IICHE-MRC E-NEWSLETTER

MUMBAI REGIONAL CENTER
APRIL 2020

FROM CHAIRMAN'S DESK

Dr. U. Kamachi Mudali
Chairman IIChE-MRC

Around the world, all eyes are on the spread of the COVID-19. The pandemic is challenging families, health care systems, and governments. The pandemic is also challenging our organization and staff in unprecedented ways. The challenge, however, is prompting necessary action, while avoiding over-reaction. India has stood up to the coronavirus crisis as Industry, R&D, academia and media are supporting government to kick out the menace. People are following key advices on hand washing, coughing etiquette, not touching face, physical distance and staying at home. With this type of support and discipline, I have no doubt that together we will win soon.

Indian Institute of Chemical Engineers (IIChE) is the premier professional organization furthering the development of chemical, petrochemical and allied industries with respect to R&D, design and engineering, educational programmes and consultancy. It also provides a platform for interacting with other disciplines of science and engineering. Apart from its tremendous academic and professional value, IIChE happens to be the most opportune ground for our members and other participants to network with fellow professionals, which is undeniably an important prerequisite for professional growth today. IIChE-MRC, being the largest among regional centres of IIChE, continues to conduct and support many events throughout the year. It also prudent to share achievements with members through this triannual E-Newsletter for the benefit of members. There has been inspiring feedback on last issue of the E-Newsletter across the board which was circulated among many regional centers, HQ, social networks, former EC members etc. I hope that this issue of the E-Newsletter too proves beneficial to the chemical engineering professionals and encourage them to take up joint ventures with immense participation towards the Nation building.

Dr. U. Kamachi Mudali

IIChE-MRC Executive Committee

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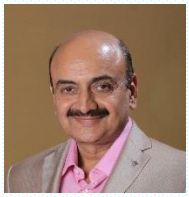

I have not heard of or thought of the phrase "flatten the curve". The Covid-19 menace is suddenly connecting the whole world. It's time to get out of our silos and come together. We may celebrate that we have the ability to work from home, but we have to recognize that there are disconnected people among us. Some courageous workers isolating themselves from own families and treat patients, we need to do much more to support these frontline responders. We also have a role when we find ourselves so dependent on the goodwill of strangers. Just as we do not waste natural resources, we also shouldn't unreasonably use gadgets which can free up bandwidth for needy. Nothing works without Empathy.

I would like to thank my mentors in the IIChE-MRC, IIChE Members, and readers for the encouraging feedback on previous E-Newsletter. IIChE in general and MRC in specific had a busy schedule during last few months. This issue has covered glimpses of Chemcon 2019 at IIT Delhi, Dhirubhai Ambani Commemoration Day Celebration at MNIT Jaipur, Industrial visit of BPCL Mumbai, Outstanding Young Chemical Engineer's contest "OYCE 2020" at ICT Mumbai, Professor NR Kamath Memorial Quiz "ChEQ2020" at DJSCE Mumbai. I would like to apologize for postponement of few IIChE-MRC events in view of prevailing conditions. I wish we soon will conquer the menace safely and come back to our schedules, of course with exceptional learnings. Members are also reminded of important forthcoming events, Theme Meeting on "Specialty Chemicals" by Heavy Water Board & IICHE-MRC at Anushaktinagar and Role of Chemical Engineers on E-Waste Management at IIT Mumbai. However, dates and venues will be announced soon. I am happy to present an article on "Safety Management Systems in Heavy Water Plants."

All said and done, IIChE is a non-profit organisation. Hence, at the end of the day, the Institute needs active support of industry houses, academic and research organisations, and, indeed, the individual members for its effective and meaningful sustenance. I request all our Members to take the initiative to bring in more and more Members (Individual and Organisations) to the IIChE family. Happy reading.

Jagdish Nageshri
Editor, IICHE-MRC E-Newsletter

CHEMCON 2019

at IIT Delhi (15 - 19 December 2019)

72nd Annual Session of IIChE, CHEMCON 2019, was held during 15 - 19 December 2019 in New Delhi. It was organised by the Northern Regional Centre in association with the Department of Chemical Engineering, IIT Delhi. This year's central theme, for CHEMCON was 'Advances in Chemical Engineering for Industrial Applications'. Keeping with the tradition, academic luminaries from India and abroad, industry bigwigs and technocrats of top order have graced the occasion. CHEMCON continues to be the biggest congregation of Chemical Engineering fraternity in India.

Union PNG and Steel Minister **Shri Dharmendra Pradhan** has graced the CHEMCON 2019, at Indian Institute of Technology (IIT), Delhi. Speaking on the occasion, Shri Pradhan said, Innovation cannot be achieved without having the courage to fail. We must move away from the culture of "status quo". Any economy cannot grow by leaps and bounds without the support of innovation driven by its scientific community. We are moving towards a knowledge based economy.

India will be at the centre of global innovation. The shifts in global economic landscape coupled with India's vibrancy is making India, the hotspot of global growth. He further said "We have ample intellectual capacity to solve our challenges. IITs are the pride of our country. They are breeding ground for academic excellence and offer immense opportunities." Speaking about Industry, he said, "Industrial Revolution 4.0 presents immense opportunity to India. We must own our failures, and become brave innovators. I have even advised PSU companies to support innovation and entrepreneurship by employees."

Appealing to the scientific community, he said, "We are a nation of aspirations. Our scientific community must contribute towards realising aspirations of our youth." While interacting with the students, he motivated them to move away from traditional notions of success and become entrepreneurs to create a better future for themselves and for our country. Expressing happiness over meeting with the students, Shri Pradhan said, "He is glad to meet some of the brightest minds in the country."

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CHEMCON 2019

at IIT Delhi (15 - 19 December 2019)

The Annual Session of the Indian Institute of Chemical Engineers (IIChE), popularly known as the Indian Chemical Engineering Congress (CHEMCON), is the most important event in the calendar of IIChE. Held every December at one of its centres, the four-day CHEMCON features a host of events, which include memorial & plenary lectures, seminars, symposia, panel discussion, exhibitions, etc. To the Indian chemical engineering fraternity in the country and abroad, CHEMCON offers the most attractive platform, ensuring four days of intensive interface with the best of brains, national and international in chemical engineering & allied fields.

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Fellowship award function from IICHE at Chemcon-19

Prof. MM Sharma with council members & Invitees

IIChE new President elect Dr. Basva Rao at Chemcon-19

Dr. K. Vijay Raghavan, PSA, for HL Roy Memorial Speaker.

Dr Ashutosh Sharma, Secretary DST for Memorial Lecture

Dhirubhai Ambani Commemoration Day Celebration

at MNIT Jaipur (28 and 29 December 2019)

As a mark of respect to the legend, Shri Dhirubhai Ambani, such 15th Commemoration Day was observed on 28 and 29 December 2019 at Malaviya National Institute of Technology Jaipur, organised by the Jaipur Regional Centre of IIChE. Programmes included the prestigious Shri Dhirubhai Ambani Lecture, delivered by Padma Vibhushan Prof M.M. Sharma. Several other Orations and Invited Lectures were delivered by renowned academics and industry bigwigs. Shri. Dhirubhai Ambani has been chosen as a businessman by Business India Magazine. He was also awarded The Dean's Medal by the Wharton School, University of Pennsylvania, USA for setting up an outstanding example of leadership.

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Chief Guest Prof MM Sharma with dignitaries

Prof Sharma delivering memorial lecture & Dr Madhu Agrawal

Prof SP Chaurasia, Dr GD Yadav. Prof Satyanaryana, Dr Soni, Prof MM Sharma and Mr Ranga Rao.

Felicitation of Prof GD Yadav by IIChE

Audience in hall during memorial lecture.

Outstanding Young Chemical Engineer's contest "OYCE 2020"

at Institute of Chemical Technology, Mumbai (15th February 2020)

The 13th Outstanding Young Chemical Engineer's contest was held at Institute of Chemical Technology on the 15th February 2020. In all 35 entries were received for the contest divided into 2 categories as Undergraduate students (21 entries) and working Professionals category (14 entries). The participation in the UG category comprised of students from Datta Meghe College of Engineering, Visvesvaraya National Institute of Technology, Gharda Institute of Technology, IIT Bombay, Institute of Chemical Technology etc. whereas participants in Working Professionals category were from RCF Chembur, HWB-DAE, Thyssenkrupp, Harmony Organics, IIT Bombay etc.

The contest started with inaugural function with Shri Vinayak Marathe, Sr. VP R&D, RIL as the special Guest. Dr. Parag Gogate, Convener of the OYCE-2020 compeered the function and welcomed the participants. Prof. Patwardhan, Head, CED, ICT and Prof. A.B. Pandit, Vice Chacellor, ICT also gave guidance to the participants on the role of chemical engineering and future prospects. Shri Vinayak Marathe, in his encouraging talk to the young participants, highlighted the concept of innovation. Dr. Gogate introduced the judges for the events which included Shri Thomas Mathew, Dr. Aniruddha Shenvi and Smt. Satyashwini for the Undergraduate category whereas the judges for the Working Professional category included Shri O. P. Goyal, Shri Sushil Kumar and Shri Jagdish Nageshri. The inaugural function ended with vote of thanks given by Shri. Dhaval Saxena (BCPL, IIChE).

The presentations during the contest covered areas such as Cavitation, nanotechnology, alternative fuels, recovery of valuable materials etc. in the Undergraduate category. The topics for the presentations in working professionals category were Process safety, innovative techniques in Complex Fertilizer Plant, Sodium Production, Chemical Process Simulation using OpenModelica and DWSIM, etc. All the presentations were of exceptional quality as remarked by the judges in the valedictory function. After the presentations, Shri. Rajesh Kumar Gera, RIL spoke about recycle of plastic waste material to reusable carry bags and also highlighted the efforts of RIL in sustainability and recycle.

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Outstanding Young Chemical Engineer's contest "OYCE 2020"

at Institute of Chemical Technology, Mumbai (15th February 2020)

Subsequently, there was a panel discussion regarding the recent trend in chemical engineering with panelist as Shri. Jagdish Nageshri (HWB, Mum), Shri. Umang Shah (Clariant), Shri. Thomas Mathew (RIL), Dr. Rahul Nabar (IITB, Harmony Organics), Shri. Rajesh Kumar Gera (RIL), Shri. J. P. Soni (thyssen krupp). The panel discussion was moderated by Shri. Praveen Kumar Saxena, Blast Carboblocks. The discussion was well received by all the participants.

The valedictory function had Mr. V.K. Joshi as the chief guest from Thyssen Krupp, Mr. A. K. Saxena of Blast Carboblocks, Dr U. Kamachi Mudali, Chairman of IIChE MRC, Prof. A. B. Pandit, Vice chancellor of ICT Mumbai was also the honorable guest for the function. Dr U. Kamachi Mudali, Chairman IICHE-MRC gave an overview about OYCE and the activities of the Mumbai Regional Center of the IIChE. Mr. V.K. Joshi and Mr. A.K. Saxena gave enlightening message to the young participants also highlighting the steps for a successful career and technology innovations. Certificate of participation were given to all the participants at the hands of chief guest, Chairman of the IIChE MRC and the guest of honor.

Subsequently Dr. Gogate announced the winners in both the categories. In the working professional category, the competition was very tough and judges had hard time in finalizing the winners. Mr. Vidyanand R. Kudtarkar (RCF, Mumbai) and Mr. Priyam Nayak (FOSSEE, IIT Bombay) were declared as joint first prize winners. Mr. Nitesh Parsai (HWB, DAE, Mumbai) won the second prize and Mr. Sumit Kamal (IIT Bombay) won the third prize. In the Undergraduate category the first prize was jointly given to Ashlesha Tiple (ICT Mumbai) and Arjav Shah (IIT Bombay). Team of Sudeep Mohanty, Yash Modi and Itika Samar of Mukesh Patel School for Technology Management and Engineering, Mumbai won the second prize. Shriley kokane (ICT Mumbai) and Gaurav Jadhav (Gharda Institute of Technology) were given the third prize jointly. Special thanks to Reliance Industries Ltd. for being the title sponsors, Thyssenkrupp and Blast Carboblocks for sponsoring the prizes for the working professionals and UG categories for the event.

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Professor NR Kamath ChEQ2020 Memorial Quiz

at DJSCE , Mumbai (7th March 2020)

Shri Vile Parle Kelavani Mandal's Dwarkadas J. Sanghvi College of Engineering (DJSCE) in Association With IIChE MRC Conducted ChEQ 2020 Prof. N.R. Kamath - Memorial Quiz on 7th March 2020 hosted by Chemical Department of DJSCE. Established in 1994 by the Shri Vile Parle Kelavani Mandal (SVKM), **Dwarkadas J Sanghvi College of Engineering (DJSCE)** one of the premier engineering colleges in Mumbai. In a short span, the college has come to be recognized asa premier institute of technical education and has been accredited with an A+ grade certificate from the directorate of Technical Education Mumbai University.

Unveiling Prof. N.R. Kamath Trophy

Prof. N.R. Kamath: The late Prof. N R Kamath was an outstanding teacher and technologist who had a profound influence on his students, first at the University Department of Chemical Technology (UDCT, now named as Institute of Chemical Technology, Mumbai), and then at the Indian Institute of Technology, Bombay. He was a role model and mentor to many of the young faculty and students of his era.

Dr. Sunil Bhagwat conducting the quiz

ChEQ 2020: Initiated 14 years ago, the N. R. Kamath Memorial Chemical Engineering Quiz (ChEQ), surely has had a legacy of its own. The quiz restarted its course in the year of 2006 under the supervision of IIChE. The quiz has henceforth been held in various colleges across Mumbai and has been wide-spread participation of students from Mumbai, Pune, Lonere, Nasik under the rolling trophy format. Colleges from Mumbai University and other colleges under IIChE-MRC have come together and compete for the glorious trophy on 7th March 2020 at Dwarkadas J. Sanghvi College of Engineering.

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Professor NR Kamath ChEQ2020 Memorial Quiz

at DJSCE , Mumbai (7th March 2020)

The morning of 7th March witnessed anxious students from ten colleges under IIChE-MRC viz. Mahatma Gandhi Memorial College of Engineering, Indian Institute of Technology Bombay, Finolex Academy of Management and Technology, Bharti Vidyapeeth College of Engineering, Thadomal Shahani College of Engineering, Gharda Institute of Technology, Shivajirao Jondhale College of Engineering, Datta Meghe College of Engineering, Institute of Chemical Technology and D. J. Sanghvi College of Engineering assembling at the seminar hall of D. J. Sanghvi College of Engineering for ChEQ 2020.

As the participants settled down, Dr. Aparna Tamaskar made the opening remarks by giving a brief introduction about the highly coveted “N. R. Kamath Quiz” and welcoming the decorated dignitaries. The guests for the event included veterans from the industry and executive council members of IIChE like Mr. Mahendra Patel, Mr. Praveen Saxena, Dr. Sanjay Mahajani, Dr. Sunil Jogwar and Dr. Sunil Bhagwat. The event then proceeded with the guests lighting the lamp along with Principal, Dr. Hari Vasudevan, Head of the Chemical Department, Dr. (Mrs.) Alpana Mahapatra and other professors. The quiz started with auspicious “Saraswati Vandana”.

Dr Sunil S. Bhagwat was the quiz master for round one. The quiz master for round two was Dr. Sujit Jogwar from IIT-B. The top six teams from first round were the competitors for the second. The third and final round which was hosted by Dr. Sanjay Mahajani witnessed a fierce competition between three teams. This was a rapid-fire round with each team getting 90 seconds to answer the maximum number of questions.

Students from Indian Institute of Technology emerged victorious followed by Institute of chemical Technology and Bharti Vidyapeeth College of Engineering. The valedictory ceremony then ensued and a tabla session added melodious musical notes to the seminar hall. The trophy was handed over to the winner and the dignitaries enlightened the audience with their fruitful talk. Lastly, the dignitaries were felicitated by Dr. Hari Vasudevan and Dr. (Mrs.) Alpana Mahapatra and the event concluded with the national anthem.

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The winning team - IIT Bombay

INDUSTRIAL VISIT

Bharat Petroleum Corporation Limited, Mumbai, (7th February 2020)

The IIChE-MRC Industrial visit of BPCL, Mahul unit was attended by Shri RK Mehra, Dr. Anita Kumari, Dr. Aparna M. Tamaskar, Dr. Bibhash Chakravorty, Shri Jayesh Master, Dr. MP Jain, and Shri Jagdish Nageshri. IIChE-MRC is grateful to BPCL management especially Shri Durairaj, DGM (Learning & Development) for all the arrangements, informative presentation, plant visit, control room visit as well exceptional hospitalities.

The visit started with High Tea and BPCL presentation at about 10:00 hours. BPCL has been professionally managed and is having many accolades with regards to innovation, CSR, training, safety, marketing. Use of technology for plant optimisation and safety management systems were remarkable. Use of drones for safety surveillance, furnace inspection, pipeline security and mobile technology for real time management of Annual Turn Around were worth replicating. Use of high end software for directly relating process parameters and plant load to profit and displaying it on big screen in control room were brilliant. Glimpses of the BPCL presentation is briefly narrated below:

Bharat Petroleum Corporation Limited is India's 'best performing' Maharatna PSU, a Fortune 500 oil refining, exploration and marketing conglomerate. BPCL is an Indian government controlled oil and gas company headquartered in Mumbai. The company is India's 2nd largest downstream oil company and is ranked 275th on the Fortune list of the world's biggest corporations as of 2019.

BPCL has two refineries at Mumbai and Kochi with a capacity of 12 Million Metric Tonnes Per Annum (MMTPA) and 7.5 MMTPA for refining crude oil. Its subsidiary at Numaligarh has capacity of 3 MMTPA.

The company today known as BPCL started off as Rangoon Oil and Exploration company set up to explore the new discoveries off Assam and Burma during the British colonial rule of India. In 1928, Asiatic Petroleum Company (India) started cooperation with Burma Oil Company. This alliance led to the formation of Burmah-Shell Oil Storage and Distributing Company of India Limited for import and marketing of Kerosene. The company also took up the challenge of reaching out to people in remote villages to ensure every home was supplied with kerosene.

Thus, the development and promotion of efficient kerosene-burning appliances for lighting and cooking became an important part of its kerosene selling activity. With the advent of motor cars, came canned Petrol to be subsequently followed by fuel service stations in the 1930s. On 15th October 1932, when civil aviation arrived in India, Burmah Shell had the honour of fuelling J.R.D. Tata's historic solo flight in a single-engine from Karachi to Bombay via Ahmedabad. Showcasing its pioneering spirit, the company introduced LPG as a cooking fuel to Indian homes in the mid-1950s.

In 1951, the Burmah Shell began to build a refinery in Trombay (Mahul, Maharashtra) under an agreement with the Government of India. Dr. S. Radakrishnan, the then Vice President of India,

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INDUSTRIAL VISIT

Bharat Petroleum Corporation Limited, Mumbai, (7th February 2020)

declared the 2.2 MMTPA (Million Metric Tonnes Per Annum) Refinery open on 17th March 1955, making it the largest refinery in India then. On 24 January 1976, the Burmah Shell was taken over by the Government of India to form Bharat Refineries Limited.

On 1 August 1977, it was renamed Bharat Petroleum Corporation Limited. It was also the first refinery to process newly found indigenous crude Bombay High. In 2017, Bharat Petroleum Corporation Limited received Maharatna status, putting it in the category of government-owned entities in India with the largest market capitalization and consistently high profits.

On 21 November 2019, the Government of India approved the privatization of Bharat Petroleum Corporation Limited (BPCL). The government invited bids for the sale of its 52.98% stake in the company on 7 March 2020.

BPCL is into exploration, production and retailing of petroleum and petrol related products. Through a network of 77 Operating Locations and 15500 Retail Outlets, BPCL caters to storage, distribution and sales of Petroleum Products in a very safe, secure, and reliable manner. Retail is also leading the sustainability initiatives like solar, rain water harvesting, energy efficient lighting, carbon sequestration etc.

Bharat Petroleum Pipelines Group operate a network of more than 2200 KM of multiproduct cross-country pipelines for transportation of MS, HSD, SKO, ATF and LPG demonstrating highest standards of safety at Operating Locations. It also offers full range of automotive engine, gear oils, transmission oils, speciality oils and greases. MAK Lubricants (300+ grades) is a trusted brand in Lubricants & Greases both in India & abroad. It also provide Aviation Turbine fuel (ATF) to its airline customers. LPG touches our lives in so many ways. Bharatgas serves more than 67 million households across metro cities to far flung villages in India. Bharatgas plays an essential role in making our lives comfortable and smoke free.

BPCL has launched a GPS technology for tracking vehicles for its 5,200 tanker trucks fleet. This system will help the company track the trucks for better logistic efficiency. This will result in prevention of pilferages and fuel adulteration. BPCL has HSSE Organisation with highest commitment by the Demonstrative Leadership towards Zero Harm, Zero Incident & Zero Excuses to Health, Safety and Security of all Stakeholders and Society with a deep rooted Sustainable Leadership in Environment Management.

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Forthcoming Major Events

National Workshop on "Role of Chemical Engineers in E-Waste Management"

To be Organised by IIChE-MRC in association with Chemical Engineering Association, IIT Bombay

(Dates & Venue to be announced soon)

Every year about 50 million tonnes of e-waste is generated all over the planet. Out of this, only 20% is recycled and the remaining ends up in landfills. E-waste constitutes about 70% of the total hazardous waste and contains high-value and scarce materials such as platinum, cobalt and rare earths. The two day workshop will discuss amongst other things the role of chemical engineers in e-waste management.

Chemical Engineering Association (ChEA), IITB established in 1965, aims at promoting awareness and knowledge about Chemical Engineering to the outside masses, as well as providing a forum for mutual interaction amongst students, past and present, of the Chemical Engineering Department, IIT Bombay.

The objective of the workshop is to understand the present state of e-waste disposal and recycling in the process industries and spread the awareness about it. With the above objective in view, IIChE, Mumbai Regional Centre, feels it is appropriate at this juncture to offer a platform for various stake holders in the field - policy makers and regulators, designers and manufacturers, operators and practicing engineers from user industries and academia to come together and to deliberate, interact and suggest future options and specific actions to be adopted by the Process Industry. The two day workshop will have distinguished speakers from Academia, Industry, Research Organisations, Technology Providers, and Policy Makers from the Government of India.

Theme Meeting on Specialty Materials

Solvents (Organic Extractants) & its Industrial Applications

(Date & Venue to be announced soon)

Heavy Water Board (HWB), a constituent unit of Department of Atomic Energy (DAE) has been mandated for production of Specialty Materials, which are required for the department. HWB has successfully mastered the challenging task of converting laboratory or bench scale processes to industrial production facilities for various specialty materials such as Solvents (Organphosphorous & Amide based metal extractants) and Boron (isotopic enriched) compounds. HWB has set up industrial scale facilities and is producing various Solvents required for Chemical, Hydrometallurgical and Nuclear Industry employing Solvent Extraction or Liquid-Liquid Extraction unit operation. This includes solvents such as TBP (Tri Butyl Phosphate), D2EHPA (Di-2 Ethyl Hexyl Phosphoric Acid), TOPO (Tri Octyl Phosphine Oxide), TAPO (Tri Alkyl Phosphine Oxide), DNPPA (Di-Nonyl Phenyl Phosphoric Acid), Di-Hexyl Octanamide (DHOA), Tri-iso Amyl Phosphate (TiAP) and Monoester of Di-Ethyl Hexyl Phosphonic Acid, TEDGA (Tetra - 2 Ethyl Hexyl Di glycol Amide), D3ODGA (Di-Do-Decyl Di Glycol Amide) and Calix Crown 6 X.

A theme meeting on specialty materials particularly Solvents (Organic Extractants) is proposed to be organized by HWB to enhance the awareness of Indian industry and enable better utilization of Solvents and related technologies produced by HWB. This meeting will focus on applications of Solvents in various sectors of Chemical, Hydrometallurgical and Nuclear industry. This included producers of Agrochemicals, Corrosion Inhibitors, Flame Retardants, Hydraulic Fluids, Mining chemicals, Printing Inks, Water Treatment Chemicals, Hydrometallurgical industry using solvent extraction process for production of Nickel, Cobalt, Zinc, Copper, precious metals and their derivatives, Rare Earth producers and Nuclear reprocessing. The theme meeting will be one day programme and will include talks from experts selected from industry, academia and research centers. The programme will facilitate networking between researchers, producers and users of Solvents to consolidate the views and obtain a comprehensive assessment of demand-supply scenario and gaps in technology development.

Six Sigma Trainings & Certifications by IIChE

IIChE in association with training & certification partner Anexas Consultancy Services is pleased to offer Lean Six Sigma trainings and certification and has the following objectives:

- To have a better understanding of Lean Six Sigma Methodology and Processes
- To understand the techniques used by Lean and Six Sigma
- To apply the knowledge and techniques used by Lean and Six Sigma
- To be able to track data, analyse errors and conduct root cause analysis
- To understand the benefits of statistical tools to improve analytical ability
- To be able to solve problems in the organization's processes
- To drive a higher level of service on key deliverables for customers

Identified participants would be given the trainings in Lean Six Sigma Yellow Belt training for 1day, Green Belt training for 2 days. The Green Belts would be given 4 more days of training in Black Belt topics. The Minitab software training is conducted using organization's data. By the end of training participants would be able to…

Lean Six Sigma Yellow Belt

- Comprehend fundamental methodologies utilized for Six Sigma.
- Apply the basic improvement tools and techniques of Six Sigma.
- Work as a team member for an individual project or multiple projects.
- For BE/ B.Tech/ M.Tech Chemical Engineering students

Lean Six Sigma Green Belt

- Track data, analyse errors and conduct root cause analysis
- Understand the benefits of statistical tools used to improve analytical ability
- Apply different tools to solve problems in the organization's processes
- For Quality Managers, Production Engineers, Operations Managers, Team Leads, Business Managers

Lean Six Sigma Black Belt

Make a roadmap for six sigma implementation across the organization

- Alignment of the six sigma initiatives with quality management system
- To drive a quantifiably higher level of service on key deliverables for customers
- For Vice Presidents / Directors / General Managers, Team Leads , Executives, Quality Analysts,

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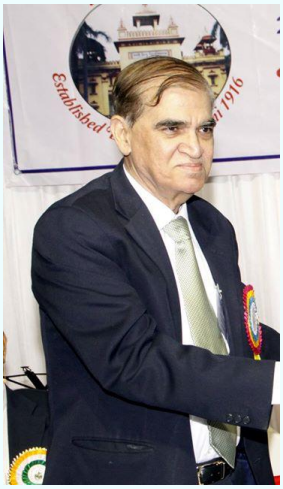
MEMORIAM



We are sorry to inform about untimely sad demise of Shri Rakesh Mehra, an active member of IIChE-MRC & former Executive Director of BPCL, on 22nd February 2020. Shri RK Mehra was B. Tech. in Chemical Engineering from IT-BHU in 1980. He was diploma in French language also. He had worked in BPCL, Mumbai from 1980 to 2015 and held various positions up to Executive Director (International Trade) and has wide range of experience in oil industry with several landmark achievements. He was widely travelled to America, Africa, South East Asia, Japan, Middle East countries and has represented the country in international Bio Fuel launch ceremony at UNHQ, New York, USA in 2007 and also addressed the media there.

Since 2015, He was working as Corporate Consulting Advisor with GP Global Group. Shri RK Mehra is survived with his wife Dr. Poonam Mehra, PhD in Physics with several published research papers to her credit and his daughter, an MBA working with Indian Oil, Mumbai. IIChE-MRC puts on record his valuable contribution to Chemical Engineering discipline as well his dedicated support to IIChE-MRC.

Safety Management Systems in Heavy Water Plants

D.K. Mishra, A.K. Sahu & Jagdish Nageshri (Heavy Water Board)

INTRODUCTION:

Heavy Water Board (HWB), a constituent unit of the Department of Atomic Energy, Government of India, has established Heavy Water Plant in different parts of India. Out of these, the plants at Kota and Manuguru are based on Hydrogen Sulphide (H2S) Water Exchange process and the plants at Baroda, Talcher, Tuticorin, Thal & Hazira are based on Ammonia (NH3) Hydrogen Exchange Process. These plants are handling large quantities of hazardous chemicals under high pressure and extreme temperatures. Some of these chemicals are toxic, flammable & corrosive and they may affect persons, property and the environment. Accordingly design safety features have been incorporated in the design and erection stages of the plants. Later, based on experience, additional operational safety features have been adopted for safety of the persons, plant and planet. At Talcher, Baroda and Tuticorin HWB has taken up diversification activities of production of solvents and other materials required for front end and back end of nuclear power programme. Some of the important design safety features are as follows.

1. Design safety features of H2S based HWPs:

1.1 Design & Process Engineering: The basic hazards emanate from exchange units and H2S storage unit of the plants, as there is a sizeable inventory of hazardous chemicals at any time in these units. Keeping in view of the toxic, flammable and corrosive nature of these chemicals, stringent measures have been taken at every stage of the plant starting from the concept, design, engineering, construction, commissioning, operation, etc., specifically in the selection of material of construction, fabrication, manufacturing, testing, etc.

1.2 Materials of Construction: The material of construction was carefully selected considering the corrosive nature of H2S. Material selection, testing and fabrication were done with extreme care and according to prescribed procedures and as per National/ International Codes/Standards.

1.3 Quality Control: Stringent quality control measures as specified by the HWB's Design & Engineering Standards besides ASME Section VIII-Div.2 for pressure vessels, ANSI B 31.3 for piping and NACE practices have been adopted. Additionally, all plate/ pipe/ forging/ casting materials are 100% ultrasonically & impact tested besides qualifying the weld consumables and welding procedures. All butt welds subjected to 100% radiography and dye penetration (DP) checks to eliminate defects besides DP check of weld-edge preparations. All weld joints of carbon steel are pre & post-weld heat-treated / stress relieved at appropriate temperatures.

1.4 Plant Layout: The layout of plants is done considering the pre-dominant wind direction so as to take care of accidental gaseous releases due to leakage from the plant or from flare stack. Exchange Unit and H2S plant are located with reference to Central Control Room that normally the gaseous releases from above units will not be carried towards these areas. Open pits and ditches are avoided to maximum possible extent as H2S tends to settle and concentrate in low lying areas, particularly in still climatic conditions. Wherever pits could not be avoided due to process limitations, like process drain tank area, it is provided with pit ventilating blowers, which discharge to a local stack of about 15 meters height.

1.5 Remote Isolation and Emergency Scram Facility: Exchange Unit towers which contain major quantity of H2S inventory are equipped with remote operated isolation valves on the periphery of each tower. These valves are double disc gate valves, with sealant injection facility for tight shut off and prevention of any passing of process fluids through the valve seat. These valves are provided with the remote operation facility through the control switches located on central control panels in Central Control Room. In addition, sectional scrams and main scram switches are provided in Central Control Room, which actuate the respective sectional isolation valves & peripheral plant isolation valves and tripping of running machinery.

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1.6 Closed Vent and Flare System: Closed vent and flare system is provided to cater the discharge from safety relief valves and occasional venting during operation of the plant. It also takes care of the dumping operation in the event of any abnormal condition of plants.

1.7 Closed Drain System: Closed drain header is provided to drain the contents of towers / vessels. The closed drain header is connected to drain tanks and the liquid of the drain tanks is periodically disposed through Effluent Treatment Plant and gasses are vented through closed venting system.

1.8 Corrosion and Protective Measures: H2S-H2O system has very high initial rate of general corrosion but comes down to acceptable limits once the protective Iron Sulphide film is formed by passivation technique. Carbon steel has been selected as the material of construction for towers, tanks, etc., where the possibility of protective film erosion is not there. Film formation was carried out to form a stable Pyrite film (stable iron sulphide) to avoid the severe corrosion of the system due to the Wet-H2S. To avoid Sulphide Stress Corrosion cracking, the hardness of the materials used for construction has been limited to a maximum of RC-22. Solution annealing has been specified wherever possible. In cases where solution annealing is not possible, softer materials were chosen to start with.

1.9 H2S Gas Monitoring system: Presence of H2S in atmosphere in the plant areas cannot be ruled out in spite of all the precautionary measures taken against H2S leakage from the system. To monitor the H2S concentration in the atmosphere, an extensive on-line gas monitoring system is installed. The H2S monitors are located strategically at different locations inside the plant and some monitors are located outside the plant boundary. The concentration of H2S in different areas of the plant is monitored in the Central Control Room. Monitors are also installed at the periphery of plant units for monitoring H2S escape prior to the off-site areas.

Landline telephones have been provided in off-site villages to communicate with Central Control Room in case of H2S detected by H2S monitors. Apart from monitors installed in the field, portable H2S monitors are also provided to monitor/ cross check the H2S conc.

1.10 Effluent Treatment Plant: Effluent Treatment facility has been established to ensure that water let off from the plant does not carry dissolved H2S. It consists of cooling tower, chlorination & neutralisation facilities. The treated effluent is further oxidised using surface aerators. Guard Pond is provided for further aeration with sufficient residence time . The effluents are continuously analysed and monitored before letting them off. This treated effluent is now being recycled and reused for various process and utility activities, thereby reducing the quantity of liquid effluent discharged from the plants and reducing raw water intake for the plant.

1.11 High Integrity Isolation Valves: Double disc gate valves, having a provision for injecting a high pressure sealant between the two discs are provided for isolation of major equipment and machinery in exchange unit. The valve sealant ensures that no process fluid leakages exist from system to atmosphere.

1.12 Sealing system: Double mechanical seals are provided for all the process pumps handling water saturated with H2S, ensuring minimum possibility of H2S leakage to atmosphere. High Pressure Sealant system is provided to prevent leakage of Hydrogen Sulphide to the atmosphere from the pumps and valves. The higher pressure of the sealant medium ensures zero leakage of contaminants in the plant environment.

1.13 Breathing Air System & Emergency Shelters: Adequate nos. of Self Contained Breathing Apparatuses (SCBA) has been provided at plant sites for protection of the personnel against exposure to H2S gas. A number of Emergency Shelters with stored breathing air supply are provided at plant sites

Continued…

to protect the plant personnel during emergency situations due to leakage of H2S gas from the plant system. Breathing Air compressors with necessary filling facility have been installed to cater the need of breathing air for SCBA sets and breathing air storage bullets of Emergency Shelters.

1.14 Pressure relief Devices: The towers of exchange units have been provided with controlled pressure relief valves, dump valves and safety valves.

1.15 Emergency Power Supply: For emergency power supply (in case of failure of Class-IV power supply), D.G. sets are provided to cater the power requirement of sealant system, emergency cooling water pumps, emergency air compressor, emergency illumination, jockey pump of fire water system, seal oil pumps for boosters, breathing air compressors, elevators, auxiliary boiler, air conditioning unit for CCR and drinking water pumps.

1.16 Emergency Instrument Air For Scram Operation: Adequate quantity of instrument air is stored for scram operation in case of emergency.

1.17 Fire Protection System: Adequate active and passive fire system has been provided for prevention, detection and fighting of fire.

a) Plant area has been divided in to various zones considering fire hazard and all the electrical equipment / fittings conform to the requirement of respective zones.

b) All the process pipelines handling flammable materials like H2S and LPG are bonded and earthed at all flange joints to prevent the build-up of static electricity to hazardous level.

c) Fire barriers, fire resistant seals have been provided in electrical installations and fire retardant coatings are also applied on the power cables in the substations/ MCC Rooms.

d) Fire detection like (Smoke detectors, heat detectors, heat sensing cables etc.) and alarm system has been provided at the locations where there is a chance of outbreak of fire.

e) Fire fighting is taken care by a well-quipped Fire Station manned RTC shifts.

f) Extensive fire water network laid throughout the plant with fire hydrants provided at strategic locations. Fire water network is fed by electric power driven / diesel operated pumps. Header pressure of the fire hydrant system is maintained by the jockey pump.

g) Water deluge system and sprinkler systems provided for H2S & LPG storage tanks which can be actuated from the Central Control Room as well as from the field.

h) Adequate nos. of portable fire extinguishers is provided at different locations in plant sites and office buildings.

i) O&M personnel have been imparted basic training on fire fighting and fire squads have been formed for different pant areas.

j) Hot line telephone for communication between Control Room and Fire Station.

k) Manual Call Points (MCP) are installed at various locations to inform fire section about any abnormality.

l) Mutual Aid Scheme with NPCIL is in force at HWP (Kota).

1.18 Operational Safety Features: Good operating practices along with well defined 'Authorisation of operating manpower at various levels' are in place. The need of various safety measures like use of lead acetate paper, BA set and other PPE along with buddy system in hazardous areas is defined in Safety Manual. Operation manuals are made available to all the operating personnel. All the necessary pre-start-up checks, start-up procedure and the trouble shooting are elaborated in the operation manual. All the operation manuals are updated periodically.

Continued...

2. Design safety features of NH3 based HWPs:

2.1 Process Safety:

i. Class III powered remote controlled valves with separately laid underground cables are provided for facilitating isolation of HWPs and the Fertiliser Plant in case of abnormal conditions.

ii. Remote operated control valves connecting to the 64 meters high vent stacks are provided for High pressure and Medium pressure loops to avoid over pressurisation and for safe discharge / dispersion of gases.

iii. Seal oil system with class III power motor driven pumps of 100% redundancy with auto start logic and emergency overhead tank are provided for Synthesis gas compressor and refrigeration compressor for preventing Synthesis gas leak. All emergency machines are connected with class III power supply.

iv. Pre-programmed inter-locks / trip logic are provided for Synthesis gas compressors in fertiliser plant, booster compressor in HWPs and battery limit valves.

v. Pre-programmed safe shut-down of plant systems is provided through program matrix.

vi. Motorised valves are provided at important process loops for quick operation.

vii. The process vessels vents are connected to M.S. stacks in the main plant.

viii. The entire main plant structures are open. This prevents the pockets of H2 and NH3.

ix. Elaborate temperature monitoring-cum-scanning for cracker.

x. Closed loop effluent system is provided for process drains keeping water in circulation.

xi. Extensive monitoring of skin / pigtail temperatures of cracker tubes in cracker unit is carried out and cracker trip-logic are structured for auto action in case of unsafe temperatures.

xii. Auto isolation of Naphtha / natural gas feed and controlled enrich ammonia feed to cracker unit are ensured on application of master trip command.

xiii. Suitable PPEs are provided to establish an effective barrier between a person and harmful objects.

xiv. The use of combustible building materials like wood is almost avoided in the main plant and in other places where hazardous chemicals are handled.

2.2 Mechanical Safety:

i. All the equipment and piping are designed and fabricated as per standard codes.

ii. Multi-wall construction technique adopted for vessels for pressure containment in the high pressure section with material chosen for handling hydrogen at high pressure, high temperature and to withstand varying stress.

iii. Suitable safety valves are provided on heat exchangers wherein the tube side operating pressure is higher than that of shell side.

iv. Safety valves, Rupture discs, Shutdown valves, Isolation valves, Drain valves, Regulating valves, Vent valves, are provided in the process system.

v. Equipment wherein the tube side fluid is at high pressure and shell of the equipment is at lower pressure are provided with safety valve and rupture disc.

vi. Cathodic protection for underground Cooling Water and Safety Water lines.

vii. High pressure vessels flange joints have been provided with leak collectors and nitrogen flow arrangements.

2.3 INSTRUMENTATION SAFETY

i. Local control panels, motor terminal boxes, cable junction boxes are pressurised by air or nitrogen to prevent the entry of explosive gases.

ii.

Continued...

ii. Intrinsically safe relays (ISRs) with potential free contacts are used in field switches to limit the power level within safe limit.

iii. Critical instruments are fed through priority air supply in case of air failure.

iv. Relay based interlock circuits with program-metrics for taking simultaneous failsafe actions on corresponding faults in the process system is provided.

v. All inputs from hazardous area to Relay Panels are routed through intrinsically safe devices (barriers isolators)

2.4 ELECTRICAL SAFETY

1. The cable junction boxes of enrichment towers are filled with moisture free silicon oil to prevent entrapping of moisture as well synthesis gas entry.

2. All motors in hazardous areas are of type E temperature T3 class increase safety construction with IP55 degree of protection as per IS4691. Fittings in compressor house and main plant are explosion proof enclosures. The motors of hyper compressors are of air pressurised casing with scavenging for 20 minutes period as a part of start-up procedure.

3. All the electrical fittings and devices in hazardous areas including lighting circuits are made of flame/explosion proof type.

4. Lighting arrestors are installed at vulnerable places both in the main plant, ammonia cracker unit and in electric switch yard to prevent damage due to lighting.

5. Diesel generator set (Class-III supply) has been installed to supply power for safe shut down and emergency operations.

2.5 FIRE PREVENTION & FIRE FIGHTING

1. All the process pipelines handling Ammonia, hydrogen, hexane and naphtha are bonded and earthed at all flange joints to prevent the build-up of static electricity to hazardous level.

2. Well laid-down fire water system is provided for fire prevention and fire protection. Fire water system in closed loop is laid with numbers of fire hydrants, wet riser points and fixed fire water monitors.

3. Top flanges of exchange towers, purifiers and ammonia convertor are provided with fire detectors and medium velocity water spray.

4. NH3/H2 detectors have been provided covering all probable/vulnerable locations.

5. High velocity spray systems are provided for HT transformers.

6. Manual Call Points (MCP) are installed at various locations to inform fire section about any abnormality. At important locations the MCP are with handsets to have telephonic communication with fire staff.

7. Flame & smoke monitors and fire alarm system have been installed at various vulnerable locations with a control panel in fire station & a repeater panel in control room.

8. Water curtain have been provided at entrance gates of Main control room.

9. Water spray system has been provided at locations vulnerable for massive ammonia leak. The spray system is also provided through Deluge valves operate-able from local as well from remote location.

3. Administrative safety features of HWPs :

3. 1 Communication System:

The following communication systems are available for fast and effective communication to handle any type of emergency in the plant.

a) Public address system
b) Hot line between CCR & critical stations.
c) Wireless sets or Walkie-Talkies
d) D.O.T. Telephones
e) Intercom Telephones.
f) Mobile phones for Section Heads & above
g) Sirens, buzzers & hooters

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3.2 Training: Intensive orientation & refreshers training programmes are imparted to every person for discharging his/her functions effectively. All personnel are made aware of the hazards and safety aspects of the plant and the action to be taken during an emergency. Training in first aid, fire fighting and use of personal protective equipment are mandatory for all O&M personnel.

3.3 Authorised Persons for Plant Operation : The plants are operated by qualified, experienced and authorised persons. Good operating practices along with well defined Authorisation (Licensing) procedure is in place. Similarly Qualification Incentive Scheme (QIS) is in vogue for Operation, Maintenance & Technical Services sections for knowledge updating of the plant personnel.

3.4 Safety Work Permit system: A well-defined Safety Work Permit system is in place and the authorized safety officers/supervisors continuously monitor for unsafe acts and unsafe conditions to guide the operating personnel. Competent authority's clearance is obtained in carrying out the critical jobs and the jobs connected to safety system. All the maintenance jobs are carried out under Safety Work Permit system.

3.5 Maintenance with built-in QA/QS: Maintenance manuals & Quality Assurance manual are available to ensure the correct maintenance practices. Preventive & Predictive maintenance schedules are in place. Periodical In-Service inspection is carried out.

3.6 Pre-start up safety review: Approved (updated) Operation manuals are provided in all the operating units as a reference for the operating personnel. All the necessary pre start up checks, start-up procedure and the trouble shooting are elaborated in the operation manuals.

3.7 Safety & Environment section: Safety & Environment section has been established in all Heavy Water Plants with qualified personnel and necessary infrastructure for monitoring of Safety & Environment activities. ***Safety Policy*** is displayed at prominent places.

In addition to the compliance with the provisions of applicable ***acts & rules***, many proactive measures like ISO 9000, 14000, IS18000, training on behaviour based safety etc. are undertaken to further improve the safety performance. Accident Investigation & reporting system at Local, Corporate level and review by the regulator (AERB) is in vogue.

3.8 Plant safety Committee: Plant Safety Committee (PSC), Plant Operational Status Assessment & Review Committee, Safety Surveillance Committees (SSC), are functioning effectively. Periodic scheduled Safety inspections and *Safety audits* are carried out.

3.9 Plant Documents: Plant Documents comprises of Operation manual, Technical Specification, Safety Manual, Maintenance manuals, ISI documents, Fire Manual, Training manual, Safety Analysis Report etc. are periodically updated and made available to O&M personnel. Safe operation of HWPs is ensured by complying with the stipulations of approved ***Technical Specifications***. Approved emergency preparedness plans are available and periodic mock drills are conducted to ensure their adequacy and response of various agencies. Annual Maintenance including ***In-Service Inspection*** activities are carried out to assess system integrity.

3.10 General Safety Rules: General safety rules are documented in safety manual and are implemented. Good housekeeping is maintained. ***Public Awareness*** programmes are carried out for the villagers, school students and state government officials working in the emergency planning zone.

3.11 Additional Precautions taken for construction activities:

i. Job Hazard Analysis for various construction activities has been carried out and documented. These are made available at the construction sites for reference.

ii. Induction safety training is imparted to all the workmen and supervisors and refresher training is being imparted periodically.

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iii. Prep-talks / tool box talks are carried out by the supervisor daily before start of each job.

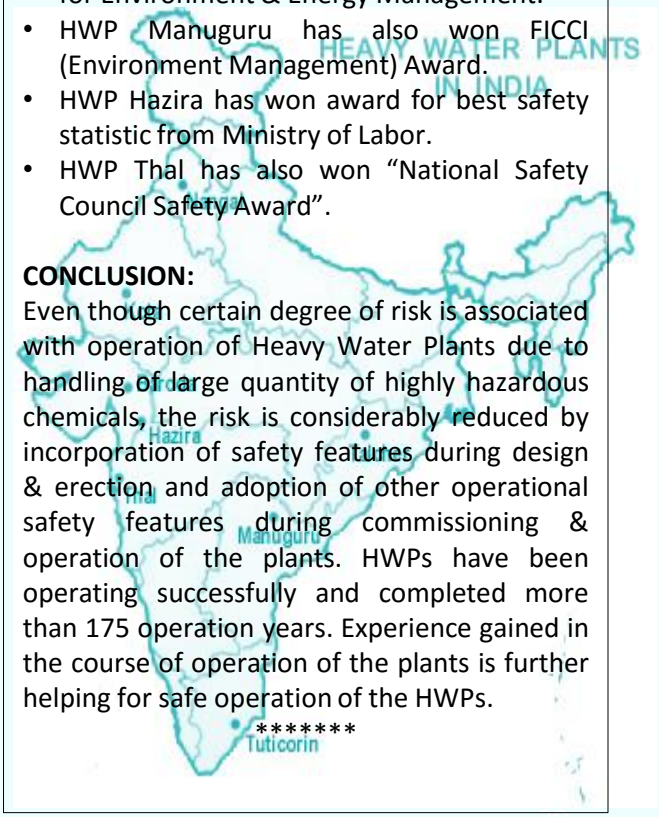
iv. Intensive safety surveillance is done during construction activities both by departmental safety staff and safety officer of the contractor.

v. Only tested and certified material handling equipment and tools are allowed to be put in service for lifting and shifting of equipment. Healthiness of the material handling equipment ensured by following the checklists prepared for the purpose. Checklists are made available to all the concerned supervisors.

vi. For jobs at higher elevations, height pass system is followed.

Awards & Accolades: During last year, all HWPs continues to bag several awards & accolades from many institutes of repute. Followings are some of the major awards bag by HWPs during 2019.

- HWPs Thal & Tuticorin have won “Industrial Safety Awards” and HWPs Kota & Baroda have won “Fire Safety Awards” from Atomic Energy Regulatory Board.
- HWP Manuguru & Hazira won ICC awards for Environment & Energy Management.
- HWP Manuguru has also won FICCI (Environment Management) Award.
- HWP Hazira has won award for best safety statistic from Ministry of Labor.
- HWP Thal has also won “National Safety Council Safety Award”.



CONCLUSION:

Even though certain degree of risk is associated with operation of Heavy Water Plants due to handling of large quantity of highly hazardous chemicals, the risk is considerably reduced by incorporation of safety features during design & erection and adoption of other operational safety features during commissioning & operation of the plants. HWPs have been operating successfully and completed more than 175 operation years. Experience gained in the course of operation of the plants is further helping for safe operation of the HWPs.

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CHEMCON-2020

Optimum Utilisation of Chemical and Mineral Resources

27th - 30th December 2020

Indian Chemical Engineers Congress (Chemcon-2020) and the 73th Annual Session of the IIChE will be held at Bhubaneswar during 27-30 December 2020. The theme of the conference is "Optimum Utilisation of Chemical and Mineral Resources". The event will be organised jointly by the Bhubaneswar Regional Centre of IIChE and CSIR – Institute of Minerals and Materials Technology, Bhubaneswar in association with Institute of Chemical Technology – IndialOil Odisha Campus, Bhubaneswar.

CHEMCON offers the most attractive platform, ensuring four days of intensive interface among the National and International experts in Chemical Engineering and allied fields. These interactions will help the delegates to constantly update and equip themselves so as to keep pace with the fast changing professional scenario. CHEMCON-2020 will feature host of events, which includes memorial lectures, plenary lectures, seminars, international symposium, panel discussions, exhibition, etc. The conference covers major themes relevant to the Chemical Engineering and allied profession through plenary, invited lectures and poster sessions. All technical sessions will be chaired by persons of eminence from the relevant field. The detail format as well as instructions for abstract and full paper preparation can be obtained from the website (www.chemcon2020.com).

Shri Dhirubhai Ambani Commemoration day will be celebrated on 28th December 2020 as a tribute to the great visionary Shri Dhirubhai Ambani, Founder of Reliance Industries Ltd., one of the largest private sector industry in India. An exhibition of Equipment Manufacturers and Service Providers in Chemical Industry and allied businesses including safety, emerging technology, consultants, etc. is proposed. For all the queries, kindly contact us through our official email: chemcon2020@gmail.com

Important Dates	
Abstract Submission	1st June 2020
Last Date of Abstract Submission	31st August 2020
Intimation of Acceptance of Abstract	1st July - 15th September 2020
Full Paper Submission	1st August - 31st October 2020
Last Date of Full Paper Submission	31st October 2020
Registration (Early bird)	Up to 15th September 2020
Registration (Normal)	16th September – 30th November 2020
Registration Closing	1st December 2020

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