



ChemE Chronicles

VOL.II No.3

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DEPARTMENTAL NEWSLETTER

FROM HOD's DESK

PROF. ADITYA KUMAR

Dear friends and well-wishers,



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It gives me great pleasure to introduce the December 2025 edition of ChemE Chronicles, the official newsletter of the Department of Chemical Engineering, IIT ISM Dhanbad. With every issue, the newsletter continues to enhance interaction and connection among students, alumni, faculty members, and well-wishers. I would like to express my heartfelt appreciation to all contributors for their dedication and efforts in bringing out this edition. This issue showcases a wide range of academic, research-oriented, and student-focused activities taking place within the department.

The Alumni ChEnect segment presents an engaging interaction with one of our undergraduate alumni, offering insights into the varied career opportunities that stem from a solid grounding in chemical engineering. These shared experiences provide meaningful direction and motivation for our

students as they plan their academic progress and professional futures.

The ChemE Trivia section explores flash distillation, which is a simple and energy-efficient for large throughputs and moderate separations (refining, gas processing, solvent recovery) but not suitable when very high purities or close-boiling components are required. The feature article on distillation establish it as the backbone of industrial separations, linking core chemical engineering concepts with large-scale operations across many sectors. Our department is organizing NOET-2026, a national conference on net-zero emission technologies on 10–11 February 2026, where leading academicians, researchers, and industry experts will participate to discuss cutting-edge low-carbon technologies and foster academia–industry collaboration toward sustainable development.

IIT(ISM) Dhanbad's centenary celebrations (3–9 December 2025) featured chemical engineering demonstrations for school students and visitors, using interactive experiments to showcase core concepts and applications. I encourage readers to explore this issue and share their thoughts, feedback, and suggestions. Together, let us continue striving to enhance education, research, and innovation in the field of chemical engineering.

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Chemical Engineering News

ORSL, IIT Bombay, and IIT Kharagpur secure DBT-BIRAC grant to launch India's first pilot-scale Bio-CCU platform

Organic Recycling Systems Limited (ORSL), a Mumbai-based pioneer in sustainable waste management, has been awarded a prestigious research grant under the Department of Biotechnology (DBT) and Biotechnology Industry Research Assistance Council (BIRAC) Joint Call on Carbon Capture and Utilization (CCU). [Read More..](#)



Tata Chemicals International to acquire 100% stake of Novabay for €25 million [Read More..](#)

Tata Chemicals International Pte. Ltd. (TCIPL), a 100% subsidiary of Tata Chemicals Limited (TCL), has signed a share purchase agreement (SPA) to acquire 100% equity shares of Novabay Pte. Ltd., manufacturer of premium grade sodium bicarbonate for €25 million to strengthen its offering in premium-grade sodium bicarbonate. This acquisition strengthens TCL's capabilities in the specialty bicarb market and enhances our ability to serve premium customer requirements. [Read More..](#)



TATA CHEMICALS LIMITED

*Please send your suggestions to: che@iitism.ac.in

Alumni ChEnect

SURBHI KUMARI

BTECH [2011-2015]



Q. Welcome to the “Alumni ChEnect” interview series! Please tell us in detail about your current job.

Thank you for having me! I am currently a fifth-year graduate research assistant in the Department of Chemical and Biomolecular Engineering at the Georgia Institute of Technology. In this role, my work focuses on my PhD research thesis, where I use computational simulation tools to design and discover novel metal-organic frameworks (MOFs) for adsorption-based applications, contributing to the development of advanced materials for clean energy and environmental technologies.

Q. Please tell us about your academic journey, starting from school days.

I did my schooling in Mumbai, where I developed a strong interest in mathematics and science during high school. This naturally led me to pursue engineering and prepare for the IIT-JEE, and in 2011 I joined IIT (ISM) Dhanbad as an undergraduate in Chemical Engineering. During my B.Tech, I developed interest in research and working in the corporate R&D sector, and I realized that a master's degree would be important for building a strong Profile in either path. I therefore prepared for GATE, secured a good rank, and went on to pursue my M.Tech in Chemical Engineering at IISc Bengaluru.

It was during my master's that I truly fell in love with research – asking questions, identifying gaps in the literature, and digging deeply into a specific problem. This experience motivated me to pursue a PhD. But before starting my doctoral studies, I briefly worked in an industrial R & D Role, which gave me insight into how research is conducted in industry and showed me that a PhD would also be valuable for climbing the corporate ladder. Therefore, while working in this role, I simultaneously prepared my PhD applications in terms of decent GRE/TOEFL scores and well-crafted

research statements. Along with it, the publication and experiences from my master's played a major role in securing a PhD position at the Georgia Institute of Technology.

Q. Why did you choose chemical engineering? Was it out of passion, or driven by circumstances? Please walk us through your thoughts as a Class 12 pass-out.

The choice of chemical engineering was driven by both circumstances and passion. During my 11th-12th grade, I took an elective course in computer science and quickly realized that, despite it being one of the most sought-after branches, I did not enjoy it enough to pursue it further. My first preference was electronics and communication engineering, especially with a strong inclination for digital electronics. During my preparation years for IIT-JEE, I had also developed a genuine interest for chemistry and chemical engineering seemed to be ideal platform for applying engineering principles to molecular sciences (including chemistry) and scaling them up to large-scale industrial processes. As per my rank, I could not secure a seat in electronics and communication, but I was able to pursue chemical engineering. In hindsight, it turned out to be a field that still aligns well with my interests and has opened its own exciting set of Opportunities.

Q. How has IIT (ISM) Dhanbad helped you in this journey? How did the BTech/MTech/PhD programme here help shape your career path? How did the academic environment and campus life contribute to your personal growth?

I was part of the very first B.Tech batch of this department and had a front-row seat to its growth – from starting with just two faculty members (including the HOD) to welcoming many new professors over the years. The department was also in its early stages of setting up labs in the main building and eventually moving into a dedicated department building. Despite these limited resources, my bachelor's at IIT (ISM) Dhanbad played a central role in shaping my interest and confidence in the field. The Programme introduced me to the core fundamentals of chemical engineering through rigorous coursework and hands-on laboratory sessions. Occasional field trips and industrial internships helped me realize the vast applications of these fundamentals into a range of industries. During my bachelor's, I also received invaluable first-hand exposure to research through a summer internship at the R&D division of Tata Steel Ltd., along with semester-run projects. These early opportunities nurtured my curiosity and laid the foundation for my long-term interest in research, which has clearly guided my subsequent Career Choices.

Beyond academics, I was very active in the extracurricular life of the institute. I actively participated in the college fests and later went on to organize some of the events in my senior years. Those activities really

helped me come out of my shell and interact with a wide range of students. Those years were also my first experience of living away from my family, and hostel life taught me independence and a strong sense of responsibility. The time I spent at IIT (ISM) Dhanbad has given me many cherished memories and friendships that continue to hold an integral place in my life.

Q. What is your typical work-day like?

My typical work-day involves a mix of reading research papers, analyzing simulated data, and visualizing atomic-level structures. I spend a significant portion of my time interpreting my results and designing new set of simulations to guide the next steps in my research. On some of the days, I also participate in group meetings and one-on-one discussions with my thesis advisor(s), for which I prepare reports or presentations to communicate my progress. While most of my time is devoted to research, some semesters also include coursework or teaching assistant duties, so my days then involve attending lectures and working my own assignments or grading those of the students I assist.

Since my work is fully computational and my entire lab essentially fits into my laptop, I enjoy the flexibility of not being tied to a single office and often choose to work from different places, such as home, cafés, or various workspaces in the library. Even during work-intensive days, I make it a priority to maintain a healthy routine by playing badminton, practicing yoga, or going to the gym, which helps me stay balanced and energized. I also enjoy cooking my meals every day, and I find the process both relaxing and meditative.

Q. What are the pros and cons of the profession in your honest opinion?

Some of the pros of pursuing a PhD include the freedom to dive deeply into a topic you care about, develop strong problem-solving and technical skills, and the opportunity to work closely with mentors and collaborators who can shape your career. The flexibility to structure your own schedule, exposure to conferences and global networks, and the satisfaction of contributing new knowledge to literature, all make it a strong foundational ground for becoming an independent researcher, whether in industry or academia.

At the same time, the PhD journey can be mentally and emotionally challenging due to slow or uncertain progress, blurred work-life boundaries, funding limitations, and a strong “publish or perish” culture that can often fuel self-doubt and imposter syndrome. Therefore, it becomes critical to prioritize self-care, build supportive communities, and nurture interests outside the lab.

NOET 2026 Conference

- The Indian Institute of Technology (Indian School of Mines), Dhanbad will host NOET-2026, the fourth edition of the national conference on *Net-Zero Emission Technologies for Sustainable Development: Challenges and Opportunities*, scheduled for 10–11 February 2026. Organized by the Department of Chemical Engineering, the conference will focus on key themes such as carbon capture and utilization, renewable and clean energy technologies, hydrogen and fuel cell systems, sustainable chemical processes, energy storage, and climate-friendly industrial practices. The event will feature eminent speakers from premier academic institutions, research organizations, and leading industries, who will deliver invited lectures sharing insights on recent advancements, policy perspectives, and real-world applications. Supported by the Anusandhan National Research Foundation and organized in association with the TEXMIN Foundation, NOET-2026 will also include technical paper and poster presentations, providing a vibrant platform for researchers, students, and industry professionals to engage in meaningful discussions and foster collaborations toward a sustainable, net-zero future.
- NOET-2026 will host eminent speakers from premier academic institutions, leading research organizations, and reputed industries across India. The invited speakers will share their expertise on recent technological advancements, translational research, industrial implementation, and policy perspectives related to net-zero and sustainable development goals. Through keynote lectures and invited talks, the speakers are expected to provide valuable insights, inspire young researchers, and facilitate meaningful interactions between academia and industry.



Feature Article

Why Distillation Still Rules the Chemical Industry

- Look at the skyline of a chemical plant—what stands out the most? Chances are it's a tall cylindrical tower reaching toward the sky. That structure is a distillation column, and it remains the backbone of separation processes across the chemical industry.
- Distillation works by exploiting differences in boiling points (or volatility) of components in a liquid mixture. When the mixture is heated, the more volatile component vaporises first. Inside the column, rising Vapour repeatedly comes into contact with descending liquid, undergoing continuous Vaporisation and condensation. Each such contact improves separation, eventually producing high-purity products at different points in the column.
- For chemical engineering undergraduates, distillation is especially important because it beautifully connects classroom theory with industrial practice. Concepts learned early—such as Vapour-liquid equilibrium, phase diagrams, mass balances, and energy balances—all come alive when studying distillation. A single unit operation ties together thermodynamics, transport phenomena, and process design.
- Despite its effectiveness, distillation has a drawback: it consumes a large amount of energy. In fact, separation processes—mainly distillation—account for a significant share of industrial energy use. This has driven research into energy-efficient distillation, including heat-integrated columns and hybrid separation techniques. Even small efficiency improvements can save enormous amounts of energy.
- For young chemical engineers, distillation is more than a textbook topic—it is a gateway to understanding how fundamental science powers real industrial systems.
- Some quick, noteworthy facts: Distillation is used in a variety of industries, including petroleum refining, alcohol production, air separation, and pharmaceuticals. Over 90% of all industrial separations involve distillation in some form! In fact, some industrial columns are taller than a 20-storey building!



Prof. Sourav Sengupta

ChemE Trivia

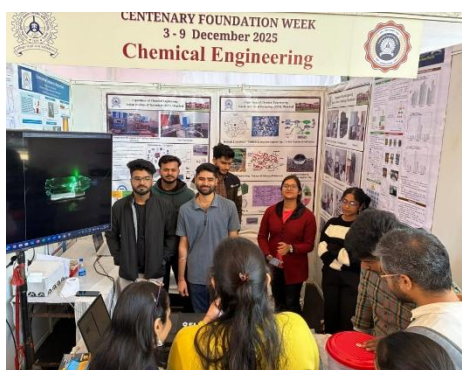
Flash Distillation

- Flash distillation is a special operation within distillation, where a liquid mixture is heated up and fed – with constant flowrate – into a distillation equipment. The resulting vapor and liquid phases enter a phase separator – an equilibrium chamber – and are drained separately. During the operation, the total pressure and temperature of the system, as well as the compositions of the two phases in equilibrium remain constant over time.
- Flash ("equilibrium distillation") is a single stage separation technique. A liquid mixture feed is pumped through a heater to raise the temperature and enthalpy of the mixture. It then flows through a valve and the pressure is reduced, causing the liquid to partially vaporize. Once the mixture enters a big enough volume (the "flash drum"), the liquid and vapor separate. Because the vapor and liquid are in such close contact up until the "flash" occurs, the product liquid and vapor phases approach equilibrium.
- Flash distillation operates on the principle of phase equilibrium, where a liquid feed partially evaporates when exposed to reduced pressure or elevated temperature. The process involves a single equilibrium stage, making it relatively easy to design and operate. It is frequently used in refining, gas processing, and solvent recovery applications to separate components with sufficiently different volatilities. While flash distillation is economical and energy-efficient for certain duties, it is not suitable for achieving high-purity separations when component boiling points are close.
- In flash distillation, a liquid feed at a given temperature and pressure is allowed to expand rapidly into a vessel maintained at a lower pressure. This expansion results in instantaneous partial vaporization of the feed until vapor-liquid equilibrium is established. The vapor and liquid phases are then disengaged and withdrawn separately. The process is particularly useful for handling large flow rates and for preliminary separations, but its effectiveness depends strongly on operating conditions and the relative volatility of the components present.

A Century of Legacy: IIT(ISM) Dhanbad Centenary Celebrations

IIT (ISM) Dhanbad proudly commemorated a century of academic excellence and national service by observing its Centenary Celebrations from 3rd to 9th December 2025. This historic milestone was marked by a series of academic, cultural, and outreach activities that reflected the institute's rich legacy and its continued commitment to innovation, research, and societal engagement. As part of these celebrations, the Department of Chemical Engineering actively participated by organizing an engaging and educational technology demonstration program for school students and esteemed guests. The department showcased several experimental models and advanced diagnostic tools designed to illustrate fundamental and applied concepts in chemical engineering. Key highlights included a demonstration of shear-thickening suspension, offering insights into non-Newtonian fluid behavior and its real-world applications; the use of a high-speed camera to visualize rapid physical phenomena otherwise imperceptible to the naked eye; and a thermal imaging camera to demonstrate heat transfer and temperature distribution in engineering systems. In addition, a water displacement jet setup was presented to explain fluid dynamics principles in an intuitive and interactive manner. These demonstrations generated keen interest among visitors and provided an effective platform for scientific outreach, inspiring young minds while showcasing the department's emphasis on experiential learning and research-driven education. The participation of the Department of Chemical Engineering significantly enriched the centenary celebrations, reinforcing IIT (ISM) Dhanbad's enduring role as a hub of technical excellence and innovation over the past 100 years.

In addition to the technical demonstrations, the Department of Chemical Engineering, in collaboration with the Department of Chemistry and Chemical Biology, organized a distinguished expert talk series as part of the Centenary Celebrations. The session brought together eminent leaders from academia and industry, providing valuable perspectives on research, innovation, and industrial practice. The invited speakers included Dr. Angshuman Ghosh, Industry Leader in Process Technology at TGC Life Sciences Limited, Kolkata; Professor Swadhin Mandal (FASC, FNA, J. C. Bose Fellow, Shanti Swarup Bhatnagar Awardee) from IISER Kolkata; Dr. Sitaram Pal, Director of JSB Agrotech Pvt. Ltd., Kolkata; and Mr. Dinesh Gangwal, Chief O&M Services (MPL) at TATA Power. The talks facilitated meaningful interaction between students, researchers, and professionals, highlighting the convergence of fundamental science, chemical engineering principles, and real-world industrial applications. The session significantly enriched the centenary program by fostering interdisciplinary dialogue and strengthening academia-industry collaboration.



PLENARY LECTURES & PANEL DISCUSSION

DEPARTMENT OF CHEMISTRY AND CHEMICAL BIOLOGY
AND
DEPARTMENT OF CHEMICAL ENGINEERING



Dr. Angshuman Ghosh
Industry Leader in Process Technology
TCG Life Sciences Limited, Kolkata



Prof. Swadhin Mandal, FASC, FNA,
J. C. Bose Fellow
Shanti Swarup Bhatnagar Awardee
IISER Kolkata



Dr. Sitaram Pal
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Dinesh Gangwal
Chief O&M Services MPL at TATA Power

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