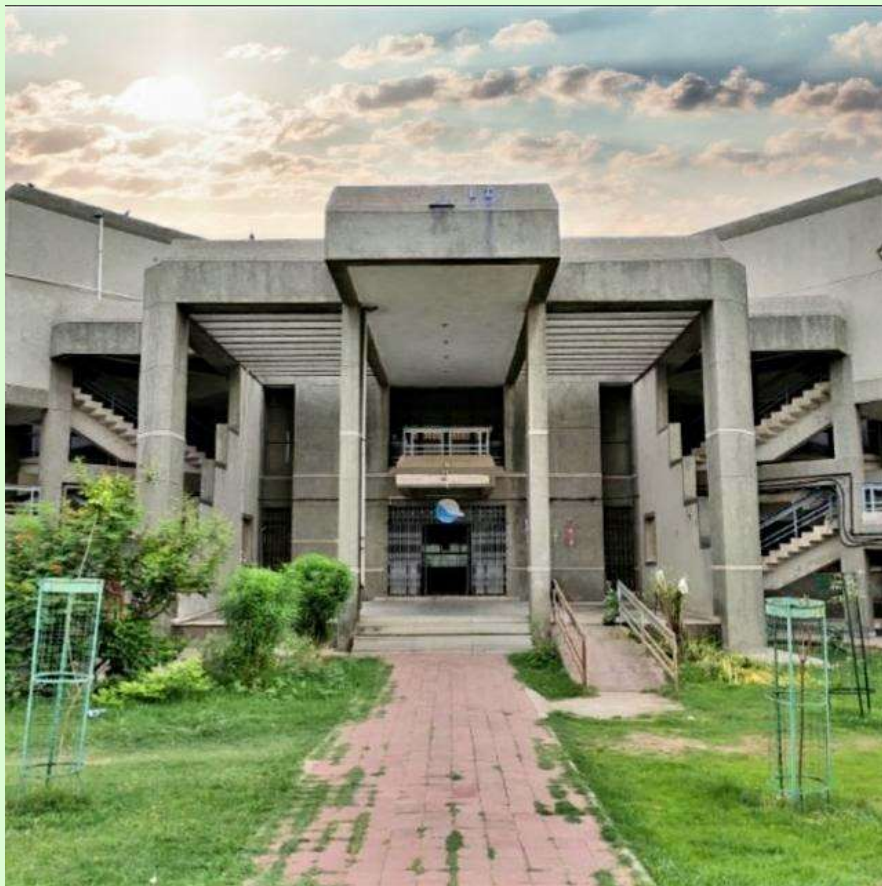




RADIANCE



Newsletter | January- June 2022

From Department Coordinator



Dr. Femina Patel
Department Coordinator

We are delighted to announce the publication of volume 5, issue 1 of the Departmental Newsletter "RADIANCE". As a result of collating an extensive amount of data during the period of January 2022 to June 2022, the newsletter covers an extensive assortment of topics including faculty members' activities, students' activities, expert lectures, co-curricular/extra-curricular activities, extension activities, etc. There is no doubt that this newsletter will serve as a method of conveying information relating to the Departmental activities and progress for continuous development. Special congratulations go out to my students who take part in various co-curricular/extra-curricular activities & extension activities, research work, and competitive exams.

After a year filled with events, we are looking forward to the year ahead. Welcoming the Fresh Man year, I wish that all of you be blessed with good health, happiness, and success in your future endeavours.

Glimpses of the Department

The Department of Chemical Engineering is a vibrant and dynamic Department, with a young and enthusiastic academic staff consisting of two Professors, two Associate Professors, eight Assistant Professors, and one laboratory Assistant. Quality in academics and a whirlpool of personality-enhancing activities have geared the students for the future and prepared them to take new challenges, to explore new avenues, and to realize, cherish as well as fulfil their dreams. Inherent strength, values, teamwork, dedication & vision steam the confidence of the students. The dedicated staff members keep themselves updated about the recent developments in their fields of interest, beyond the curriculum. They are also provided exposure to the environment of the industry parallel to academics. The Department regularly organizes expert lectures beyond the curriculum. The faculty mentors counsel the students from time to time for their career development.

DEPARTMENT VISION

To foster a vibrant environment for creating professional Chemical Engineers with integrity and ethics.

DEPARTMENT MISSION

- To develop open access laboratories and infrastructure for conducive learning.
- To enhance the professional engineering skills along with entrepreneurship, innovativeness and management.
- To strengthen linkages with industries, alumni and professional bodies.
- To undertake industry collaborative projects and research.
- To inculcate professional ethics and make socially responsible engineers.

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

The Chemical Engineering program aims to develop versatile professionals who can excel in a variety of career environments. The Program Educational Objectives of B.E. (Chemical) program is:

- PEO-1:** To prepare graduates who will be skilled in fundamental concepts of Chemical Engineering.
- PEO-2:** To prepare graduates who will be capable of obtaining position in Industrial, Research, Government, Academic, Entrepreneur or other organizations, which use their technical knowledge and professional skills.
- PEO-3:** To prepare graduates who will have proficiency in execution of real time Chemical Engineering projects.
- PEO-4:** To prepare graduates who will contribute to the socio-economic environment of their communities.

“Education is not the filling of a pail, but the lighting of a fire.” –W.B. Yeats

FACULTY AT A GLANCE

Sr. No.	Name	Degree	Area of Specialization	Current Designation
1	Dr. Femina J. Patel	Ph.D.	Heterogeneous Catalysis, Waste Water Treatment, Automotive Emission Control	Professor
2	Dr. Parin D. Shah	Ph.D.	Green Chemistry and Green Engineering, Waste Water Treatment	Professor
3	Prof. Suchen B. Thakore	M.E.	Equipment Design	Associate Professor
4	Prof. Dolly R. Gandhi	M.E.	Thermodynamics	Associate Professor
5	Prof. Zoher Z. Painter	M.E.	Cleaner Production	Assistant Professor
6	Dr. Milap G. Nayak	Ph.D.	Alternative Energy, Plasma Pyrolysis	Assistant Professor
7	Prof. Yogesh J. Morabiya	M.E.	Green Engineering	Assistant Professor
8	Prof. Sahil N. Prajapati	M.E.	Waste Water Treatment	Assistant Professor
9	Prof. Sunil R. Patel	M.Tech.	Waste Water Treatment	Assistant Professor
10	Prof. Jay B. Trivedi	M.E.	Waste Water Treatment	Assistant Professor
11	Dr. Ujvala P. Christian	Ph.D.	Polymer Technology	Assistant Professor
12	Prof. R. R. Merchant	B.E.	Chemical Processes	Assistant Professor

Congratulations GATE ACHIEVER

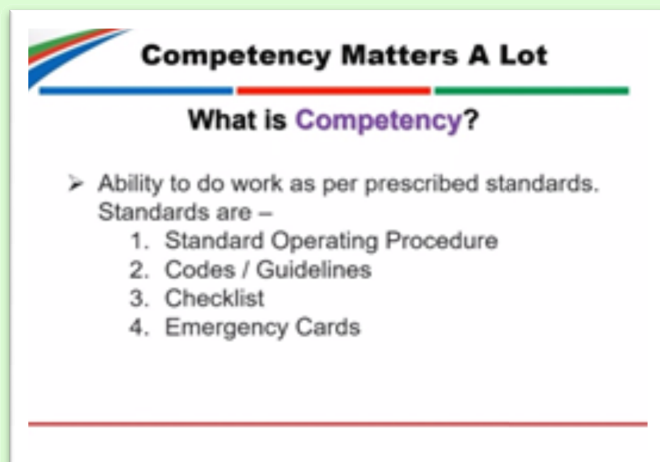
				
Parth Darji AIR: 580	Patel Raj AIR: 774	Shukla Utkarsh AIR: 967	Patel Dharam AIR: 2097	Modi Dweep AIR: 2169

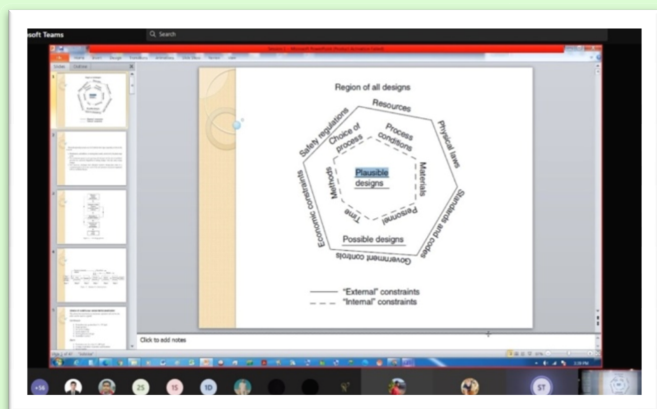
DEPARTMENTAL ACTIVITIES

An expert talk on “**Important Aspects of Experiential Learning**” was organized under the banner of the **Indian Institute of Chemical Engineers (IChE) students’ chapter** for students of B.E. Semester-6 of Chemical Engineering and IChE student members from other Government Engineering Colleges across the Gujarat State through Microsoft Teams by **Mr. Harshad Patel, Commissioning Coordinator, SPIE Oil & Gas Kuwait** on 12th January 2022. The talk was coordinated by Dr. Ujvala Christian. The main objective of this expert talk was to create an understanding of experiential learning among students and develop competency through experiential learning and apply it to resolve technical problems in Chemical and Allied Industries. The major points discussed were the Concept of Lock out and Tag Out, Styles of Experiential learning, Skill v/s Will, and Resolving technical problems through experiential learning, and with the importance of competency development. 70 students and faculty members benefitted from it.



An expert talk on “**Introduction of Process Industries**” was organized under the banner of the **Indian Institute of Chemical Engineers (IChE) students’ chapter** for students of Chemical Engineering and IChE student members from other Government Engineering Colleges across the Gujarat State through Microsoft Teams by **Shri Mani Bhusan Thakur, Discipline Lead (Process), L & T Technology Services Ltd., Vadodara-Gujarat** on 29th January 2022. The talk was coordinated by Dr. Ujvala Christian and Prof. Shuchen Thakore with the objective to understand the importance of Chemical Process Industries, principles, and thumb rules for chemical processes via unit operations and unit processes aspects. The major points discussed were the role of the Chemical Engineer in Process Industries, selection criteria for plant location and layout, the importance of process equipment design concepts as a process engineer, and applications of advanced technology in chemical process industries. 180 students and faculty members benefitted from it.





An expert talk on “**GATE, Career Opportunities & Internship**” was organized under the banner of the **ChEA** for students of B.E. Semester- 4 and 6 of Chemical Engineering through Hybrid mode using Microsoft Teams by **Shri Shailesh Chaudhary, Center Head, I.C.E. GATE Institute, Ahmedabad** on 5th March 2022. The talk was coordinated by Prof. Shuchen Thakore with the objective that acquainting students with numerous opportunities after passing the GATE Exam. The important points dealt with include the importance of the GATE examination and eligibility of the GATE scores in various PSU sectors. The outcome of the talk was that the students got aware of various opportunities after completing Chemical Engineering. 55 students benefitted from it.



An awareness session on “**Smart India Hackathon-2022**” was conducted under the **Student Startup for Innovative Policy (SSIP)** on 9th March 2022. The event was coordinated by **Dr. Milap Nayak** for B.E. semester 6, 8, and M.E. students. The event aimed to discuss the necessary information for the SIH-2022 event and to create awareness among the student group for the “Smart India Hackathon”. Discussed the important instruction regarding participation in the event, formation of the group, and selection of problem statement, encouraged the students to come out with innovative ideas and convert their technical strengths into a feasible outcome. The outcome of the event was that students got aware of a selection of problem statements, the formation of the team. Hackathon scrutiny at the Institute level was held on 25th March 2022. Students have participated in SIH at the Institute level.





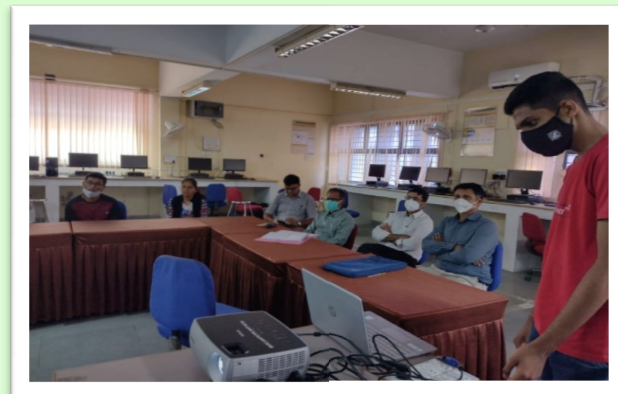
An Expert evaluation of the “**Smart India Hackathon-2022**” was conducted under the **Student Startup for Innovative Policy (SSIP)** on 25th March 2022. Students have participated in the event. The event was coordinated by Dr. Milap Nayak with the objective to showcase the solution for the problem statement on “Waste segregation and disposal” for the SIH-2022 event and evaluated the problem solution of the team by the invited jury. Team members have discussed the use of plasma pyrolysis for the disintegration of waste including medical waste, plastic, and other types of waste such as vacuum residue of the refinery.

Jury members

- Dr. Supritam Dutta, Associate Prof. Chemical Engineering, L. D. College of Engineering, Ahmedabad
- Prof. Amar Vaghela, Associate Prof. Chemical Engineering L. D. College of Engineering, Ahmedabad

Jury members evaluated the team on the techno-economic viability of the proposed solution.

“Education is one thing no one can take away from you” – Elin Nordegren



An expert talk on “**Crude Distillation and Cracking- Industrial Experience**” was organized on 29th April 2022 on the Microsoft Teams platform. The event was coordinated by Prof. Dolly Gandhi. The key points discussed include Heat Management for a refinery unit, Crude Distillation Unit (CDU)”, How does Vacuum Distillation Work?, the Need for catalytic cracking, FCC Plant Configuration, Selecting FCC based on feed quality, and How A FCC/ RFCC Operates?, Heat Balance in FCC. **Mr. Saugata Palit, Sr Manager, Operation - RFCC Block, Qatar Petroleum/ Energy, Qatar** was the distinguished expert of the session, which benefitted around 45 students of B.E. Sem 6 of Chemical Engineering.

HOW DO WE SELECT THE CRUDES?

• Selection of appropriate crudes is very important, considerations include:

- Refinery configuration
- Products required
- Crude availability / cost
- Refinery metallurgy – acid crudes?
- Expected Margin

• Refinery economics depend on crude oil and processing costs

- Lighter, sweeter, “nicer” feeds are more expensive, but require less processing
- High acid crudes are cheaper – but corrosion is an issue and not all refineries have suitable metallurgy

As oil fields mature crudes are getting heavier and more sour



HEAT MANAGEMENT FOR A REFINERY UNIT

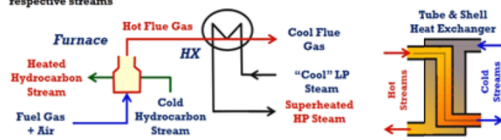
In a refinery we have to “heat-up” and “cool-down” process stream

Heating Requirements	Cooling Requirements	Heat Exchangers
Pre-heating reactor feeds Distillation unit re-boiling Incineration of waste gases Steam generation	Condensing & Cooling products Distillation reflux Flue gas cooling	Flue Gas ↔ Steam Steam ↔ Hydrocarbons Hydrocarbons ↔ Hydrocarbons

Furnaces are in many cases - usually fuelled by refinery gas

- ✓ Refinery gas = C1-C2 saturates and maybe some propane or n-butane

But the smart thing to do is to use the excess heat from some streams to heat up colder streams - this is done in heat exchangers (HX) - which simultaneously cool and heat respective streams

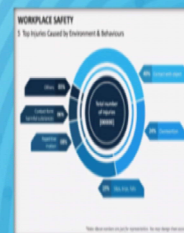


about process safety, how to deal with incidences and related accidents taking place in Industries, and the challenges, and opportunities as a safety engineer in the Industry. Mr. Sukanto Das (Process Safety Management Specialist, Indorama Ventures-IOD division) was the distinguished expert in the session, which benefitted around 83 students.

Process Safety Vs Workplace Safety

Process safety is focused on prevention of, preparedness for, mitigation of, response to, and restoration from catastrophic releases of chemicals or energy from an industrial chemical manufacturing process associated with a facility.

Occupational safety is focused on the prevention of injuries/illnesses to employees due to their tasks or work environment. As such, it tends to focus on hazardous energy related to their personal momentum or the momentum of objects they may be manipulating. Injuries/illnesses could result, such as slips, trips, falls, cuts, thermal burns, musculoskeletal injuries, etc.



Sukanto D. ...

IEI TRAINING ON CHEMICAL PROCESS SAFETY

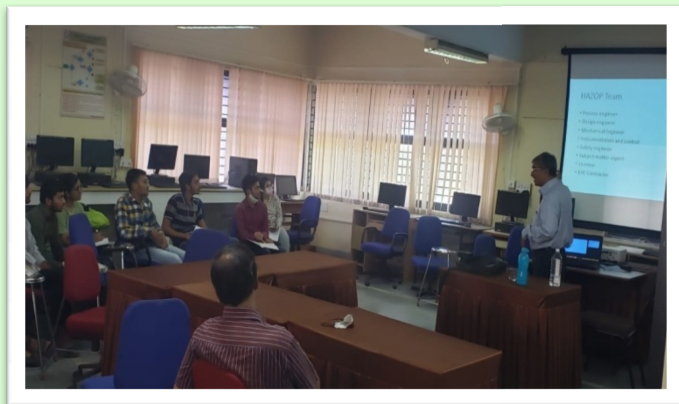
Chemical Engineering Department organized training on “Chemical Process Safety” under the banner of the Institution of Engineers India (IEI) Students’ Chapter on the Microsoft Teams platform for Undergraduate Students. The training was coordinated by Prof. Sunil Patel and Prof. Jay Trivedi.

Session – 1

The session on “Introduction, Historical Background, Importance and Need, Process Safety Management System” was organized on 29th April 2022. The objectives of the session were to discuss safety, its importance, needs, and fundamentals to make students aware of the incidences and related accidents taking place in Industries due to lack of safety management and awareness. The Participants learned

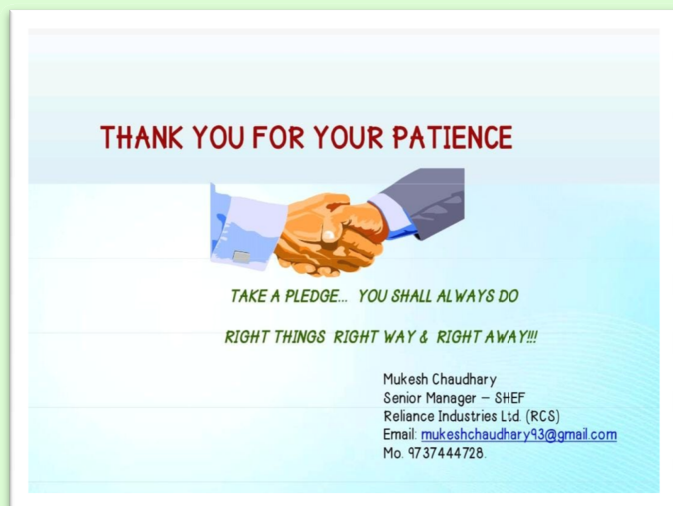
Session – 2

The session on “Hazard and Hazard Identification, HAZOP, Fault Trees, Event Trees and Case Study on Toluene Di-Isocyanate” was organized on 29th April 2022. The objectives of the session were to understand Hazard and their identification, HAZOP, Fault trees, Event trees, and case study related to it; understand the severity of avoiding safety procedures and precautions. The Participants learned about day-to-day hazards in the industry and how to deal with types of hazards and identify them. Mr. Amit Dave (Technical Advisor- ISOCYANATES) was the distinguished expert of the session, which benefitted around 65 students



Session – 3

The session on “Safety: Laws and Regulations, Emergencies Handling, Safety Audit, and M.S.D.S.” was organized on 30th April 2022. The objectives of the session were to understand the legal legislation for industries of Chemical Process Safety, the key legal terms, labor legislation, and so on. The Participants learned about labor legislation, key what are our duties and responsibility in the factory and about our health and safety also, health and safety concerns to prevent accidents in industries. Mr. Mukesh G Chaudhary (Senior Manager- HSEF Reliance Industries Ltd. (RCS)) was the distinguished expert in the session, which benefitted around 69 students.



Session – 4

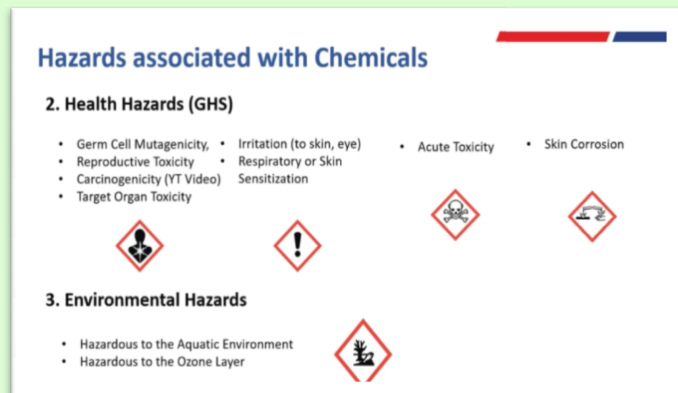
The session on “Fire and Explosion, Personal Protective Equipments, Instrumentation, and Control” was on 30th April 2022. The objectives of the session were to understand the science and management of fire, igneous sources, major fire control, instrumentation, and control, and know about PPE, its uses of PPE, and its importance of PPE. The Participants learned about types of fire and fire management, how to control major fire and ingenious sources, and various kinds of fire & explosions in industries and how to control them. Mr. Amit Dave (Technical Advisor- ISOCYANATES) was the distinguished expert of the session, which benefitted around 65 students.



Session – 5

The session on “Process Safety Management in Petroleum Refinery” was organized on 21st May 2022. The objectives of the session were to understand the process and occupational safety, about provisions related to process and occupational safety, and know about incidents happening due to lack of process safety. The Participants learnt about the need for process safety, the incidences taking place due to negligence of process safety, and

health and safety concerns to prevent accidents in industries. Mr. Mukesh G Chaudhary (Senior Manager-HSEF Reliance Industries Ltd. (RCS)) was the distinguished expert in the session, which benefitted around 57 students.



Session – 6

The session on “Process Safety Management in Fertilizer Industries” was organized on 21st May 2022. The objectives of the session were to understand fertilizers and need of fertilizers, plant operation and process safety, and management for hazards. Participants learnt about types of fertilizers and their needs of it, plant operation and process safety in industry and HSE and safety management system. Mr. Rupesh Sarkar (Manager, Environment & Pollution Control Department, IFFCO, Kalol) was the distinguished expert of the session, which benefitted around 45 students.



Session – 7

The session on “Safe Handling of Hazardous Materials, Storage Aspects, Transportation Aspects” was organized on 4th June 2022. The objectives of the session were to understand safe chemical handling, plant operation, process safety, and management of hazards. The Participants learned about the handling of chemicals, the incidences taking place due to negligence of process safety, & health and safety concerns to prevent accidents in industries. Mr. Ashish Ramesh Jain (Process safety Manager Chola MS Risk Services) was the distinguished expert in the session, which benefitted around 65 students.

Session – 8

The session on “Safety Engineering in Chemical Industries” was organized on 4th June 2022. The objectives of the session were to understand various statutory provisions, material safety data sheet and process hazard and control. The participants learnt about the scope of safety engineer, the importance of safety measures in industry and how to do process hazard control, process hazard analysis, and the HAZCHEM scale. Mr. Shubham Sajwar (Process Safety Manager Reliance Industries (RCS)) was the distinguished expert in the session, which benefitted around 45 students.

How Do We Control Hazards

To control hazardous and unsafe conditions and work practices, use the most effective control methods feasible at your work place. Try to reduce employee exposure by implementing effective controls that do not primarily rely on individual employee behavior. Follow a system of strategies, called the "Hierarchy of Controls," which prioritizes control methods that try to remove or reduce the hazard:

Hierarchy of Controls (most to least effective)

Eliminate/reduce the hazard	Engineering Controls
Reduce the hazard	Work Practice Controls Administrative Controls
Put barrier between worker and hazard if need	Personal Protective Equipment

Industry Sponsored Research Laboratory

Dr. Parin Shah was instrumental in establishing the 'Industry Supported Research Laboratory' at Chemical Engineering Department with the financial support of Rs 7,50,000/- by Bodal Chemicals Limited, Ahmedabad.

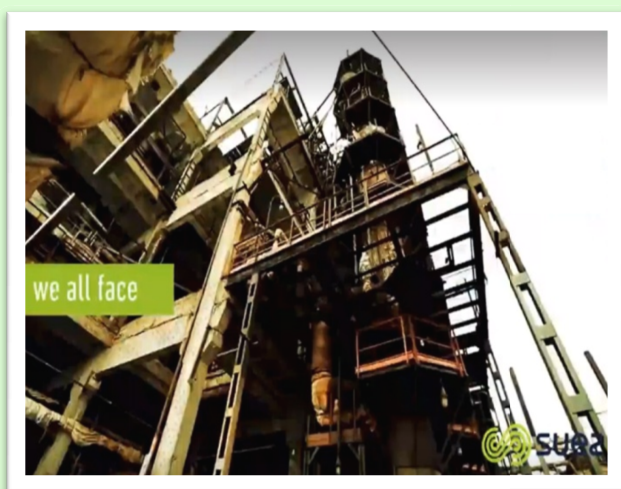
The important equipment received under 'Industry Supported Research Laboratory' from Bodal Chemicals Limited, Ahmedabad. includes UV-VIS Spectrophotometer (Shimadzu), Muffle Furnace, Jar Testing Apparatus, Digital pH meter, COD Digester (HACH), Medium duty Stirrer with 1/8 hp motor, Ultra Sonic Cleaner, Rota-mantle with 1 lit capacity, Magnetic Stirrer with Hot plate 1 MLH, COD vials with caps, COD tube etc. .

Sr. No.	Major Equipment	Cost (Rs.)
1	UV-VIS Spectrophotometer	4.25 lakh
2	HACH COD Digester	1.42 lakh
3	Jar Testing Apparatus	0.40 lakh
4	Ultra Sonic Cleaner	0.30 lakh
5	Muffle Furnace	0.65 lakh
6	Rota-mantle	0.16 lakh
7	Digital pH meter	0.05 lakh
8	Consumables and accessories	0.27 lakh

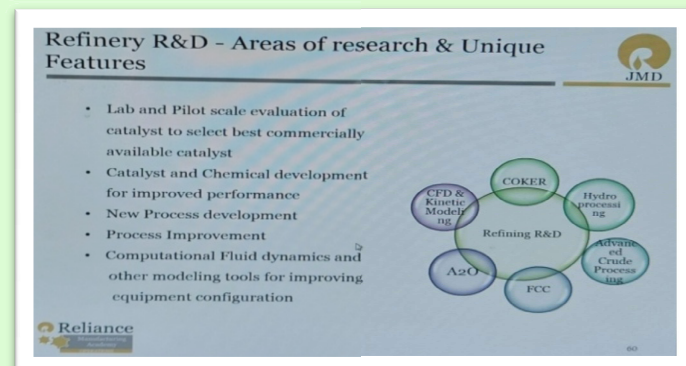
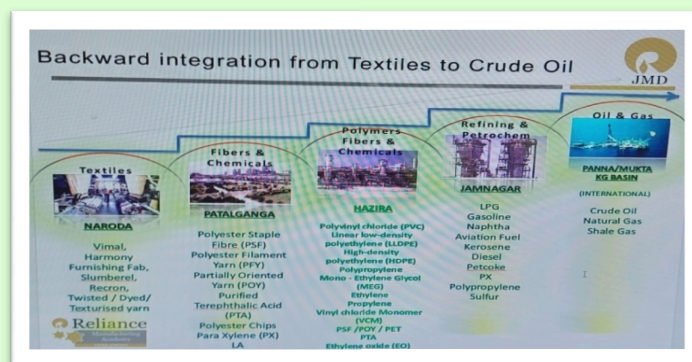


Alumni

An Alumni interaction on “SUEZ Industry Experience and Preparation for Campus” was organized under the Alumni Event on 29th January 2022, through the online platform of Microsoft Teams by Miss Ekta Chavda (2019 pass-out alumnus), Engineer - SUEZ Water Technologies and Solution, Jamnagar, coordinated by Dr. Milap Nayak and Prof. Jay. Trivedi, to create awareness of work culture and core area of SUEZ industries, discuss the eligibility criteria, screen test, and selection procedure at SUEZ industry, make students aware about question framework, materials to be used, preparation strategies, and how to express in the interview. The participants understood key areas of SUEZ industries and got aware of exam patterns and selection procedures as an intern in the industry, challenges, and opportunities as an engineer in the SUEZ industry. Students interacted with the alumni regarding Company’s collaboration, work culture, and career opportunities in the SUEZ industry. 103 students got benefitted from it.



An Alumni interaction on “Overview of Refinery and Petrochemical units” was organized under the Alumni Event on 19th February 2022, through the online platform of Microsoft Teams by Shri Sachin Sakariya (2010 pass-out alumnus), Senior Manager - Central Technical Services, CPP/Utilities- Energy Management, Reliance Industries Ltd. Jamnagar, coordinated by Dr. Milap Nayak and Prof. Jay. Trivedi, to discuss the role of chemical engineer in the refinery, the various unit operations and process involved in the Reliance Industries Ltd., Jamnagar and make students aware about the objective of every refining and petrochemical units and their inter-linkage in the industries. The participants understood the importance of the strategic location of the Reliance industry, the sequence of refining and petrochemical units, challenges and opportunities as an engineer in the Reliance industry, plant safety, and environmental aspect of Refining units. 121 students got benefitted from it.



Pedagogy

- A pedagogy lecture was organized on 16th March 2022 on "Mapping of COs-POs-PSOs and Attainment Calculations". The lecture was delivered by Prof. Jay Trivedi, highlighting the mapping of COs-Pos-PSOs & the method of attainment calculation for NBA accreditation.
- A pedagogy lecture was organized on 22nd June 2022 on "Purchase of Equipment Costing below Twenty Thousand on GeM portal". The lecture was delivered by Prof. Yogesh Morabiya, highlighting the purchase procedure of the equipment under the GEM portal.



Industrial Visit

The existence of real learning beyond the four walls of the classroom, with this objective industrial visit, was organized for the student members of IChE students' chapter on 16th March 2022. Total 25 student members of IChE students' chapter along with faculty coordinator - Dr. Ujvala Christian visited (1) S. S. S. Pharmachem Pvt. Ltd., Changodar, Ahmedabad (2) Macro Polymers Pvt. Ltd., Changodar, Ahmedabad. The students got the opportunity to interact with plant personnel who explained the production process and working of process equipment in detail. Students were taken through the industrial premises to gain practical experience and knowledge of active pharmaceutical ingredient production processes, the final finished product (i.e. in tablet, granules, and powder, gel, spray form) manufacturing and packaging, and good manufacturing practices implemented by the unit.

Research & Publication

Dr. Femina J Patel

Published a paper on "A Comprehensive Review on Spinel Based Novel Catalysts for Visible Light Assisted Dye Degradation" Process Safety and Environmental Protection 161 (2022) 703-722 (Impact Factor: 6.158) (ISSN 0957-5820) (Elsevier)

Published a paper on "Design and Development of Automotive Catalytic Converter using Non-noble catalyst for the Reduction of Exhaust Emission: A review" Materials Today: Proceedings, 57 (2) (2022) 2465-2472 (ISSN: 2214-7853) (Elsevier)

Published a paper on "Photocatalytic Dye Degradation using Nickel Ferrite Spinel and its Nanocomposite", Environmental Science and Pollution Research, 11th June 2022 (Impact Factor: 5.190) (ISSN 1614-7499) (Springer)

Dr. Parin D Shah

Published a paper on “A Comprehensive Review on Spinel Based Novel Catalysts for Visible Light Assisted Dye Degradation” Process Safety and Environmental Protection 161 (2022) 703-722 (Impact Factor: 6.158) (ISSN 0957-5820) (Elsevier)

Prof. Dolly R Gandhi

Published a paper on “Naturally Occurring Bentonite Clay: Structural Augmentation, Characterization and Application as Catalyst” Materials Today: Proceedings, 57 (1) (2022) 194-201 (ISSN: 2214-7853) (Elsevier)

Presented a paper on “Preparation of Zeolite by Non-conventional Source of Heating and its Application” at International Conference on “Technological Interventions for Sustainability” (CHEM-CONFLUX22) jointly organized by MNNIT Allahabad and University SAINS Malaysia held on 14-16th April 2022.

Dr. Milap J Nayak

Published a paper titled “Parametric study and Optimization of Microwave Assisted Biodiesel Synthesis from Argemone Mexicana oil using Response Surface Methodology”, Chemical Engineering and Processing - Process Intensification, 170 (2022) 703-722 (Impact Factor: 4.264) (ISSN 2552701) (Elsevier)

Prof. Ujvala Christian

Presented a review paper on “Bio-electro-Chemical Processes: An Efficient Method for Treatment of Waste Water” at 3rd edition of the National Conference on “Advances in

Chemical Engineering and Science (ACES-2022)” organized by IChE- IISER Bhopal Students’ Chapter.

Presented a research paper on “An Experimental Investigation on Cellulosic Particles Synthesis via Emulsion Solvent Evaporation Method” at 3rd Edition of the National Conference on “Advances in Chemical Engineering and Science (ACES-2022)” organized by IChE-IISER Bhopal Students’ Chapter.

FACULTY PARTICIPATION

Dr. Milap Nayak

Attended training on “Nanotechnology and Non-Materials for Various Technological Applications” organized by NITTTR, Bhopal from 28th March 2022 to 1st April 2022.

Prof. Jay B Trivedi

Attended training on “Induction Phase-II” organized by NITTTR, Bhopal from 21st February 2022 to 4th March 2022.

FACULTY ACHIEVEMENTS

Dr. Femina J Patel

Patent on “An Improved Planetary Ball Mill” granted by the Patent Office, India on 17th May 2022 (Patent No. 396950)

Received the certificate for guiding Parth Shah (M.E. student), who received the 2nd prize award with a cash prize of Rs. 5,000/- towards selection of Abstract of Dissertation on Cleaner Production and Clean Technology under ‘Interlinking of Industry, Academia and Government’ event held by Gujarat

Cleaner Production Cell GCPC, Gandhinagar
on 11th March 2022.

Dr. Parin Shah

Appointed as a member of the Environment Committee of 'Gujarat Chamber of Commerce and Industry' (GCCCI) for the year 2022-23

Dr. Milap Nayak

Has been conferred as reviewer for "Journal of Taiwan Institute of Chemical Engineers" published by Elsevier in March 2022.

Received a research grant for his project entitled "Selective air oxidation of 2-chlorotolueneto 2-chlorobenzaldehyde using Mn-Cu bimetallic supported on ZrO₂ and CeO₂" of Rs. 2 Lakh funded under STEM for 3 years.

Prof. Zoher Z Painter

Has been conferred as reviewer for "Journal of The Institution of Engineers (India): Series E (IEIE)" published by Springer Journal's Editorial Office in February 2022.

Prof. Sunil R. Patel

Has been conferred as reviewer for "Journal of Chemical Engineering Communications" published by Taylor & Francis Journal's Editorial Office in May 2022

"Education is the key that unlocks the golden door to freedom." – George Washington Carver

STUDENTS ACHIEVEMENTS

Parth Shah received 2nd prize award with a cash prize of Rs. 5,000/- towards selection of Abstract of Dissertation on Cleaner Production and Clean Technology under 'Interlinking of Industry, Academia and Government' event held by Gujarat Cleaner Production Cell GCPC, Gandhinagar on 11th March 2022.

Kedar Joshi published the work on "McCabe Thiele for Binary Distillation Column" under the MATLAB Central File Exchange updated on 17th March 2022.

Harsh Desai along with **Dr. Ujvala Christian** presented a review paper on 'Bio electrochemical Processes: An Efficient Method for Treatment of Waste Water' at 3rd edition of the National Conference on "Advances in Chemical Engineering and Science (ACES-2022)" organized by IChE-IISER Bhopal Students' Chapter on 25th March 2022.

Hemendra Parmar and **Dr. Ujvala Christian** presented a research paper on 'An Experimental Investigation on Cellulosic Particles Synthesis via Emulsion Solvent Evaporation Method' at 3rd edition of the National Conference on "Advances in Chemical Engineering and Science (ACES-2022)" organized by IChE-IISER Bhopal Students' Chapter on 26th March 2022.

Education is one thing no one can take away from you" – Elin Nordegren

STUDENTS PARTICIPATION

Suhagiya Sandeep (200170105032)

Has participated in “**Smart India Hackathon 2022**” on 25th March 2022.

Patel Sujal (210170105501)

Parmar Aman (210170105507)

Mansuri Shafik (210170105508)

Patel Jeet (210170105513)

Have successfully completed training on “**Spoken English Course**” from the period of April 2022 to May 2022 at Learnvern Pvt. Ltd.

Patel Varun (200170105037)

Gujjar Jay (210170105509)

Dhamecha Rohan (210170105510)

Rohan Arya (210170105014)

Nevil Badhani (210170105043)

Patel Tirth M. (210170105038)

Have participated in the “**International Seminar of Renewable energy Resources**” organized by Chemical Engineering Department, School of Engineering, Institute of Technology, Nirma University on 5th March 2022.

Patel Varun (200170105037)

Rathod Yuvraj (2001705056)

Have participated in BGMI at a “**National level Tech-fest, Irada**” organized on 3rd February 2022 by the Innovator Club of L. D. College of Engineering, Ahmedabad.

Prajapati Adarsh (200170105001)

Has successfully completed workshop on “**Chemical Process Safety in the Chemical Process Industries**” on 27th March 2022.

Has successfully completed workshop on “**Importance of Process Safety**” on 12th April 2022.

Akshay Asodariya (210170105007)

Has participated in the “**Fundamental Awareness of E-Commerce**” organized by B-School on the 12th February 2022.

Sevak Chauhan (210170105025)

Preet Naneera (210170105066)

Himanshu Chariya (210170105045)

Have participated in the “**Human Rights Pledge**” organized by National Human Rights Commission, India on the 7th April 2022.

Risabh Rawal (210170105017)

Dhruv Patel (210170105041)

Parth Gurjar (210170105046)

Krish Munjani (210170105047)

Have participated in the “**Lakshaya 2022: a National Level Edu-Tech Fest**” organized by L. D. College of Engineering, Ahmedabad on 28th April 2022.

Risabh Rawal (210170105017)

Has participated in “**The Selection and Recruitment Process as the Social Media Marketing Intern at younity.in**” organized by Start- UP India on 12th February 2022.

Raj Surani (210170105024)

Had participated in the “Yes to Life, No to Drugs to live a Healthy Life” organized by Gujarat Technological University on 17th April 2022.

Rana Omkumar (200170105008)

Patel Nishit (200170105012)

Mistry Punit (200170105052)

Pithadiya Pritesh (210170105503)

Vaghani Utsav (210170105512)

Patel Tirth (210170105038)

Tarang Parmar (210170105057)

Lavkumar Mishra (210170105051)

Have participated in the webinar on “Impact and Importance of Academic and Research Profile for UG Students” on 7th January 2022.

Jayswal Deep (210170105505)

Vadhaiya Nikunj (210170105506)

Have successfully completed a quiz on the “Fundamental knowledge of E-Commerce” with 90% marks on 3rd January 2022.

Rana Omkumar (200170105008)

Has participated in Anime quiz at a “National level Tech-fest, Irada” organized on 3rd February 2022 by the Innovator Club of L. D. College of Engineering, Ahmedabad.

Vadhaiya Nikunj (210170105506)

Has attended webinar on “**Electric Vehicle Technology: Future Career option**” organized by Sigma Institute of Engineering, Vadodara on 8th January, 2022.

Patel Sujal (210170105501)

Has successfully completed the “**Road Safety Online Workshop**” conducted by Gujarat Power Engineering and Research Institute (GPRI), Mehsana on 1st April 2022.

Has participated in **Chem-O-Think** at a “**National level Tech-fest, Irada**” organized on 3rd February 2022 by the Innovator Club of L. D. College of Engineering, Ahmedabad.

Has participated in General quiz at a “**National level Tech-fest, Irada**” organized on 3rd February 2022 by the Innovator Club of L.D. College of Engineering, Ahmedabad.

Has participated in **OTT quiz** at a “**National level tech-fest, Irada**” organized on 4th February 2022 by the Innovator Club of L.D. College of Engineering, Ahmedabad.

Has participated in **Round Table** at a “**National level Tech-fest, Irada**” organized on 4th February 2022 by the Innovator Club of L. D. College of Engineering, Ahmedabad.

Has participated in live webinar on “**Career Insights in Embedded Systems & Robotics**” organized by Boarding Pass For Success, Canada on 26th February 2022.

Has participated in International quiz competition on “**Life of Mahatma Gandhi**” organized by Gandhi Study Center, Loknete College, Nashik on 30th January 2022.

Has participated in “**Scope of Science Policy Research for Circular Bio-Economy**” organized by IChE Student Chapter, USCT on 31st January 2022.

Has attended webinar on “**Android Programming**” organized by Sigma Institute of Engineering, Vadodara on 31st March 2022.

Shyam Gorfad (210170105001)
Utkarsh Bhagat (210170105008)
Nidhi Raval (210170105034)
Patel Tirth M. (210170105038)

Have attended the “**Quiz on COVID-19 Awareness**” organized by National Service Scheme on 9th January 2022.

Kailash Gorfad (210170105002)
Kava Avadh (210170105004)
Akshay Asodariya (210170105007)
Utkarsh Bhagat (210170105008)
Dinesh Vasan (210170105009)
Rohan Arya (210170105014)
Risabh Rawal (210170105017)
Dev Padiya (210170105018)
Mehul Barot (210170105019)
Sevak Chauhan (210170105025)
Surani Raj (210170105024)
Nidhi Raval (210170105034)
Patel Tirth M. (210170105038)
Saurang Jariya (210170105056)
Tarang Parmar (210170105057)
Sauryajeet Rana (210170105059)
AnkuShankala (210170105064)
Preet Nannera (210170105066)
RajdipVadhiya (210170105062)

Have participated in the event “**Wrong Side of the Road Safety Online Workshop**” organized by Gujarat Technological University on 1st April 2022.

PLACEMENT UPDATES

Enrolment No.	Name of the Student	Name of the Industry
180170105002	Bandhaniya Pratikkumar G	Adani Enterprise Limited
180170105015	Gabani Shubham V	
180170105018	Gohil Mitkumar J	
180170105037	Patel Kaumilbhai H	
180170105040	Patel Niteshkumar P	
180170105042	Patel Rajkumar B	
180170105050	Prajapati Paresh L	
180170105057	Trivedi Hitarth P	
190173105010	Suthar Pradeep B	
190173105003	Modi Ronak S	Reliance Industries Limited
180170105001	Baladaniya Piyushbhai R	Zydus Cadila Healthcare Limited
180170105009	Bhuva Rajesh L	
180170105011	Chhatbar Harsh P	
190173105001	Chitroda Jayesh M	Zydus Cadila Healthcare Limited and Nirma Limited
180170105014	Dobariya Maulik R	Nirma Limited
180170105051	Prajapati Parth K	
180170105043	Patel Roshankumar S	Ametrine Quartz
190173105007	Parmar Vijay K	
180170105006	Bhavsar Jenish B	Arvind Envisol Limited

Technical Articles

Metaverse and Chemical Engineering

Chirag Parmar (200170105023)

You must be wondering by the title of this article what a Chemical Engineer can do in the field of the Metaverse. But the real answer to this question is what a Chemical Engineer can't do in any field. Chemical Engineering along with Mechanical and Civil Engineering is the most senior branch of Engineering.

Recently the Metaverse is in the trend and it gives you the real-time feeling of being somewhere. But what about you can feel something in it? How about holding hands with your best friend and feeling the same way you feel in the physical world.

To give a leap to virtual reality, A team of Engineers has built a new Haptic solution by which you can feel sensations. Identically you will need to use skin patches to feel this. From a sensory standpoint, not much has been done for sensations in the metaverse.

So who made these Patches?

Experts of the Human-Computer Integration Lab at the University of Chicago developed this chemical-based haptic system that yet produces 5 key sensations tingling, numbing, stinging, warming, and cooling.

How does this work?

The team of Engineers provided this in detail in their research paper. But let me tell you in short. The chemical patch is made with certain stimulants which get released via a patch applied on the hands and when they reach the skin receptors, they produce the 5 sensations mentioned below.

What are those stimulants?

Sanshool for tingling, Lidocaine for numbing, Cinnamaldehyde for stinging, Capsaicin for warming, and menthol for cooling.

How can it be helpful?

It is as advantageous as it reduces the need for vibration motors and electro-tactic stimulators. Let's say for instance that when you open the door to the steam bath in VR it releases capsaicin which gives a warm sensation to you. But there are some limitations to this.

First of all to have a broader range of sensations one will have to discover new chemical stimulants. The team of the Human Computer Integration Lab at the University of Chicago is looking for collaboration as they want to expand this concept and create more sensational stimulants.

Alkali Cations Boost Carbon Dioxide reduction into Feedstock Chemical

Yashil Kanani (200170105019)

University of Szeged researchers have developed a new electrochemical process that could help combat climate change by reducing carbon dioxide emissions. Electrochemical reduction of Carbon Dioxide is a potential clean energy alternative to the current practice of directly burning fossil fuels or using bio fuels, which may still damage the environment. This electrochemical flow cell consists of five steps:

1. An enzyme reaction to separate the natural product glycolate from carbon dioxide
2. An enzyme reaction to separate the natural product glycolate from carbon dioxide.
3. A stabilized chemical conversion stage including formic acid and hydrazine alters the charge of glycolate from positive to negative
4. Quenching glycolated electrons with oxygen
5. Injecting negatively charged glycolate back into the fuel cell as carbon monoxide
6. Reacting hydrazine in hydrochloric acid, where it's regenerated to continuously close the circuit.

The valorization of carbon dioxide using an electricity feedstock has fulfilled a dual purpose: decreasing emission rates and providing an alternative carbon source for

the chemical industry to create valuable materials, like carbon monoxide, methyl formate, and methanol. Several hurdles have blocked the adoption of these technologies, however. For one, it requires a very basic environment that creates a reaction system with carbon polarization (cs) and a large SEI layer on the electrode.

The team, which included researchers at the University of Cambridge, found that their process extends the enzyme's high catalytic activity by a factor of 10 and makes it possible to produce hydrogen on a continuous scale. An enzyme is a protein that speeds up specific chemical reactions in cells. The researchers have tested their new version of this catalyst in small-scale 'micro-reactors' with good results. Now they are testing its scalability, by developing it into a membrane coating for giant versions called 'microbial electro-synthesis reactors' that produce hydrogen on an industrial scale.

Researchers from the Graphene Flagship's Energy Materials and Surface Sciences Unit have developed a new concept for low-cost super capacitors that could be used in fuel cells. Super capacitors are devices with exceptional power density but poor energy density. To make it possible to store more energy, they could act as batteries or chemical storage tanks too; charging quickly and delivering current on demand. Electrodes catalyze the circuit during charge and discharge, producing water that slows down the reaction. Unfortunately, this meant feeding more cations to the mix, which eventually led to more undesired precipitates.

While replacing the electrolytes in their pilot experiment, scientists made another surprising discovery. Hydroxides promote the efficiency of catalytic activity by making it easier to add hydrogen to carbon monoxide and then combine it with hydrogen at a later

time. However, this method causes precipitates to form too frequently and leads to a decrease in carbon monoxide production over time since hydroxides build up on the cathode. This prevents water from flowing properly around the cell while they're in use because they block its path. Furthermore, they observed that other alkali ions also activated the electrolytic cells. 'We used cesium in all our long-term tests, it clearly out performs potassium,' he adds.

Núria López from the Institute of Chemical Research of Catalonia in Spain hopes that in the future further mechanistic studies and simulations will help understand the true role of electrolytes in the activity of this catalyst. "Their device is very robust and a wonderful example of integrated engineering," says López. She confirms: "They found a link between all three elements, catalyst, operational technique, and device, and managed to stabilize the catalyst with a clever operational technique. This reaction is truly amazing!"

Facts and Familiarity

Darshil Pethani (200170105021)

One of the joys, but also one of the challenges, of the liberation of curiosity in the 17th century – when it became permissible to ask any question about anything – is that perhaps science's greatest attribute is its capacity for continual self-replication. As humans, we strive to make sense of the world around us by finding out more about even how things work on a smaller scale than ever before. This happens all the time in chemistry and physics – after all, our knowledge comes from being curious and fascinated by nature itself!

Comparing current and past problems with physics is like comparing apples to oranges.

However, we have noticed a common trend in the study of condensed matter over the past several decades - where historical concepts are revisited and problems are re-examined in light of more understanding of today's physics. This might be because new instruments are able to perform studies at previously inaccessible scales or because we understand the subject better now. In any case, these newer issues can often be framed in new theoretical ways or solved due to a better understanding of physics. For example, scientists can now do experiments to study sand, which was once only tackled with rules of thumb. It's important to note that we are in an age where scientific experiments are being conducted at an affordable cost to reveal new insights into the properties of sand. Sand is seemingly everywhere and even might have been on Mars!

All this is true of a topic that combines great visual appeal with conceptual subtlety and practical importance: the behaviour of droplets, and in particular of droplet impacts. It is astonishing to think how little we know about a raindrop falling into a puddle or onto a windscreen. And yet in our busy lives where we rely on printers, it's important to know how inkjet technology operates because all this knowledge can help you make an informed decision about which one to buy! Because who doesn't want to know more about these fascinating things!

In recent times the Leidenfrost effect has raised serious interest. The subject refers to the skittling of droplets over a hot surface, suspended in the air by means of evaporating gas beneath them. It is clear that something very peculiar and wonderful happens when one discovers that Johann Leidenfrost, a German physician, observed this strange phenomenon when imitating alchemical procedures in order to be better equipped

and practised for the lessons in his actual textbooks (1756) and an academic article he added to his findings at a later date. The jittery animation of the suspended drops still seems so fascinating, especially when you are able to control their heat transfer from a surface by modifying its texture such that they can climb obstacles or negotiate mazes.

But it's those droplets that surprise you the most. You realize almost immediately upon seeing them that their silver, circular symmetry is so perfect and complex. Arthur Worthington invented the first high-speed photography camera in 1872 to capture such a beautiful moment. Before this, scientists believed they wouldn't be able to see anything of consequence within a droplet's infinite ripples. It's almost certain that Worthington enjoyed his job much more than he thought he would and got a whole lot more out of studying water drops from a scientific point of view than his employers expected him to. So yes, as scientists we need to make sure we don't get too distracted by all these lovely symmetries every time we gaze lovingly at our work!

While the existence of a hidden order might have proved elusive using today's cameras, numerical simulations indicate that present-day lenses may miss the levels of intricacy seen when viewed closer to the third dimension. A glorious display emerges when one tiny drop falls into another as it basks in vortices creating what's been likened to interplay between fractal and eddy formations created via von Karman vortex streets in liquid dynamics.

Even a seemingly straightforward question like why an impacting drop may or may not produce a ragged splash on a solid surface has only just been unravelled. Before, scientists have known about the complex variables involved in calculating this kind of problem. High-speed video shows that the

fluid is ejected sideways in a thin radial sheet, but it only breaks up and spits out those secondary drops if its "flight" above the surface is sustained by aerodynamic lift from the gas below. Furthermore, this criterion involves a complex concatenation of many parameters that must be calculated simultaneously – making simultaneous multidisciplinary approaches an important step forward in overcoming these kinds of problems.

Consider a drop of water suspended in the air. **We can track its position as it falls and record the trajectories of individual water molecules within it.** Surprisingly, the speed at which these molecules move is affected by a macro scale parameter: the mean free path of those very same molecules in the surrounding air. Longer mean free paths lead to greater speeds for those suspended water molecules and thus sooner impact on our hand (or countertop). Here then is a normal process that we have all seen, but one that only now can be understood as involving two scales - one as recognisable as raindrops on your glasses and yet only made comprehensible by reaching deep into molecular physics.

“Education’s purpose is to replace an empty mind with an open one” – Malcolm Forbes

“Intelligence plus character — that is the goal of true education” – Martin Luther King Jr.

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