Department of Chemical Engineering
Aligarh Muslim University, Aligarh

ALCHEMY
NEWSLETTER 2015-2016
Editors' Message

We are very thankful to the faculty members of the Department of Chemical Engineering who entrusted us with the responsibility of the Editor of Newsletter of the department. Our aim is to provide an insight of various activities that were organized by the Department of Chemical Engineering along with the events that were held in ZHCET including conferences, workshop and seminar. Information related to the placement of students of the department has also been mentioned. We would also appreciate the efforts of students who contributed in making of this newsletter.

Mohd Mubashshir  
(M.Tech Final Year)  

Abdullah Saleem  
(M.Tech Final Year)  

Yusra Hamid  
(B.Tech Final Year)
Student Chapters of the following International Associations have been formed at the Department of Chemical Engineering:

**IAHE: International Association for Hydrogen Energy**

The Association strives to advance the day when hydrogen energy will become the principal means by which the world will achieve its long-sought goal of Abundant Clean Energy for Mankind. Toward this end, the Association stimulates the exchange of information in Hydrogen Energy field through its publications and sponsorship of international workshops, short courses and conferences.

**AIChe: American Institute of Chemical Engineers**

AIChe is the world’s leading organization for chemical engineering professionals with nearly 43,000 members from 92 countries. AIChe academy brings a full array of education and training resources to chemical engineers and the companies they work for. Courses, webinars, conference presentations and more can be found on the academy.

**IIChE: Indian Institute of Chemical Engineers**

Student Chapters of the IIChe guide its members in career choice and arrange lectures, seminars, short courses, plant visits, etc., at regular intervals to better equip and empower the students when they come out of their academic areas. Academic activities apart, Student Chapters organize cultural events and sports activities for their members.
The student society actively working in Chemical Engineering Department is called as Society of Aligarh Chemical Engineering Students (SACHES), which has organized several events such as workshops, seminars, Poster Presentation, short term courses, Professional Short Talk and Software training programs for last two years. This society is a professional association that unites chemical engineering students and professionals who work in industry, academia and government. The main objectives are to promote professionalism and to contribute to the development of Chemical Engineering at Aligarh Muslim University. Membership is open to all students majoring in chemical engineering i.e. both undergraduate and postgraduate students. This society not only encourages its members to hone their professional skill but also helps them in refining their interpersonal skills.

Lectures, Training Programs and Workshops

Air Pollution Assessment and Sustainable Development

A one day lecture was conducted by the Department of Chemical Engineering through TEQIP-II on Air Pollution Assessment and Sustainable Development on 12th March 2015. The lecture was delivered by Dr. Wesam Al Madhoun, Post-doc Fellow, Malaysia Japan International Institute of Technology (MJIIT), Kuala Lumpur, Malaysia.

Introduction to Molecular Modelling using WINGAMESS

A one day workshop was organised by the Department of Chemical Engineering through TEQIP-II on Introduction to Molecular Modelling using WINGAMESS on 29th April 2015 for UG and PG students. There were around 70 students who participated in the event. The workshop was conducted by Professor V. G. Gaikar, FNAE, FMASc, Bharat Petroleum Professor of Chemical Engineering ICT, Mumbai; and Dr. (Ms.) Rupa S. Madyal, Assistant Professor, Department of
Chemistry, S. I. W. S. College of Science, Wadala, Mumbai.

This software includes a standard interface for opening files, saving files, printing, copying, window movement, and display commands. It possesses several basic front end molecule capabilities such as structures, reaction paths, molecular orbitals, electron density, vibrational modes, and so on.

**Plant Design and Management System (PDMS)**

A one day workshop was organised by the Society of Aligarh Chemical Engineering Students (SACChES) on Plant Design and Management System (PDMS) on 8th February 2016 for UG and PG students. There were around 60 students, thus making it a successful event.

The workshop was conducted by Mr. Shadab Ahmad Khan, Associate Director of SK Design Consultancy Services in collaboration with Baltimore, USA. PDMS is a specification driven, 3D modelling system, consisting of a single relational database management program and several and distinct modules, each performing a unique function. With PDMS project management can monitor the progress of a project at any point in the design cycle with disrupting the work. It reduces 35-45% time and 15-25% cost.

This event elaborated a new and innovative approach towards the career. Mr. Shadab Ahmad Khan also encourages students by highlighting future prospects of this professional course.
# Students Recognitions and Achievements

<table>
<thead>
<tr>
<th>Name of Student(s)</th>
<th>Achievement(s)</th>
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<tbody>
<tr>
<td>Mohd Mubashshir</td>
<td>Selected as Research Intern, IIT Madras (Among 20 students from India) - 2015</td>
</tr>
<tr>
<td>Mohd Mubashshir</td>
<td>Paper titled “Cyclic Distillation: An Innovative Technique for Enhanced Separation” was published in International Conference CHEMCON 2015 - Chemical Engineering: From Laboratory to Industry organized by IICHE and IIT Guwahati, 27-30 December, 2015, Guwahati, India.</td>
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<tr>
<td>Abdullah Abu Huzaifa</td>
<td>Presented a Paper titled “Purification and Dehydration of Natural Gas using Membranes” which was published in the proceedings of 6th International Conference on “Recent Trends in Applied Physical, Chemical Sciences, Mathematical/Statistical and Environmental Dynamics” (PCME-2015) Organized by “Krishi Sanskriti” at Jawaharlal Nehru University, New Delhi on 9th August 2015.</td>
</tr>
<tr>
<td>Momina</td>
<td>Selected as Research Intern, IIT Delhi - 2015</td>
</tr>
<tr>
<td>Aamir Baig</td>
<td>Selected as intern at BHEL (Haridwar)</td>
</tr>
<tr>
<td>Sameer Imdad</td>
<td>Selected as intern at Carbon Continental (Ghaziabad)</td>
</tr>
<tr>
<td>Mohd Mohsin Ikram</td>
<td>Selected as intern at Hindustan Zinc Limited (Rampura Agucha mines)</td>
</tr>
<tr>
<td>Mohd Javed Khan</td>
<td>Selected as intern at TECHNIP (Noida)</td>
</tr>
<tr>
<td>Mujahid Ali</td>
<td></td>
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<tr>
<td>Arafat Hussain</td>
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<tr>
<td>Hamza Mohammad</td>
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This year GATE is conducted by the Indian Institute of Science (IISc-Bangalore) on behalf of the National Coordination Board – GATE, Department of Higher Education, Ministry of Human Resources Development (MHRD), Government of India.

Apart from CFTIs, GATE scores are also being used by several Indian public sector undertakings (i.e., government-owned companies) for recruiting graduate engineers in entry-level positions such as: Bharat Petroleum Corporation Ltd., Hindustan Petroleum Corporation Ltd., Indian Oil Corporation Ltd., Oil and Natural Gas Corporation, Bank Note Paper Mill India Pvt. Ltd., Steel Authority of India Ltd., Gas Authority of India Ltd. And many more.

This year, after completion of test, an Answer Key is provided for candidates to check their answers. Candidates can now challenge the GATE 2016 Answer Key on a nominal fee for a specified time period.

Following students have qualified the GATE:

<table>
<thead>
<tr>
<th>Name of Student</th>
<th>Degree</th>
<th>Year of Qualifying Exam</th>
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</thead>
<tbody>
<tr>
<td>Abdullah Saleem</td>
<td>M.Tech</td>
<td>2016</td>
</tr>
<tr>
<td>Jyoti Nimesh</td>
<td>M.Tech</td>
<td>2016</td>
</tr>
<tr>
<td>Tarique Aziz</td>
<td>M.Tech</td>
<td>2016</td>
</tr>
<tr>
<td>Karan Pal Singh</td>
<td>M.Tech</td>
<td>2016</td>
</tr>
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Following students are placed through On-campus and Off-campus recruitment:

<table>
<thead>
<tr>
<th>Name of Student</th>
<th>Degree</th>
<th>Placed In</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belal Siddiqi</td>
<td>B.Tech</td>
<td>Voltas Limited, RnF Technologies-Noida</td>
</tr>
<tr>
<td>Abhay Tiwari</td>
<td>B.Tech</td>
<td>Tata Chemicals Limited, Babrala</td>
</tr>
<tr>
<td>Amir Khurshid</td>
<td>M.Tech</td>
<td>Al-Habib University, Hyderabad</td>
</tr>
<tr>
<td>Anuj Chaturvedi</td>
<td>M.Tech</td>
<td>Jaipur National University, Jaipur</td>
</tr>
<tr>
<td>Kalpana Sharma</td>
<td>M.Tech</td>
<td>Jaipur National University, Jaipur</td>
</tr>
<tr>
<td>Nidhi Shrivastava</td>
<td>M.Tech</td>
<td>Research Scholar at IIT-Kanpur</td>
</tr>
<tr>
<td>Abu Huzaifa</td>
<td>M.Tech</td>
<td>Central Pollution Control Board, New Delhi</td>
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Indian Chemical Industry to Touch $ 190 Billion

By FY 2017-18, the Indian chemical industry is most likely to reach USD 190 billion as a result of the growth in the demand for chemicals from different industries their numerous sectors. Currently, the size of the industry is at USD 118 billion and accounts for 3 per cent of the global chemicals market, states a report recently released at India Chem International Conference 2014. The report by Tata Strategic Management Group (TSMG) and FICCI, titled ‘Sputing the Growth of the Indian Chemical Industry' was released by Ananth Kumar, Minister for Chemicals and Fertilizers.

Mini fuel cell holds promise for phones, drones and cars

A new type of fuel cell miniaturized with a combination of thin-film electrolyte and porous stainless steel holds promise as a source of long-duration power for small applications such as cellphones and drones and larger ones such as cars. South Korean researchers developed the new solid oxide fuel cell with an eye to both improved performance and endurance over their silicon-based counterparts.

1st Bio-LNG Plant in Indonesia to be developed by Wärtsilä

Wärtsilä and two Indonesian partners have signed a joint development agreement with the intention of creating the first ever bio-LNG plant in Indonesia. The co-signers of the agreement with Wärtsilä are PT Pertamina (Persero), a national energy company, and PT Godang Tua Jaya (GTJ), a waste utilisation sector specialist company. Wärtsilä Oil & Gas Systems (WOGS) will conduct a feasibility study for the project to develop a mini bio-LNG plant with a capacity of 0.75 tons/hour, which corresponds to approximately 4 MW/hour in electrical production. The plant will process municipal solid waste into eco-friendly biogas for use as a renewable energy source for typical vehicle fuel.

New Biological Wastewater Treatment System Launched by UOP

UOP LLC, a Honeywell company, announced its commercial launch of an integrated bioreactor system to efficiently remove organic and inorganic contaminants from a wide range of industrial wastewater streams. Honeywell’s UOP XCeed bioreactor system, based on Honeywell’s immobilised cell bioreactor technology, helps industrial, manufacturing, and groundwater remediation facilities meet contaminant removal specifications for wastewater discharge or reuse.

UOP’s XCeed bioreactor system has been proven reliable and cost-effective in food and beverage, chemical and textile manufacturing, groundwater remediation, and refinery and petrochemical applications worldwide. The integrated treatment process can be delivered as a modular system and incorporates mixed-media support for immobilized bio-catalysts, or microbes. A sophisticated biological ecosystem enables longer biomass retention time and results in highly efficient biological oxygen demand (BOD) removal with low sludge production. The system has a relatively simple mechanical design that minimizes energy consumption and required operator attention.
Biosurfactants- An Eco-Friendly Cleaning Agent

Biosurfactants are a structurally diverse group of surface-active substances produced by microorganisms. All biosurfactants are amphiphiles, they consist of two parts—a polar (hydrophilic) moiety and non-polar (hydrophobic) group. A hydrophilic group consists of mono-, oligo- or polysaccharides, peptides or proteins and a hydrophobic moiety usually contains saturated, unsaturated and hydroxylated fatty acids or fatty alcohols. Due to their amphiphilic structure, biosurfactants increase the surface area of hydrophobic water-insoluble substances, increase the water bioavailability of such substances and change the properties of the bacterial cell surface.

They are environmentally friendly, biodegradable, less toxic and non-hazardous. They have better foaming properties and higher selectivity. They are active at extreme temperatures, pH and salinity as well, and can be produced from industrial wastes and from by-products.

Because of their potential advantages, biosurfactants are widely used in many industries such as agriculture, food, cosmetics, paints and pharmaceutics. Many properties of microbial surface active compounds such as emulsification/de-emulsification, dispersion, foaming, wetting and coating make them useful in physico-chemical and biological remediation technologies of both organic and metal contaminants.

Sameer Imdad, B.Tech Final year

Distinction between Chemical Engineers and Chemists

The chemicals are a part and parcel of life in one or the other form. Chemists and biochemists study and research to understand their roles. Analytical chemists develop method for their detection, determination and extraction. The chemical engineers find technology their production, packaging and processing. Thus chemistry is everywhere and chemical engineering makes it possible to be available to everyone.

Chemical engineering is the branch of engineering concerned with the design, construction, and operation of machines and plants that perform chemical reactions to solve practical problems or make useful products.

Chemical engineers have been improving our well-being for more than a century. From the development of smaller, faster computer chips to innovations in recycling, treating disease, cleaning water, and generating energy, the processes and products that chemical engineers have helped create touch every aspect of our lives.

Elizabeth Sattely, an assistant professor of chemical engineering at Stanford has isolated the machinery for making a widely used cancer-fighting drug from an endangered plant. According to him” People have been grinding up plants to find new chemicals and testing their activity for a really long time. What was striking to us is that with a lot of the plant natural
products currently used as drugs, we have to grow the plant, and then isolate the compound, and that's what goes into humans”

William Chueh and Nicholas Melosh has made a discovery that could make large-scale solar power storage a reality. The breakthrough is based on the fact that ordinary metal oxides, such as rust, can be fashioned into solar cells capable of splitting water into hydrogen and oxygen. Using solar cells to split H2O by day is a way to store energy for use at night. The photons captured by the cell are converted into the electrons that provide the energy to split water. Recombining hydrogen and oxygen after dark would be a way to reclaim that energy and "dispatch" power back into the electrical grid – without burning fossil fuels and releasing more carbon into the atmosphere.

Though chemistry began as Al-chemia in search of Elixir of life but chemists and chemical engineers make it possible to provide a comfortable life to the human beings by their researches and innovations. Thus the search of Elixir of life failed but comfort of life have been gained.

Momina, B.Tech Final year

**Sustainable Production and Storage of Hydrogen**

Use of hydrogen as an alternative fuel and energy carriers which offers potentially attractive advantages over existing energy sources.

Hydrogen can be produced from natural gas by means of various chemical processes Steam reforming, partial oxidation, Auto thermal Reforming and Biomass Gasification etc. A Novel Method for the production of Hydrogen is Biomass Gasification which offers the earliest and economical route for the production of renewable hydrogen. By the application of catalyst called ‘Dolomite’ this process can be accelerated along with the simultaneous removal of continual build-up of condensable organic compounds present in producer gas.

Hydrogen can be used with a high efficiency as a high Quality energy carrier having practically no emission and can be produced using a variety of starting materials, both renewable and non-renewable sources.

Minimization of storage cost and efficient production technique of hydrogen, switching to environmentally more sustainable energy system along with the replacement of conventional fossil fuels from biomass. Compressed Hydrogen is more suitable storage technique over liquid hydrogen as a minimum environmental impact alternative because the energy associated with the liquefaction of hydrogen is much higher than associated with the generation of compressed hydrogen gas.

Abdullah, B.Tech Final year
Molecular Modelling—an Enabling Technology for Chemical Engineers

Modelling and simulation research aims to develop and use theoretical tools to predict the properties of materials, to understand molecular-scale chemical processes, and to design, analyse, and improve procedures for manufacturing new products.

Modelling a real world becomes a challenge due to its complexity. Phenomena’s at different scales of size and time are often involved within systems. These size and time scales are related to different approaches in the movement and interaction of bodies that must be regarded for developing systematic procedures for the design and optimal operation of chemical plants. Conventionally, process engineering ranges its tools in the macro-world only. However, necessities such as new characteristics of the products and environmental restrictions, have encouraged chemical engineers to think about body interactions at molecular levels and to include molecular-based models for describing a process. The study of the relationship between the scales and the inclusion of molecular-based models can provide the industry with new "tools" to design and operate processes effectively, in such a way that they might prove successful in today’s competitive world. The two most commonly used molecular modelling methods are molecular dynamics (MD) and Monte Carlo (MC). The methods are particularly useful for studying structures at the length scale of nanometre. In general, MC is more efficient than MD in terms of generating equilibrated structure while MD can provide information about the dynamics of a system.

In most cases molecular modelling works as an accessory in the development of novel products/materials rather than a tool for direct innovation. Chemical engineering is entering a new era, characterized by remarkable control over chemical reactions as well as product molecular architecture, conformations and morphology.

Mohd. Mubashshir, M.Tech Final year
"All Work and No Play Makes Jack a Dull Boy"

We've encountered this phrase numerous instances of time but how often do we actually implement it in our own lives?

Especially for engineering students, it’s as if the semester starts with the mid-semester examinations, followed by assignment completion and in no time final semester exams arrives. And the vivacious cycle continues.

But Thanks to some ingeniously creative minds who found the perfect remedy "Zarf'16" that somehow is a good bargain for this hectic schedule!

Zakir Husain College of Engineering and Technology shall be witnessing its annual techno management fest Zarf'16 in the month of April. The activities will culminate in a grand two day festival event on the campus of ZHCET. “ChemEcar” is one of the national level event that is going to be organised by chemical engineering students in Zarf'16.

Keeping the humanitarian welfare in mind Zarf'16 is based on the theme of charity, donating 10% of the registration and 5% of the sponsorship amount for the charitable causes. Zarf'16 is a plethora of events allowing students to showcase their literary and cultural skills and at the same time testing their technical mettle.

A confluence of literary, technical, cultural and fun events, Zarf'16 promises the participation and involvement of a humongous number of students. The elite clubs of ZHCET vis-a-vis IEEE, ASCE, ASME and EDC that have been the hosts to various national level festivals will be collaborating to represent the idea of 'One Year, One Fest'.

The USP of Zarf'16 would be the amalgamation of unique cultural identity of AMU with the transcending technological developments of AMU.