



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

January 2023 - June 2023

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.	Dr. Neha B. Gautam	Ph.D.	Chemical Engineering	Assistant Professor
11.	Prof. Priyanka Shivde	M.Tech.	Chemical Engineering	Assistant Professor
12.	Dr. Prashant Kumar	Ph.D. Pursuing	Chemical Engineering	Assistant Professor

■ CHEMFEST 2K23

The Department of Chemical Engineering organized a one-day online National Level Technical Symposium, CHEMFEST 2K23, on 28th April, 2023. The program featured a variety of engaging activities, including technical paper presentations, a creative poster competition, and an impressive Inno-model Exhibition that highlighted the talents of the participants. Dr. V.S. Mane, Head of the Chemical Engineering Department, delivered the welcome speech for the event, while Dr. Yennam Rajesh, ChemFest Co-Coordinator, proposed the vote of thanks for the inaugural function. The ChemFest-2K23 was an excellent platform for promoting innovation, research, and collaboration in chemical engineering. The event began with an inspiring inaugural ceremony featuring Chief Guest Dr. V. G. Pangarkar, Retd. Professor, Department of Chemical Engineering, ICT Mumbai. The event was further enriched by the presence of respected judges from academia and industry: Mr. Chandrakant Mohikar, Energy- Infra Consultant, Nashik; Dr. Satish S. Rikame, and Prof. Kumawat from K. K. Wagh Polytechnic, Nashik. The valedictory ceremony was honored by the presence of Mr. B. Sitharaman, Director, BSR Technologies, Nashik, whose participation added great value to the event. With over 220 students taking part, including 50 from other colleges, ChemFest-2K23 was a huge success, encouraging learning, creativity, and technical excellence, and leaving a lasting impact on everyone involved.

■ Expert Lectures and Career Guidance Sessions Organized:

- Expert Talk on "Environmental Awareness of Chemical Industries" was delivered by Dr. A. Ashok Kumar, Associate Professor, MPIST, Thanjavur on 27th May 2023.
- Expert Talk by Alumni Mr. Parag Suryavanshi, a GATE Qualified alumni and M.Tech. Scholar, IIT Roorkee was organized on 4th June 2023.
- Expert Talk on "Process Engineering & Overview of Simulation Softwares" was delivered by Ms. Swarali Shah, Chemklub, India on 18th March 2023.
- Expert Talk on "Utilization of CO₂ for Fuel Generation: Problems & Prospects" was delivered by Dr. Leela Manohar, Assistant Professor, NIT Srinagar on 11th March 2023.
- Expert Talk on "Environment Sustainable & Inclusive Development" was delivered by Mr. C. R. Mohikar, Petro-Project Consultant, Nashik on 10th March 2023.
- Expert Talk on "Energy Conservation and Audit" was delivered by Mr. Pramod N. Daspute, B.E.E. Certified Energy Auditor & PCRA Faculty, Mumbai on 15th February 2023.
- Expert Talk on "Abroad Education" was conducted by Mr. Manya Group Higher Education, Chennai on 11th February 2023.
- Expert Talk on "How to Prepare for GATE?" was delivered by Dr. Chandra Sekhar, Professor, Dept Chemical Engg. Pondicherry Engg. College on 1st February 2023.
- Expert Talk on "Entrepreneurship" was delivered by Mr. Somesh Bandichhod, Assistant Business Development Manager, WINZER Pvt. Ltd. on 5th January 2023.

■ Training and Placements :

Sr. No.	Student Name	Name of Company
1	Sonawane Jay Sanjay	TCS Ltd., Pune
2	Raut Achal Pravin	JNK India Pvt. Ltd., Thane
3	Jorwar Darshan Bajirao	Adani Group, Mumbai
4	Prachand Tanmay Subhash	United Heat Transfer Pvt. Ltd., Nashik
5	Kulkarni Saurabh Atul	Torrent Power Ltd., Surat
6	Jadhav Yash Ravindra	Konark Global Engineering, Nashik
7	Joshi Sayli Subhash	Praj Industries Ltd., Pune
8	Andhale Vaibhav Umesh	NOCIL Ltd., New Mumbai
9	Walunj Mayur Sunil	
10	Tambe Tejas Shivaji	
11	Patil Sakshi Vinod	Thermax Ltd., Pune
12	Jadhav Kausar Sharad	Plank and Weave India Pvt. Ltd., Bengaluru
13	Shelke Sushant Somnath	Bhor Chemicals Pvt. Ltd., Virholi, Nashik
14	Omkar Govindrao Bhatane	Floating Minds Infotech., Pune
15	Priyanka Ganesh Avhad	Laxmi Organic, Mahad, Raigad

■ Industrial Visits :

S.No.	Class	Name of Industry	Date
1.		Sewage Treatment Plant, Nashik	15/05/2023
2.	SE	Delta Finochem Pvt. Ltd., Nashik	04/05/2023
3.		Jain Lube Corporation, Musligoan, Sinnar	18/04/2023
4.	TE	Kadawa Sakhari Sakhar Kharkhana, Dindori	17/04/2023
5.		Agriseach Pvt. Ltd., Nashik	20/03/2023
6.	BE	Vadivarhe Speciality Chemicals Ltd., Nashik	21/03/2023

■ FDP/ Workshop/STTP/Webinar attended by Faculty:

- Prof. Prashant Kumar and Prof. T. B. Mahale successfully completed an FDP on "Advanced Manufacturing" from 12th to 17th June 2023, conducted by KKWIEER., Nashik.
- Dr. Yennam Rajesh successfully attended a webinar on "Teaching with AI: Using CHAT GPT in the classroom" on 5th May 2023, conducted by SCROLLWELL at KKWIEER., Nashik.
- Dr. V. S. Mane successfully completed a Udemey course (29 Hours) on "Management Consulting Approach to Problem Solving" on 26th March 2023.
- Dr. V. S. Mane successfully completed a Udemey course (29 Hours) on "Effective Problem Solving and Decision Making under Pressure" on 24th March 2023.
- Prof. Mawal V. N. successfully completed a Udemey course (29 Hours) on "Complete Presentation Skills Masterclass for Every occasion" on 23rd March 2023.
- Dr. V. S. Mane successfully completed a Udemey course (36.5 Hours) on "Leadership skills for Inspiration in Life & work" on 03rd March 2023.
- Prof. P.P. Joshi, Dr. Neha B. Gautam, Dr. V. S. Mane, Dr. S.N. Jain, Dr. G. B. Daware, Prof. T. B. Mahale, Prof. Z. K. Deshmukh, Prof. V. N. Mawal and Dr. Yennam Rajesh successfully completed a FDP on "Hands on training on Ansys Fluent" from 22nd to 24th February 2023 at Chemical Engineering Department, KKWIEER., Nashik.
- Dr. S. N. Jain successfully completed a FDP on "Novel Technology for Environment and Energy Sustainability" from 20th to 25th February 2023 at DVV Patil Polytechnic, Loni.

■ Papers Presented in Conference by Staff and students :

Title of Paper: Silica extraction from Bamboo Leaves using Alkaline Extraction Method

Name of Conference: National Conference on Advances in Chemical Engineering and Science (ACES)

Names of Authors: Dr. Neha Gautam, Dr. Yennam Rajesh, Himani Chaudhary and Shraddha Pansare

Date of Conference: 31st March to 1st April 2023

Abstract: The silica is the most common constituent of bamboo leaves mainly varies from 75.90-82.86%. In this study, silica was extracted from bamboo leaves using an alkaline extraction process. Analyses of proximate and ultimate contents of bamboo leaves were conducted initially. In proximate analysis, bamboo leaves contain significantly more ash (24.5%) which contain 79.28% silica, and a low level of fixed carbon, while in ultimate analysis, bamboo leaves contain 57.56 % oxygen. The yield and quality of silica were improved by extracting silica from bamboo leaves ash under various operating conditions. A higher concentration of NaOH (2.5 N) resulted in a greater yield of silica (97.73%). During the alkaline process, an acid leaching treatment was used to remove metal impurities either from bamboo leaves ash or extracted silica. Hydrochloric acid (HCl) solution was used for

acid leaching treatment. The silica yield increased from 97.73 % to 98.86 % after acid leaching of feed. In an FTIR analysis, Si-O-Si, Si-O, and Si-OH bonds were identified. Modern characterization techniques such as XRF were used to determine the purity of silica. There is a significant difference between the maximum purity of acid leached silica samples (96.13%) and that of commercial silica samples (95.52%). As a result of this study, silica that has a wide range of applications in the food and nutrition industries, the pharmaceutical industry, and as a nano-catalyst could be produced.

- **Title of Paper:** Synthesis of Bioplastic from agricultural waste

Name of Conference: National Conference on Advances in Chemical Engineering and Science (ACES)

Names of Authors: Dr. Yennam Rajesh, and Dr. Neha Gautam

Date of Conference: 31st March to 1st April 2023

Abstract: The current research focuses on the development of bioplastics from agricultural resources like banana peels, potato peels and corn starch. The specific focus here is the utilization of agricultural resources into bioplastics as an eco-friendly alternative to conventional plastics. The main objective of this research is to explore the manufacturing of biodegradable plastics by utilizing these materials. The formation of bioplastics from banana and potato peels is not as successful, while notably consistent formation for bioplastics derived from corn starch. The additional research has been conducted on corn starch based bioplastic films. The impact of various glycerol amounts (0.2 g to 0.8 g) was studied concerning the measurement of tensile strength (1.52 MPa to 5.08 MPa) in corn starch-derived bioplastics. The physico-chemical properties, availability of FT-IR functional groups (C-O-H, O-H, C-H, C = O, CONH, C-O, and C-O-C) and SEM analysis are confirming bioplastic films surface derived from corn starch and compared to existing literature. Furthermore, the research includes solubility and biodegradability tests were determined the most suitable and preferred agricultural resources for biodegradable plastic production.

- **Title of Paper:** Synthesis of Activated Carbon using Kigelia africana and application towards wastewater treatment

Name of Conference: National Conference on Advances in Chemical Engineering and Science (ACES)

Names of Authors: Dr. Yennam Rajesh

Date of Conference: 31st March to 1st April 2023

Abstract: The need for waste water treatment, which can be accomplished via adsorbents, is growing today. Adsorbents are inexpensive, environmentally responsible, and made of biodegradable materials that can be replenished. In this work, chemical activation is used to create powdered activated carbon from Kigelia africana. The raw material was chosen because this fruit has not been the subject of any significant

research on dye removal. It is also a poisonous fruit, abundantly available in nature, has high cellulose content, carbon rich and possesses less ash content thus making it a low cost activated carbon. After activation, the surface area has increased from 5 m²/g to 400 m²/g, morphology studies with SEM analysis and also analyzed the functional groups with FT-IR. These properties have made our adsorbent highly efficient for dye removal. The batch adsorption studies have been carried out for the removal of acid blue 113 using various combinations of synthetic dye solution concentrations (50–300 mg/L), adsorbent dosage (0.4–7 g/L), contact time (30–300 min), and pH (2–10). The removal % efficiency and capacity (mg/g) are obtained from this work as 99.79 % and 188.89 mg/g, respectively.

- **Title of Paper:** Experimental investigation of thermo-physical properties of hybrid Nanofluid: Application in heat transfer enhancement

Name of Conference: National Conference on Advances in Chemical Engineering and Science (ACES)

Names of Authors: Dr. Yennam Rajesh, and Dr. V. S. Mane

Date of Conference: 31st March to 1st April 2023

Abstract: Current study highlights the earlier research and more recent developments in the enhancement of heat transfer using hybrid nanofluid (HNF). By exploiting novel mixture of two different nanoparticles for the synthesis of HNF made of Al₂O₃-Co₃O₄ nanoparticles suspended in a glycerol (GLY) as a green base fluid. The current study suggests potential uses of synthesized nanofluid. The thermo-physical characteristics of HNF, including density, stability, thermal conductivity (TC), electrical conductivity (EC) and viscosity, are currently being studied for Al₂O₃-Co₃O₄ /GLY hybrid nanofluid. HNF was synthesized in the volume fraction of nanoparticles of 0.05 – 0.4 % and tested in the temperature range from 30 to 70 °C. the result demonstrated that thermal conductivity of HNF increase from 0.30 to 0.34 W/mK which is higher than the TC of base fluid along with EC also increases from 0.05 to 0.1 S/cm. Recent results also reveal that the viscosity and density of HNF decreases from 7 to 5 cP and 545 to 543 Kg/m³ with increasing temperature of HNF. The concentrations of nanoparticles also play a major in the thermos-physical properties of HNF.

- **Title of Paper:** Synthesis of handmade paper from rice husk

Name of Conference: International Conference (Pranathi-2k23)

Names of Authors: Himani Chadudhari, Shraddha Pansare, and Dr. Yennam Rajesh

Date of Conference: 16th to 17th February 2023

Abstract: The present work is to promote the use of agricultural waste (sugarcane bagasse, banana fibers, and rice husk) in the creation of handcrafted paper. This work alters the manufacturing process by utilizing various cellulose ratios derived from different agricultural residues. Craft papers have been made

continued on page 4

with the use of a fairly straightforward and environmentally benign process known as the handmade technique, which includes these raw residues in various ratios. The physico-mechanical properties are measured for synthesized sheets with an appropriate basis weight (63–80 g/m²), thickness (20–300 μ m), burst strength (58.9–105.2 kPa), burst index (1.03–1.67 kPa m² /g), and bulk (1.06 – 3.12 cm³ /g), respectively. It is demonstrated that the used ingredients are cost-effective and eco-friendly. In addition, it is found that the quality of the handmade paper sample composition formed with a blend of 20% rice husk, 30% sugarcane bagasse, and 50% banana fiber, is relatively high. This study demonstrates that agricultural waste can provide viable alternatives for the industries that produce handmade paper.

- **Title of Paper:** Dye Adsorption of Activated Adsorbent from Plant Waste

Name of Conference: International Conference (Pranathi-2k23)

Names of Authors: Hetansha Boricha, Aishwarya Suryawanshi, and Dr. Yennam Rajesh

Date of Conference: 16th to 17th February 2023

Abstract: The study focused on the synthesis of carbon dots (CDs) by microwave-assisted rapid synthesis method and their application for the removal of acid blue 113 dye from textile wastewater. The synthesized CDs were characterized by various techniques such as UV-Vis spectroscopy. The present Fourier-transform infrared spectroscopy (FTIR), transmission electron microscopy (TEM), and X-ray diffraction (XRD) analysis. The results revealed that the CDs had a spherical shape with an average particle size of 4–5 nm and exhibited excellent adsorption properties towards the acid blue 113 dye. The optimal conditions for dye removal were found to be at pH 7, an adsorbent dosage of 70 mg/L, and a contact time of 60 minutes. The kinetics and isotherm studies showed that the adsorption process followed a pseudo-second-order kinetic model and the Langmuir isotherm model. The maximum adsorption capacity of the CDs was found to be 45.23 mg/g. Additionally, the study also compared the effectiveness of pyrolysis and microwave-assisted rapid synthesis methods for the synthesis of CDs, and it was found that the microwave-assisted rapid synthesis method was more efficient. Overall, the results demonstrated that the synthesized CDs can be an effective and eco-friendly alternative for the removal of acid blue 113 dye from textile waste water.

- **Title of Paper:** Synthesis of carbon dots from CD waste for the application towards drug delivery

Name of Conference: International Conference (Pranathi-2k23)

Names of Authors: Kalyani Thorat, Suyog Jadhav, and Dr. Yennam Rajesh

Date of Conference: 16th to 17th February 2023

Abstract: Carbon dots (CDs) are known as the rising star of carbon-based nanomaterials and, by virtue of their unique structure and fascinating properties, they have attracted considerable interest in different

fields such as biological sensing, drug delivery, photodynamic therapy, photocatalysis, and solar cells in recent years. Particularly, the outstanding electronic and optical properties of the CDs have attracted increasing attention in biomedical and photocatalytic applications owing to their low toxicity, biocompatibility, excellent photostability, tunable fluorescence, outstanding efficient up-converted photoluminescence behaviour, and photo-induced electron transfer ability. This work describes recent progress on the synthesis routes and optical properties of CDs as well as biomedical and photocatalytic applications. Furthermore, we discuss an outlook on work and potential development of the CDs based biosensor, biological dye, biological vehicle, and photocatalysts in this booming research field.

- **Title of Paper:** Oil-in-Water Emulsions by Using Natural Emulsifiers-Soyabean Oil

Name of Conference: International Conference (Pranathi-2k23)

Names of Authors: Rushikesh Gunjal, Avinash Pawar, and Dr. Yennam Rajesh

Date of Conference: 16th to 17th February 2023

Abstract: Oil-in-water emulsions are present in products including creams, desserts, candies, dressings, dips, milks, sauces, and soft drinks. These emulsions can be made using either high energy or low-energy methods. The physicochemical properties of the surfactant, oil, and water system are used in low-energy ways to spontaneously form emulsion droplets by employing simple mixing procedures or by just changing ambient conditions like temperature. Low energy technologies, however, are becoming more and more well-liked due to their low cost and ease of use. By utilising sonication, emulsions made of a variety of oils and surfactants have been produced. Numerous advantages include the need for little surfactant concentration, moderate energy efficiency, low production costs, and simplicity of use, cleaning, and management. Proteins, oils, polysaccharides, and phospholipids are just a few examples of the various natural emulsifiers that can be found. The soybean oil emulsifier the author uses (DIKO SOY65) is pure and has a long shelf life. It is absolutely devoid of alkyl phenol, making it biodegradable and harmless to aquatic life and microbes. The majority of oils and organic solvents can dissolve it. Creating food-grade oil-in-water emulsions with a natural surfactant (soybean oil emulsifier) and a low-energy method was the main objective of this research (spontaneous emulsification).

- **Title of Paper:** The usage of Drag Reduction Agent (Polyethylene Glycol) in Cylindrical Tank

Name of Conference: International Conference (Pranathi-2k23)

Names of Authors: Jay Sonawane, Vinod Suralkar, and Dr. Yennam Rajesh

Date of Conference: 16th to 17th February 2023

Abstract: Degradation can occur on the surfactant during the flow. Because of the pressure and temperature on the surfactant, it is easier to break

continued on page 5

them down. Because of this, the drag reducing agent is re-injected after points like pumps and turns, where the pressure and temperature can be extra high. To safeguard against degradation at high temperature, a different class of drag reducing agents are at times used, namely, polymer. With drag reduction, there are many factors which play a role in how well the drag is reduced. A main factor in this is temperature. With a higher temperature, the drag reducing agent is easier to degrade. At a low temperature the drag reducing agent will tend to cluster together. This problem can be solved easier than degradation though, by adding another chemical, such as aluminum to help lower the drag reducing agents' attraction to one another. Another factor is the pipe diameter. With a decreasing pipe diameter, the drag reduction is increased. Going along with this, the roughness of the inside of the pipe has a factor. The rougher the inside, the higher the percent drag reduction occurring. Increasing the pressure in a pipe will help with drag reduction as well, but often that pressure is greater than what the pipe can withstand. Drag reducing agents have been found useful in reducing turbulence in the shipbuilding industry, for fire-fighting operations, oil-well fracturing processes, in irrigation systems and in central heating devices. Drag reducers can work in a couple of different fields. The most popular are crude oil, refined products and non-potable water. Currently there are several studies with ongoing tests in rats looking to see if drag reducers can help with blood flow. This work describes about the simultaneous approach both experimental and simulation towards a drag reduction system using industrial effluent. The parameters of the present work are two exit pipe, exit pipe length, liquid height in the tank and concentration of solvent etc. After experimental the result is validated simulation approach.

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

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

ISSN Number: 27098028

Names of Authors: Dr. Yennam Rajesh and 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 ($-NH_2^+$ 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:** Novel-supported ionic liquid membranes for an effective removal of pentachlorophenol from wastewater

Name of Journal: Journal of Molecular Liquids

ISSN Number: 1873-3166

Names of Authors: Dr. Yennam Rajesh

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.

■ **Achievements**

- Nikhil Dhuri, a second-year student of Chemical Engineering, secured the Consolation prize in the ChemFest 2K23 organized by KKWIEER, Nashik, on 28th April 2023.
- Rahul Barhate, a third-year student, secured the 1st prize in the Poster Presentation category at ChemFest 2K23, KKWIEER, Nashik on 28th April 2023 for the project "Seawater desalination with membrane."
- Saurabh Kulkarni and Rohit Fulzhele, a final year student, secured the 3rd prize in the Model Exhibition category at ChemFest 2K23, KKWIEER, Nashik on 28th April 2023 for the project "Design of the Microbial fuel cell for power generation & wastewater treatment."



- Prasad Musale and Nilesh Thakare, a final year student, secured the Consolation prize in the Model Exhibition category at ChemFest 2K23, KKWIEER, Nashik on 28th April 2023 for the project "Biofuel production using water polluting water hyacinth."
- Omkar Shinde, a final year student, secured the 2nd prize in the Paper Presentation category at ChemFest 2K23, KKWIEER, Nashik on 28th April 2023 for the project "Solar dome."
- Ishwar Wagh, a final year student, secured the 1st prize in the Model Exhibition category at ChemFest 2K23, KKWIEER, Nashik on 28th April 2023 for the project "Web portal for agricultural application."
- Jay Shah, a third-year student, secured the 1st prize in the Paper Presentation category at ChemFest 2K23, KKWIEER, Nashik on 28th April 2023 for the project "Augmented reality."
- Deepali Sonawane, a third-year student, secured the 2nd prize in the Model Exhibition category at ChemFest 2K23, KKWIEER, Nashik on 28th April 2023 for the project "Experimental investigation of thermo-physical properties of hybrid nanofluids."
- Deesha Chawda, a third-year student, secured the 1st prize in the Techo Hunt category at Mecheven-2K23, KKWIEER, Nashik on 28th April 2023.
- Rakesh Patil, a third-year student of Chemical Engineering, secured the 2nd prize in Athletics category at SNJB College, Chandwad on 26th February 2023.
- Rakesh Patil, a third-year student of Chemical Engineering, secured the 2nd prize in Discus throw category at "Maffick", organized by KKWIEER, Nashik, from 25th to 27th February 2023.
- Darshan Barhe, final year, Vaibhav Jadhav, Tushar Ekhand, Teckchand Brahmankar, Jaspal Rajput, Krishna Agrawal, Omkar Joil, Prashant Jorwar, Rahul Barhate, Rakesh Patil, third-year students and Rushikesh Gaikwad, Shivam Pawar, second year students of Chemical Engineering won the Kabaddi trophy in the "Maffick", organized by KKWIEER, Nashik, from 25th to 27th February 2023.

