REJOYCE

Department of Petrochemical Technology

Yearly newsletter
June 2014- May 2015

Vision:

To be a Department of Excellence in the field of Petrochemical Technology.

Mission:

To craft the students as potential technologists endowed with pragmatic skills.

To produce competent engineers to identify the emerging industrial, societal needs and address the same through innovative and eco-friendly solutions.

To fulfil the aspirations and expectations of the future generation by designing suitable academic, research and extension programmes.

Staff co-Ordinators

Mr. M.Rengasamy
Mr. M.n.Stalin

Our Editorial Team

Surendar - iv year
Megala - iv year
Balaji - iv year
Boobalan - iii year
Vedhagirishwaran. N - ii year
Vinith - ii year

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Events corner

TEQIP-II Sponsored
National Conference on Green Engineering and Technologies for Sustainable Future
Dec 5-6 2014

The aim of the two-day National conference on Green engineering and technologies for sustainable future - 2014 is to provide a forum for researchers in academic and industry to share and discuss their cutting edge results on the use of green engineering processes and technologies

The rapid industrialization and technological progress have led to unprecedented growth and development across the globe. But its adverse effects encompass degradation of the earth's natural resources and the emission of green house gases causing irreparable damage to the environment. A global green technological transformation has become imperative which envelopes new science, engineering and technology pathways ensuring the reduction on the usage of earth's non-renewable resources, decreasing the carbon emissions and reversal of ecological destruction. In this view The department of Petrochemical Technology planned to organize two days national conference on green engineering and Technologies for sustainable future. The scientific program will offer plenary lectures, submitted oral presentations and poster sessions


அண்ணா பல்கலைக்கழகம்
ANNA UNIVERSITY


BIT CAMPUS, TIRUCHIRAPPALLI


அண்ணா பல்கலைக்கழகம்
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BIT CAMPUS


UNIVERSITY

TEQIP - II sponsored
Faculty Development Programme on
Nano Technology Applications in Engineering and Technology

The world of nanotechnology provides exciting challenges and opportunities for scientists and technologist's irrespective of their discipline as the size effect is an important consideration while studying and computing various physical phenomena. A number of areas such as electronics industries, bio-medical engineering, lasers, micro electro mechanical systems, etc. employ analysis and design based on microscale and nanoscale phenomena.

The main objective of this faulty development programme is to introduce participants to various characterization technologies in the field of Nanotechnology and also to discuss possibilities of research in the area. The proposed programme also covers the vast range of applications of Nanotechnology, which is an expected future technology that will make most products lighter, stronger, cleaner, less expensive, more precise and importantly energy efficient.

TEQIP-II Sponsored
International conference in Energy and Environmental Engineering
Nov 6-7 2014

International Conference on Energy and Environment Engineering (ICEEE 2014) organized by the Department of Petrochemical Technology, Anna University -BIT Campus, Trichy aims to bring together leading academic scientist, researchers and research scholars to exchange and share their experiences and research results about all aspects of Energy and Environmental Engineering. It also provides the premier interdisciplinary forum for researchers, practitioners and educators to present and discuss the most recent innovations, trends and concerns , practical challenges encountered and the solutions adopted in the field of Energy and Environmental Engineering.

Facts sheet

Crude oil price during june 2015-may 2016

Primary petrochemicals

METHANE: A GREENHOUSE GAS THAT CAN BE USED AS FUEL AND IS OFTEN INCLUDED IN ROCKET FUEL

ETHYLENE: USED TO MAKE PLASTICS AND FILMS, AS WELL AS DETERGENTS, SYNTHETIC LUBRICANTS, AND STYRENES (USED TO MAKE PROTECTIVE PACKAGING)

PROPYLENE: A COLORLESS, ODORLESS GAS USED FOR FUEL AND TO MAKE POLYPROPYLENE, A VERSATILE PLASTIC POLYMER USED TO MAKE PRODUCTS RANGING FROM CARPETS TO STRUCTURAL FOAM

BUTANES: HYDROCARBON GASES THAT ARE GENERALLY USED FOR FUEL AND IN INDUSTRY

Petrochemicals historical timeline

1835 Polyvinyl chloride (PVC) discovered by French chemist and physicist Henri Victor Regnault after leaving a sample of vinyl chloride gas in the sun. The sample hardened into a white solid but it was not patented until 77 years later.

1839 Polystyrene discovered by accident by German pharmacist Eduard Simon when he tried to distil a natural resin called storax. He obtained an oily substance he called "styrol" and this thickened, probably due to oxidation. This substance wasn't recognised as being made up of many styrene molecules until 1920.

1851 Carbon oil for lamps first produced.

1856 Synthetic dyes first discovered by 18-year-old student William Perkin at the Royal College of Chemistry in London when trying to develop an artificial form of quinine from coal tar. Instead of quinine, he was left with a purple powder which was used as an affordable fabric dye. Before this, fabric was dyed purple using shells of a Mediterranean mollusc and was very expensive. This discovery, making purple fabrics more widely available, boosted the petrochemical industry by demonstrating the usefulness and profitability of petrochemical products.

1859 Oil discovered when retired railway conductor Colonel Edwin L. Drake drills a well near Titusville, Pennsylvania. Annual US oil production is 2,000 barrels.

1862 Industrialist John D. Rockefeller finances his first oil refinery and created the Standard Oil Company with his brother, William and several associates.

1865 First successful oil pipeline built from Titusville to a railway station five miles away. Trains then transported oil to refineries on the Atlantic coast.

1878 John D. Rockefeller controls 90% of the oil refineries in the United States.

1879 The first synthetic rubber was created.

1888 The study of liquid crystals begins in Austria when scientist Friedrich Reinitzer found that a material known as cholesteryl benzoate had two different melting points. However, it has only been in the last few decades that liquid crystal use has come into its own with uses

Edwin Drake (right) in 1866, pictured in front of the well where he first struck oil in 1859, heralding the birth of the global oil industry.

including mobile phones, electronic toys and computer screens.

1900 Texas, California and Oklahoma all producing oil. Annual US production at 64 million barrels.

1909 The discovery of Bakelite is announced. Considered the world's first plastic, it was invented by Belgian Leo Hendrik Baekeland when he tried to make a substitute for shellac. It helped transform the radio industry in the 1930s.

Bakelite, the original plastic, found many uses from radios to cameras and beyond, and examples are still much sought-after today.

1908 First major discovery of oil in Iran.

1912 German chemist Fritz Klatte develops a new process for producing PVC using sunlight. He was the first to patent PVC but had difficulties processing the sometimes brittle polymer.

1913 High-pressure hydrogenation process for transforming heavy oils into lighter oils developed by German organic chemist Friedrich Bergius.

1913 Thermal cracking patented as a method of oil refining by chemical engineers, William Burton and Robert Humphreys, of Standard Oil.

1914-1918 During World War I, Germany started large-scale production of synthetic rubber and further investigations into its production continued after the war.

1920s-1940s A busy era for petrochemicals with nylon, acrylics and polyester materials developed, as well as new compounds derived from oil-refining by-products entering the market. Other successful materials included polystyrene, polyvinyl chloride (PVC) and polyethylene. Nylon, acrylics and polyster developed for a wide range of uses, such as clothing, sports gear, industrial equipment, parachutes and plexiglass.

1920 German chemist Hermann Staudinger recognised that polystyrene (see 1839) is made up of many styrene molecules joined together in a chain. (see 1929)

1925 US oil production exceeded 1 billion barrels.

1925 Synthetic fuels pioneered with the development of the Fischer-Tropsch process by German researchers Franz Fischer and Hans Tropsch. Coal, biomass or natural gas could now be converted into synthetic fuels.

1926 IG Farben acquires patent rights to the Bergius hydrogenation process (see 1913). Carl Bosch had already been working on high-pressure hydrogenation processes for IG Farben.

1926 American inventor Waldo Semon plasticises PVC by blending it with different additives to create a more flexible material.

1927 First major discovery of oil in Iraq.

1928 Portable offshore drilling on a submersible barge pioneered by Texan merchant marine captain Louis Giliasso.

1929 Scientists at chemical company BASF develop a way to commercially manufacture polystyrene based on Staudinger's findings (see 1920) and a year later, large-scale polystyrene production started.

1930s New process of alkanisation and fine-powder fluid-bed production increases the octane rating of aviation gasoline.

1931 Neoprene invented by DuPont scientists after attending a lecture by Belgian priest and chemistry professor Dr Julius Nieuwland.

1931 German organic chemist Friedrich Bergius and Carl Bosch share a Nobel Prize for their work in high-pressure hydrogenation. (See 1913 and 1926)

1933 German scientists invent Buna-S, a synthetic rubber made from styrene and butadiene. Mainly used for car tyres.

1933-1935 Plexiglass is discovered by accident by German researcher Otto Röhm. He developed a method for polymerising methyl methacrylate which was intended for use as a drying oil in varnishes but found it could also be used as a coating for safety glass. Plexiglass was manufactured from 1938, used in war planes from 1940 and in car exteriors from 1974.

1933 A white, waxy material, is discovered by accident by two organic chemists at the UK's Imperial Chemical Industries (ICI) research laboratory. ICI chemist Michael Perrin develops a high-pressure synthesis process in 1935 to turn the waxy material into polyethylene. It was available on the mass market in the toy sector from the 1950s.

1935 American chemist Wallace Hume Caothers creats a fibre which came to be known as Nylon. Nylon stockings were introduced to the US market in 1940 to great acclaim. The material is used today for multiple purposes including fabrics, carpets, ropes and guitar strings. Solid nylon is used for mechanical parts.

1936 Catalytic cracking, using silica and alumina-based catalysts, introduced by French scientist Eugene Houdry.

Otto Bayer conducting an experiment demonstrating polyurethane foam in 1952.

1937 Ethylene glycol and propylene glycol become available as an anti-freeze. Methanol was used until this time.

1937 German chemist Otto Bayer patents polyurethane and further tests created moulded foam with bubbles. Between 1943 and 1944, the Germans secretly used polyurethane on wartime aircraft components. In the post-war years, it became highly successful in mattresses, insulation and furniture padding. Polyurethane is also used in paints, varnishes and sportswear fabrics.

1938 First major discovery of oil in Saudi Arabia.

1938 Dow Chemical Company introduces STYRON polystyrene resins.

1938 American chemist Roy Plunkett develops Teflon after accidentally exploding tetrafluoroethylene gas. The white, waxy powder that remained was a polymer of tetratfluoroethylene which was used as the basis for Teflon, a new non-stick, heat-resistant plastic. Gore-Tex, the breathable, waterproof textile, is also a result of this discovery.

1939-1945 World War II. During this time, the US supplied more than 80% of aviation gasoline and American refineries manufactured synthetic rubber, toluene, medicinal oils and other important petrochemical-based military supplies.

1941 DuPont chemists John R. Whinfield and James T. Dickinson created the polyester fibre from ethylene, glycol and terephthalic acid. This was called Terylene and was manufactured by ICI.

1941 Polyethylene terephthalate – or PET – is developed from ethylene and paraxylene. It was originally used in synthetic fibres, was first used in packaging in the mid-1960s and pioneered for bottles in the early 1970s. It was first recycled in 1977.

1942 The first catalytic cracking unit is put on stream by Standard Oil in Baton Rouge, Louisiana.

1946 DuPont buys all legal rights for polyester

By the time this photograph of an oil refinery and storage tanks was taken in 1956, Saudi Arabia was well on the way to capitalising on the world's largest oil reserves.

and develops Dacron, a second polyester fibre.

1946 It is believed that the first synthetic detergents were developed by the Germans in World War I because of a shortage of fats for making traditional soaps. In 1946, there was a breakthrough in detergent development when the first man-made detergent, containing a surfactant/builder combination, was introduced in the US.

1947 German-born American chemical engineer Vladimir Haensel invents platforming, a process for producing cleaner burning high-octane fuels. The process uses a platinum catalyst to speed up chemical reactions.

1949 BASF chemist Fritz Stastny starts work on a process to turn polystyrene into a foam form. In 1951, he succeeded and turned STYRON, a substance that is 98% air, into one of the world's most successful plastics.

Early 1950s Polypropylene discoveries were made in different places because of improved knowledge-sharing but this led to nine different teams claiming to have invented it. Patent litigation was finally resolved in 1989. American chemists Paul Hogan and Robert Banks, working for Phillips Petroleum, are generally credited as the inventors.

1955 South Africa starts making its own synthetic fuels using the Fischer-Tropsch method because of limited oil imports with the trade sanctions under the apartheid regime.

1960s Work conducted on water conservation for soils in the US led to the development of a resin in the form of an acrylic gel which were then developed into super-absorbent fibres. Commercial production began in Japan in 1978 and in 1980, super-absorbent polymer was used in baby diaper production.

1960s First synthetic oils are developed with Mobil Oil and AMSOIL leading the field. The synthetics contain additives such as polyalpha-olefins derived from olefins. Introduced commercially in the 1970s to the automotive market.

1963 Australian chemists start work on conducting polymers which are now used as anti-static substances for computer screen shields, windows that can exclude sunlight and photographic film.

1965 Kevlar is invented at DuPont as a result of research involving high performance chemical compounds. It is used in bullet-proof vests, underwater cables, space vehicles, brake linings, skis, building materials, parachutes, boats and skis.

2000 The Nobel Prize for Chemistry is awarded to three Australian researchers, Alan J. Heeger, Alan G. MacDiarmid and Hideki Shirakawa, for their discovery and development of conducting polymers.

Staff corner

We are proud to say that our honourable HOD Dr. Arulmozhi Muthukumarasamy has been selected as a Expert Committee member in Kochi- Kootanad-Bangalore-Mangalore Pipeline Project of GAIL.

Gas (India) Limited (GAIL) (formerly known as Gas Authority of India Limited) is the largest state-owned natural gas processing and distribution company in India. It is headquartered in New Delhi. It has the following business segments: natural gas, liquid hydrocarbon, liquefied petroleum gas transmission, petrochemical, city gas distribution, exploration and production, GAILTEL and electricity generation.

PAPERS OF THE YEAR

Removal of phenolic compounds from aqueous solutions by emulsion liquid membrane containing Ionic Liquid [BMIM]+[PF6]− in Tributyl phosphate

A. Balasubramanian, S. Venkatesan

Abstract

An experimental study on removal of phenolic compounds from aqueous solutions using Ionic Liquid Mixed Carrier (ILMC) containing 1-Butyl 3 Methylimidazolium Hexafluorophosphate [BMIM]+[PF6]− dissolved in Tributyl phosphate (TBP) in an Emulsion Liquid Membrane (ELM) was carried out. The effects of various operating parameters such as TBP Concentration, stripping reagent concentration, surfactant concentration, emulsification time, phase volume ratio, treat ratio, stirring speed, external phase pH and [BMIM]+[PF6]− concentration in TBP on removal of phenol has been experimentally investigated. It was found that addition of 0.02% (v/v) of [BMIM]+[PF6]− in membrane phase has enhanced the emulsion stability by 5 times and this was carried out using Rose Bengal dye to visualise the emulsion separation. An FTIR spectrum for TBP, ILMC and membrane phase before and after loading of phenol was generated to indicate their interactions and bonding. By selecting appropriate operating conditions, it was found to remove 99.5% of phenol and more than 90% of chlorophenols from aqueous solutions at the treat ratio of 3.

Castor leaf mediated synthesis of iron nanoparticles for evaluating catalytic effects in transesterifi cation of castor oil

Mooka n Renga samy,a Krishnasamy Anbalagan,b Shanmugam Kodhaiyoliib and Velan Pugalenthi*b

Abstract

A castor (Ricinus communis) leaf extract mediated process was developed for the synthesis of iron nanoparticles. The resultant iron nanoparticles were used as a catalyst in the transesterification of castor oil. The iron nanoparticles were characterized using UV-visible absorption spectrophotometry (UVvisible), Fourier-transform infrared spectroscopy (FTIR), X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), scanning electron microscopy (SEM), energy dispersive X-ray (EDX) and transmissionelectron microscopy (TEM). The TEM images confirm that the size of the iron nanocatalyst was in the range of 10 to 35 nm. The optimum conditions for obtaining the high yield of biodiesel were a 65 C temperature, a 1 : 9 molar ratio of castor oil and methanol, 1 wt% catalyst loading, 150 min of reaction time and a 400 rpm stirring speed. The iron nanocatalyzed transesterification of castor oil yielded 85 1% of biodiesel. The distributions of the saturated, monounsaturated and polyunsaturated fatty acid methyl esters (FAMEs) were identified as 4.11, 89.63 and 6.26%, respectively, using gas chromatographymass spectrometry (GC-MS). The physico-chemical properties of the produced biodiesel agreed well with the ASTM standards

An analytical study on forming limit curve of IF sheet metals of different grades

ming limit curve of IF sheet metals of different grades

N.V.Anbarasi and R.Narayanasamy*

Abstract

Fracture is the major failure in sheet metal forming, and the selection of an appropriate material for a component still depends on designer's experience and trial and error. In order to ensure a component to be free from fracture, it is advantageous and gainful to use an analytical model to understand the influence of the material properties on the formability of the designed component before the component is put into production. The effect of the parameters m-value (yield equation constant), p - value (exponential parameter involved in r- value), and r-value (plastic anisotropic ratio or radius of curvature of the neck) on nonlinear , linear Forming Limit Stress Curves (FLSCs) and Forming Limit Strain Curves (FLCs) are analysed using new yield equation for Interstitial – Free (IF) steels of different thickness. IF steel of thickness 0.6 mm is taken as IF steel (1) ,1.6 mm is taken as IF steel (2) and 0.85 (non-coated) is taken as IF steel (3) for convenience.

Publications on international journal by our staff

A.Balasubramanian and S.Venkatesan, "Optimization of removal of phenol from aqueous solution by Ionic liquid based Emulsion Liquid Membrane using Response Surface Methodology", ***CLEAN-Soil, Air, Water* (Wiley), 42,1 (2014) 64-70 (Impact Factor: 2.56).**

P. Rajesh Prasanna1, P. Selvamani2 and E.Gomathi* , Waste Water Treatment through Dendrimer – Conjugated Magnetic Nanoparticles, International Journal of Chem Tech Research.Vol.5, 2014, 1239 – 1245.

K.Kumaraguru, P.Sureshkumar (2014) "Kinetics, Modeling, Thermodynamic Analysis and Optimization of Biosorption Parameters for Biomass of Sargassum Wighiti using Response Surface Methodology" International Journal of ChemTech Research, Vol. 6. Number 5. 3040-3052. issn : 0974-4290, SAI SCIENTIFIC COMMUNICATIONS publisher:SPHINIX KNOWLEDGE HOUSE

- Sundaresan Mohanraj, Shanmugam Kodhaiyolii, **Mookan Rengasamy** and Velan Pugalenthi, “Phytosynthesized iron oxide nanoparticles and ferrous iron on fermentative hydrogen production using Enterobacter cloacae: Evaluation and comparison of the effects”, International Journal of Hydrogen Energy, Vol.39, August 2014.

- Saravanan KK , **Stalin N** 2015,” Design of three Phase Fifteen level Cascaded Multilevel Inverter using Embedded Controller”, International Journal of Applied Engineering Research (Anna University recommended Journal: Annexure-II, Version 2014.2), ISSN 0973-4562 vol.10 no.72 pp.437-443

- **N. Jaya** & B. Karpanai Selvan, Comparative Study on Kinetic Parameters for Tranesterification of Pongamia and Cotton Seed Oil. International Journal of ChemTech Research. 6(10) (2014) 4475-4479, H Index: 17, ISSN NO: 0974- 4290.

- **M.Arulmozhi**, K.M.Meera S.Begum, N.Anantharaman “Continuous foam fractionation of Chromium (VI) ions from aqueous and Industrial Effluents”, Desalination and Water Treatment, Taylor and Francis Journal, 1 -11. (Impact Factor:1.173

Students awards and achievements


ESTABLISHED 1947

VICAL AWARD FOR STUDENTS' ACTIVITIES

FOR

THE BEST STUDENT'S PAPER PRESENTATION DURING THE PREVIOUS SCHEMCON

SECOND PRIZE

For the Year

2014

Presented to

E Titus Praveen Kumar

the 27th December, 2014

Ch V Ramachandr

Our final year student E Titus Praveen Kumar has been awarded The best student's paper presentation in vical awards for students activities

Mini Bytes

Total daily oil consumption around the world is 84,249,000 barrels/day.

Phenol and Cumene are used to create a substance that is essential for manufacturing penicillin (an extremely important antibiotic) and aspirin.

Industry interaction/internship

STUDENTS PARTICIPATED	INDUSTRY
Hemalatha M, Saravanakumar G, Sivashankar R, Suriya K P, Vijay Selvaraj N, Karthik Raj T, Murugesan M	Chennai Petroleum corporations Ltd
Dinesh K, Karthick R, Rathinavel T K, Subramani R, Titus Praveen Kumar E	Cetex Petrochemicals Ltd
Antodavid J, Aravind Manickam P, Deenadhayalan S	MRPL
Mohamed Haneef S, Sivabalan C	Kothari Petrochemicals Ltd
Karuppiah Vignesh, Mohanraj K, Santhosh V	Asian Paints Ltd Penta Division
Moovendhan K, Sakthi C, Siva Prathap K, Sivaram S, Vignesh S, Vijayaraj J, Vanaraj M	The Fertilizers and Chemicals Travancore LTD
Dinesh R, Kishore Kumar, Nithin B	Travancore – Cochin Chemicals Ltd
JeyaSuriya V, Malathi A, Sajeetha Begum R, Venkadesh D	Trichy distilleries and Chemicals limted

Students Participation in symposiums

Student's Name	Participated Symposiums
K.Bhuvaneshwari	Schemcon,
V.Boobalan	Schemcon,
A.Gangadharan	Syllogic
G.Gowtham	Schemcon,syllogic
R.priyadharshini	Prospect,peconova
R.Sandeep kumar	Syllogic, ,peconova, ZEALICHE 2015, Technical Symposium
S.sanjeevi	Syllogic, ZEALICHE 2015, Technical Symposium
D.vinoth	Syllogic, ZEALICHE 2015, Technical Symposium .
T.Balaji Muthumanickam	ZEALICHE 2015, Technical Symposium

ALUMNI ARENA

NAME : LAKSHMIPATHI SAKTHI
YEAR PASSED : 2009
DESIGNATION : PRODUCTION ENGINEER, TNPL

NAME : MOHAMMED IMAMUDDEEN R
YEAR PASSED : 2012
DESIGNATION : PROCESS MANAGER, CHEMFAB ALKALIS LTD

NAME : MOHAMED AZARUDEEN M
YEAR PASSED : 2012
DESIGNATION : ASSISTANT MANAGER, HALDIA PETROCHEMICALS

NAME : SANTHOSH KUMAR
YEAR PASSED : 2010
DESIGNATION : FLUOR INDUSTRIES

NAME : PRABHAGARAN K
YEAR PASSED : 2012
DESIGNATION : QA EXECUTIVE SICGIL INDUSTRIAL GASES

Photos of Convocation held on 2015

Alumni meet 2015 (2010-2014 batch)


DEPARTMENT OF PETROCHEMICAL

Save water !
Save energy !
Save future !