajit Debnath

Date of Publication: 12th September 2025

Book Name: Machine Learning in Water Treatment

DOI: https://doi.org/10.1002/9781394303526.ch17

Summary: This chapter examines the integration of machine learning (ML) with advanced oxidation processes (AOPs) in the domain of water purification, underscoring current advancements and implementation strategies. AOPs recognized for their capability to decompose an extensive range of pollutants through the generation of highly reactive hydroxyl radicals, provide a practical and sustainable strategy for environmental remediation. By reviewing research from 2014 to 2023 for case studies and its successful implementation, this chapter underscores the potential of ML in optimizing AOP performance through predictive modeling and real-time decision-making.

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The application of various ML models, including artificial neural networks, is discussed in relation to enhancing AOP efficiency by dynamically adjusting operational parameters. While challenges in model validation and data collection persist, the integration of ML presents promising opportunities for improving AOP efficiency and scalability. Future research directions are proposed, emphasizing the need for larger datasets and continued exploration of advanced ML techniques.

Other Activities:

- Dr. S. N. Jain, Head of Chemical Engineering, was invited as an expert for project evaluation in the Avishkar Competition of SPPU Pune at LVH College, Nashik on 3rd October 2025.
- Prof. S. N. Derle was appointed as an Industry Expert for developing a learning material on Emerging Trends in Chemical Engineering by Maharashtra State Board of Technical Education (MSBTE) Mumbai from 22nd September 2025 to 26th September 2025 at K. K. Wagh Polytechnic Nashik.

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