

# द्विवार्षिक प्रतिवेदन BIENNIAL REPORT



Creating future fuels

2006-2008

भारतीय पेट्रोलियम संस्थान, देहरादून  
Indian Institute of Petroleum, Dehradun



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# प्रा क् क थ ब 2006-08



वर्ष 2006-08 के दौरान अपने संस्थान के कार्य का प्रतिवेदन आपके समक्ष रखते हुए मुझे बड़ा हर्ष है। इस अवधि में कुछ युगान्तरकारी उपलब्धियाँ हुई हैं और ऐसी नव-पीढ़ी प्रौद्योगिकियों के विकास की स्पष्ट दिशा मिली है जिनका कार्बन दुष्प्रभाव क्षेत्र कम है और ऊर्जा-दक्षता उच्च है।

यह अवधि नए अंतर्राष्ट्रीय संबंधों के साथ ही भापेस की प्रौद्योगिकियों के विदेशों में हस्तांतरण की दिशा में प्रथम बार वास्तविक प्रयासों के श्रीगणेश और सुदृढ़ीकरण की भी साक्षी रही है। आइए, मैं आपको कुछ सफल प्रयासों की जानकारी दे दूँ।

प्रमुख सीमा-भेदक अन्वेषण हाइड्रोविगंधकन विकल्प हेतु प्रौद्योगिकियों के विकास के रूप में था। डीज़ल के ऑक्सीकारी विगंधकन, जैव-विगंधकन और साथ ही गैसोलीन के अधिशोषण विगंधकन हेतु प्रौद्योगिकी विकसित करने की दिशा में उल्लेखनीय प्रगति हुई है। इसके साथ ही, हमने डीज़ल के परा-गहन विगंधकन हेतु एक नए उत्प्रेरक का भी विकास किया है।

आपसी संबंधों के क्षेत्र में हमने 'उच्च प्रौद्योगिकी केंद्र' के निधिपोषण से दो नई परियोजनाओं का श्रीगणेश किया, जिनके नाम हैं- C6+ समावयवीकरण तथा आइसो-ब्यूटेन का एल्किलन।

गिलसॉल से प्रोपेन-डाइऑल ईथरों के उत्पादन हेतु विभिन्न प्रवाहों में मान-वर्द्धन करने पर संस्थान का सदैव ही विशेष बल रहा है। देहरादून के ग्रामीण क्षेत्रों में अपनी ऊर्जा-दक्ष गुड़ भट्टियों के लोकप्रतिकरण पर हम अपना कार्य जारी रखे हुए हैं।

जहाँ हम एसआइएनटीईएफ, नॉर्वे के साथ अधिशोषी विगंधकन के क्षेत्र में अपना कार्य जारी रखे हुए हैं, वहीं हमने एसएबीआइसी, यू के को हस्तांतरित करने के लिए ऋजु-धाव नैफथा से शुद्ध ऐरोमैटिकों की पुनर्प्राप्ति के लिए एक प्रौद्योगिकी भी विकसित कर ली है। एक अन्य उपलब्धि है, सऊदी अरब के एक ग्राहक हेतु प्रयुक्त ल्यूब तेल के पुनः परिष्करण हेतु प्रौद्योगिकी का विकास।

यह अवधि 11वीं पंचवर्षीय योजना के प्रारंभ की भी साक्षी रही। एक विशिष्ट 'सुप्रा इंस्टीट्यूशनल प्रॉजेक्ट' जिसका शीर्षक था, 'जैव मात्रा के ईंधनों, स्नेहकों व योज्यों में पर्यावरण-स्नेही रूपांतरण और प्रयोग हेतु सूत्ररूप (तकनीकी) जानकारी वाली प्रौद्योगिकी का विकास करना', इस अवधि में प्रारंभ हुआ। इस परियोजना की 20 उप-परियोजनाएँ हैं जिनमें जैव-अर्थव्यवस्था को भविष्य में सफल बनाने के लिए अपेक्षित सभी पहलू सम्मिलित हैं। संस्थान ने कई पुरस्कार जीते, जिनमें प्रमुख हैं : 2006 का 'सीएसआइआर प्रौद्योगिकी पुरस्कार' व 'नवोन्मेष (नवाचार) हेतु प्रथम सीएसआइआर प्रौद्योगिकी पुरस्कार 2007'। कई समझौता-ज्ञापनों पर हस्ताक्षर किए गए, जिनमें सर्वाधिक उल्लेखनीय है, नोएडा में 'ईंधन परीक्षण प्रयोगशाला' का प्रबंधन। आपको यह जानकर प्रसन्नता होगी कि पेट्रोलियम एवं प्राकृतिक गैस मंत्रालय ने अब भापेस को इस प्रयोगशाला के स्थाई प्रचालन का उत्तरदायित्व सौंप दिया है। हम तेल उद्योग के कार्मिकों को पेट्रोलियम परिष्करण के क्षेत्र में ही नहीं, अपितु तेल उद्योग से जुड़े कई क्षेत्रों में भी प्रशिक्षण देते आ रहे हैं।

अंत में मैं यह भी कहना चाहूँगा कि इस अवधि में फुटकर बिक्री केंद्रों (RO's) में गैसोलीन की हानियों के अध्ययन पर प्रारंभिक कार्य भी संपन्न हुआ। देश के चारों कोनों में स्थित 200 से अधिक फुटकर बिक्री केंद्रों को सम्मिलित करते हुए ग्रीष्म व शीत दोनों ऋतुओं में एक बहुत ही विस्तृत अध्ययन किया गया, और प्रस्तुत किया गया प्रतिवेदन अगले कई आने वाले वर्षों तक अपनी तरह का एक अनूठा प्रतिवेदन होगा।

मैं अपने अंशधारकों और इस संस्थान के शुभचिंतकों का भी धन्यवाद करूँगा जिनकी अंतर्दृष्टि से हमें नई-नई ऊँचाइयाँ छूने की अभिप्रेरणा मिली है। यह नकारा नहीं जा सकता कि यह सब संस्थान के सभी लोगों की सहायता और अवलंब के बिना संभव न होता। इस हेतु मैं सभी के प्रति अपनी प्रशंसा और उनका आभार व्यक्त करता हूँ।

*Madhukar*

(डॉ० मधुकर ओंकारनाथ गर्ग)

निदेशक



# FOR RE FE W O R D 2006-08



It is a great pleasure to bring to you the work report of our Institute during the period 2006-2008. This period has seen some landmark achievements and a clear direction for developing new-generation technologies, which have low carbon footprint and high energy-efficiency. This period also saw the consolidation and initiation of new international relationships as well as for the first time sincere attempts to transfer IIP technologies abroad. Let me mention a few success stories.

The major breakthrough was in terms of developing technologies for desulphurization alternative to hydrodesulphurization. Significant progresses have been made for developing technology for oxidative desulphurization of diesel, bio-desulphurization as well as adsorption desulphurization of gasoline. Further, we also developed a new catalyst for ultra-deep desulphurization of diesel.

In the liaison area we initiated two new projects with the funding of CHT namely : C6+ isomerization and alkylation of iso-butane.

Value addition to various streams has always been a strong focus of the Institute for production of propane-diol ethers from glycerol. We continue our work on popularizing our energy-efficient *gur bhattis* in the rural areas of Dehradun.

While we continue to work with the SINTEF, Norway in the area of adsorptive desulphurization, we have also developed a technology for transfer to the SABIC, UK to recover pure aromatics from straight-run naphtha. Another achievement is the development of technology for a client in Saudi Arabia for re-refining of used lube oil.

The period saw the beginning of the 11th Five Year Plan. A specialization Supra Institutional Project (SIP) entitled "*To develop know-how technology for environment-friendly conversion and utilization of bio-mass to fuels and additives*" was initiated. This project has 20 sub-projects encompassing all the aspects required to make bio-economy a success in the future. The Institute won several awards, major ones being the CSIR Technology Award of 2006 and the first CSIR Technology Award for Innovation 2007. Several MoU's were signed out of which the most outstanding is the management of the Fuel Testing Laboratory in NOIDA. You will be happy to know that the Ministry of Petroleum & Natural Gas has now given a perpetual operation of this laboratory to the IIP. We continue to train the oil industry personnel not only in petroleum refining but also in many areas related to the oil industry.

Finally, I would like to add that this period saw the completion of a seminal work on studying losses of gasoline in Retail Outlets (RO's). A very comprehensive study involving more than 200 Retail Outlets across the length and breadth of the country, both in summer and winter, was carried out and the report submitted would be the only one of its kind for many years to come.

I must thank my stake-holders and well-wishers of this Institute, whose instinct has motivated us to attain greater heights. Of course, this would not have been possible without the help and support of one and all in the Institute for which I would like to put on record my appreciation and gratitude.

(Dr Madhukar Omkarnath Garg)  
Director

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1

Contribution to  
Science &  
Technology



## 1.1 SEPARATION PROCESSES

### 1.1.1 Aromatics Extraction Area

#### Development of process for oxidative desulphurization of diesel

The commonly used deep hydrodesulphurization process has inherent problems like high capital and operational cost, high energy requirements and limitations of the catalyst to desulphurize sulphur species like 4, 6- dimethyldibenzothiophene (4,6-DMDBT). Owing to these difficulties, alternative methods like oxidative desulphurization, bio-desulphurization, liquid-liquid extraction and selective adsorption are being investigated worldwide for desulphurization of diesel fuel. Among the alternative methods, oxidative desulphurization approach has drawn worldwide attention due to its simple operation and being highly selective for the removal of 4-MDBT and 4,6-DMDBT, thereby yielding ultra-low sulphur diesel with sulphur content below 10 ppm.

Two processes for reducing the sulphur contents of diesel from the initial level of 500 ppm to ultra low-levels, that is, below 15 ppm, have been developed. In these processes the sulphur compounds are oxidized to sulphones or sulphoxide using carboxylic acid and active oxygen-bearing species and organic hydroperoxides, which in turn are removed by extraction with NMP anti-solvent mixture or by adsorption.

#### Production of aromatics from typical straight-run naphtha

Aromatic hydrocarbons are traditionally produced by the catalytic reforming of naphtha, followed by their separation by liquid-liquid extraction and extractive distillation. IIP, in collaboration with EIL, has developed extraction processes and commercialized them in BPCL, Mumbai and KRL, Kochi for production of benzene & toluene using sulpholane solvent.

Development of process for production of pure aromatics from straight-run naphtha poses challenges such as removal of impurities like close-boiling naphthenes & olefins from feed-stocks containing high

naphthenes and low aromatics contents. Innovative approach has been suggested to use a combination of anti-solvent low light paraffin stream and high aromatic stream to knock out the naphthenes and achieve the desired purity, making the production of pure BTX from straight-run naphtha feasible. It will be further beneficial to the units having naphtha cracker as it improves cracking performance.

### 1.1.2 Adsorption and Membranes

#### Sulphur reduction in naphtha product obtained from FCC gasoline

Under a joint research project with SINTEF Materials and Chemistry, Oslo under Indo-Norwegian Programme of Institutional Co-operation, a vapour phase adsorption process for desulphurization of FCC gasoline has been developed.

Using the combinatorial chemistry, screening of the adsorbents was done by SINTEF and the most promising adsorbents were tested at IIP in high pressure and high temperature adsorption unit. The best adsorbents were able to selectively remove the benzothiophene and alkylated benzothiophene from FCC naphtha which are not removed in the conventional hydrodesulphurization processes. The process developed will produce ultra-low sulphur naphtha of <30 ppm sulphur with minimum octane loss. A basic engineering process package has been prepared for an Indian Refinery. Commercialization of this technology will have both economic as well as environmental benefits.

### 1.1.3 Gas Separation Area

The group has been engaged in the development of technologies for removal or recovery of harmful gases like SO<sub>2</sub>, H<sub>2</sub>S and CO<sub>2</sub> from flue gas streams by absorption in solvents.

#### Selective absorption of SO<sub>2</sub> from flue gas streams

Under a project taken up with EIL as the industrial partner and sponsored by CHT, a regenerative process has been developed for selective absorption of SO<sub>2</sub> from flue gas streams. Numaligarh Refineries Ltd. is likely to implement this technology.



*GC facility for analyzing gas streams*

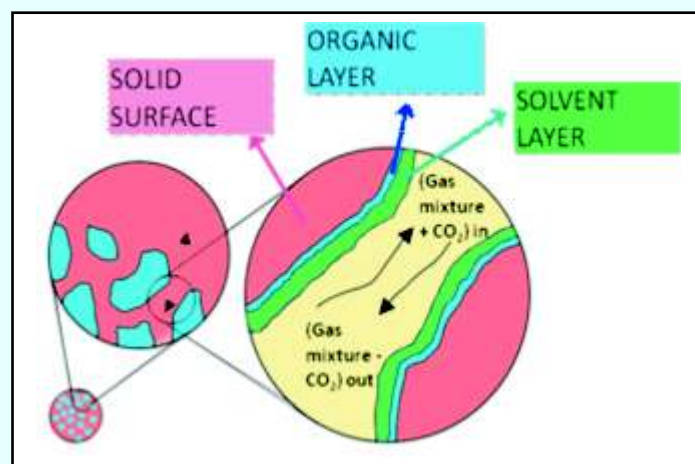
Due to high removal rates, absorption-based gas separations are the most preferred routes for high concentration of the active component systems. However, corrosion, liquid pumping, make-up solutions and solvent losses are operational problems associated with this. To overcome these problems, the use of solids with the absorbing liquids was explored under 'CSIR Network Project on Waste Minimization'. Effect of solids on the rate of absorption and regeneration has been studied.

Studies were also conducted for identification of an effective solvent for CO<sub>2</sub> recovery from flue gas streams. Absorption-regeneration data with various solvents and



*Pilot plant for gas desulphurization studies*

mixtures using solids has been generated. Based on this, a solvent will be finalized, taking into account its economic and environmental aspects.



*Structure of supported liquid phases*

#### 1.1.4 Lubes & Wax Area

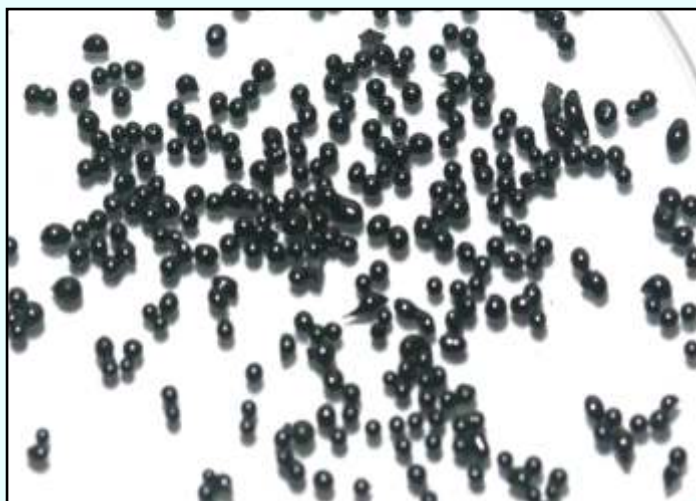
Several technologies developed in the area of lubes, wax and carbon materials have been transferred to the industry. The group has linkages and collaborations with national and international industries.

##### Preparation of carbon spheres from petroleum pitch precursor

Under a project sponsored by the DRDO a process has been developed to prepare perfect spherical beads from petroleum pitches of desired diameter between 0.6-1.2 mm. These pitch beads are to be used as adsorbents for making activated carbon spheres for applications in chemical and biological protective garments for defence personnel. The process uses spraying method.

##### Optimization of NMP extraction unit

Studies for process optimization and process integration of an NMP extraction unit of one of the Indian refineries have been undertaken by carrying out simulated runs under varied conditions and further applying 'pinch analysis' with the objective of reduction in utility consumption through 'process integration'. The suggested process modifications are likely to lead to energy saving of over 20% without any hardware changes.



*Pitch spheres of 0.6- 1.2 mm size*

### Re-refining of used oils

A study on re-refining of used oil has been taken up for a USA-based firm to produce Group-II base oils having saturates >90% and sulphur content <300 ppm with viscosity index (VI) 80-120. This is being attempted through NMP extraction approach.

### Studies of Motor Spirit (MS) stock losses at company-owned as well as company-operated retail outlets

A task was assigned by the Ministry of Petroleum & Natural Gas (MoPNG), sponsored by the Oil Industry Development Board of India, to collect actual MS stock loss data from a large number of retail outlets at different locations during summer & winter months. Studies involved estimation of stock-losses using theoretical models available for comparison and lab-scale studies

under simulated conditions using miniature underground storage tank.

## 1.2 CATALYST & CONVERSION PROCESSES

### 1.2.1 Hydroprocessing

#### Development of catalyst for ultra-deep desulphurization of diesel

In order to keep pace with the world scenario, India formulated a plan for sulphur specifications for diesel from 2005 onwards as shown in the table below:

To meet the specifications of sulphur in diesel as required under Bharat Stage (BS) IV, the Institute initiated work to develop indigenous catalyst for ultra-deep desulphurization of gas-oil to produce diesel having sulphur content of 50 ppm or lower. The financial assistance for this project was provided by the Centre for High Technology (CHT), New Delhi.

A catalyst, namely UD-25, of CoNiMo/Alumina-Zeolite type has been developed which can reduce sulphur content of a refractory straight-run gas oil from initial ~2000 ppm to 50 ppm.

Commercialization of the catalyst would enable a refiner to produce diesel meeting BS IV norms.

### 1.2.2 Sweetening

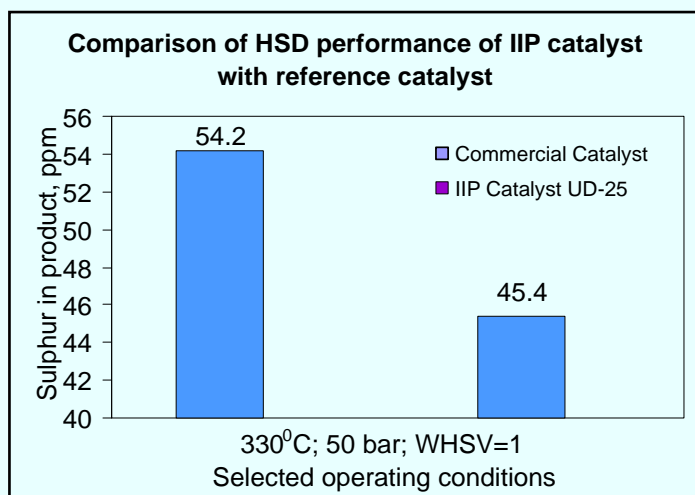
#### Development and commercialization of sweetening catalysts

The presence of mercaptans in petroleum products like

### Sulphur Specifications for diesel in India

	Upto 2005		2005 Onwards		2010 Onwards	
	Metros	Rest of the country	Metros	Rest of the county	Metros	Rest of the county
	Euro-II		Euro-III	Euro-II	Euro-IV	Euro-III
Sulphur, ppm	500	2500	350	500	50	350





LPG, naphtha, gasoline, kerosene, ATF etc is highly undesirable due to their foul odour and highly corrosive nature. In addition, these poison the catalysts used in secondary refining processes. Reduction of mercaptan content in petroleum products is called sweetening.

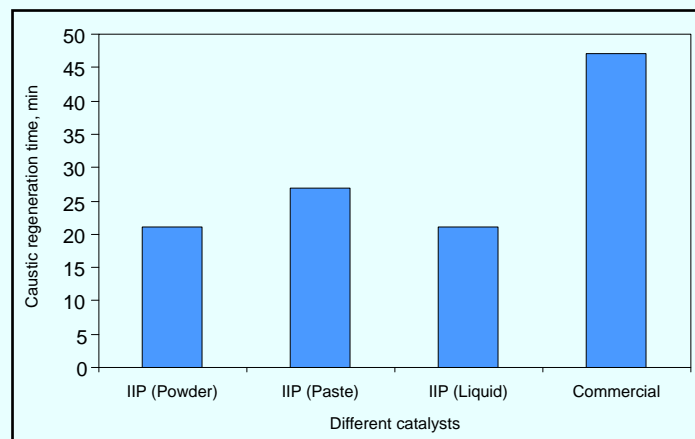
Under a project sponsored by BPCL, IIP developed two catalysts in powder form, one named as Thoxcat ES for extractive or liquid-liquid sweetening of lighter petroleum fractions like LPG, light straight-run naphtha etc. and other for fixed-bed sweetening of heavier petroleum fractions like FCC gasoline, kerosene, ATF.

A method for conversion of formulation of Thoxcat ES from powder to liquid form has now been developed. Activity and stability of liquid form of this catalyst was found the same as that of its powder form. The process for synthesis of Thoxcat ES catalyst was further modified by reducing some steps like drying, grinding etc to make liquid formulation directly without preparing powder form. Activity and stability of liquid form of catalyst was found comparable to the solid catalyst.

One short trial run with the paste form of this catalyst and a commercial trial run of eight months' duration of liquid form of Thoxcat ES catalyst was conducted at LPG Merox units at RIL, Jamnagar. In this unit, the feed was a mixture of 15-20% Coker LPG and 85-80% FCC LPG containing very high mercaptan content.

Time needed for total mercaptans conversion to disulphide, i.e., caustic regeneration for powder, paste

and liquid forms of IIP-BPCL catalyst and that of commercial catalyst confirmed that IIP-BPCL catalyst is



*Comparative performance of various forms of IIP catalyst vs commercial catalyst in caustic regeneration*

more active than the commercial catalyst. Catalysts were also found to have comparable stability.

### 1.2.3 Catalytic reforming

Naphtha reforming, isomerization and alkylation are the major areas of petroleum refining sector. The Institute has made a remarkable breakthrough in the development of indigenous reforming catalysts such as Pt-Re bi-metallic balanced reforming catalyst, designated as IPR-2001 and commercialized at CPCL, Chennai and subsequently at IPCL, Vadodara.

#### Selective oxidation of light alkanes

Under a CSIR Network Project, a zeolite-based catalyst was developed for the selective oxidation of light alkanes, especially propene and propane. The catalyst exhibited 88% selectivity to acrolein in selective oxidation of propene. Chemical anchoring of the  $\text{Re}_6\text{O}_{13}$  nano-clusters with the ZSM-5 pore channels increased the stability of rhenium even at selective oxidation conditions. The catalyst was also found active for the reactions such as benzene to phenol.

#### Solid acid catalyst for alkylation of iso-butane with alkenes to form alkylates as gasoline blend

Under a project sponsored by the CHT, New Delhi, studies were undertaken to develop zeolite-based solid

acid catalyst such as FAU (Faujasite) and BEA (beta) zeolites. These are environment-friendly materials and can replace the liquid acid catalysts for conversion of iso-butane and light olefins, such as butenes, pentenes and the mixed feed-stocks containing these components, for production of high-octane alkylates suitable for gasoline blending.

Several catalyst formulations by varying zeolite type, acidity and binders are being prepared, characterized and evaluated.

#### Isomerization of C<sub>7+</sub> hydrocarbons with industrial feed-stock

A zeolite-based catalyst for isomerization of C<sub>7+</sub> paraffin hydrocarbons in the industrial pre-treated feedstock to have a suitable product for gasoline pool is being developed under a CHT, New Delhi-sponsored project.

Various catalyst formulations are being characterized and evaluated for their performance for isomerization reaction.

#### Production of ethers from glycerol

This Supra-Institutional Project involves a study aimed at the catalytic conversion of glycerol, a major by-product of bio-diesel production, into ethers. Among the ethers, the di- and tri-ethers gain importance due to their oxygenating efficiency, miscibility and diesel blending capacity. The study aimed to develop a solid acid catalyst using resins or zeolites as base material. Mesopore

materials are expected to increase the concentration of di- and tri-ethers in the product. Studies are in progress.

#### 1.2.4 Light stocks processing

##### Development of Gas to Liquid (GTL) technologies for DME and Fischer-Tropsch fuels

While crude oil reserves are depleting, natural gas reserves are increasing enormously. Much of this gas is either available at remote locations or is flared. Conversion of gas to liquid fuels is an alternative proposition to produce sulphur-free, clean fuels.

Networking with the NCL, Pune and the CFRI, Dhanbad under a CSIR Network Project, studies were conducted to develop a catalyst and technology for Fischer-Tropsch (FT) fuels as well as Dimethyl Ether (DME) as a substitute of diesel. Cu-Zn supported catalysts (34 recipes) for FT synthesis and Cu-Zn supported catalyst for DME synthesis from syn gas were prepared and evaluated in high-pressure fixed-bed reactor. C<sub>5+</sub> liquids selective to middle distillates were obtained at 50 hrs and paraffin wax was obtained at a higher TOS. FT synthesis liquid had Cetane No. 11 and contained 99% non-aromatic hydrocarbons.

This work demonstrated the possibility of converting syn gas to middle distillates over promoted and un-promoted Co-based FT catalysts.

##### Non-oxidative conversion of methane to ethylene

Non-oxidative conversion of methane is a relatively new

Table : FT synthesis studies on cobalt-supported catalaysts:

Catalyst	CO conv%	C <sub>1-4</sub> sel%	C <sub>5+</sub>	CO <sub>2</sub>
FTS 16a	67	24	68	8
FTS 16b	74	18	77	5
FTS 16c	70	20	72	8
Co/SBA-15	52	28	59	13
Fe/HMS	25	40	50	10



*FT synthesis paraffin wax obtained from syn gas*

and feasible idea for effective use of abundantly available methane resources for making valuable chemicals/liquid fuels. Natural gas is being considered as an alternative source for petrochemical feedstocks in view of declining crude oil reserves. However, methane being the most stable and symmetric organic molecule, its activation and conversion to higher molecules is a challenging task.

For conversion of methane to ethylene in absence of oxygen, several catalyst recipes viz. metal carbides-promoted ZSM-5, phosphotungstic acid-impregnated zirconia, silicotungstic acid- and silicomolybdic acid-promoted zirconia were prepared and characterized by XRD, FTIR & thermal analysis for surface area, acid sites and redox sites. Molybdenum carbide-supported HZSM-5 catalysts exhibited formation of benzene with 80% selectivity at 6.7% methane conversion on 12-hour TOS. Carburization of 2% Mo/HZSM-5 having Si/Al ratio of 175 exhibited higher (20%) selectivity to ethylene at methane conversion of 6% than Si/Al ratio of 40 of HZSM-5. Studies are under progress to maximize the aromatics from methane over metal carbides promoted ZSM-5 catalysts.

### 1.3 CHEMICAL AND BIO-SCIENCES

#### 1.3.1 Synthetic & Applied Chemistry

##### Direct hydroxylation of benzene and its derivatives

Hydroxyaromatic compounds like phenol, cresols &



methoxy phenols are important intermediates in chemical industries. For production of phenol, the Cumene process used at present is a three-step process and has disadvantages of lower conversion and formation of acetone as an inevitable side product.

A novel methodology has been developed for the hydroxylation of benzene to phenol, toluene to cresols and anisole to methoxy phenols by using hydrogen peroxide as environmentally benign oxidant, vanadyl tetraphenoxypthalocyanine as a heterogeneous recyclable catalyst and acetonitrile as solvent under mild conditions. The product yields are significantly high, 41.5% conversion of benzene to phenol with 100% selectivity for phenol.

##### Studies on transition metal-mediated organic transformation

Development of green synthetic methodologies which involve the replacement of conventional processes by atom-efficient catalytic methodologies, use of non-volatile, recyclable green solvents as reaction media for carrying out reactions under solvent-free condition, has become an area of tremendous importance in recent years. We have developed several new synthetic methodologies mainly for oxidation of various substrates using  $O_2$ ,  $H_2O_2$ , solid peroxides like UHP and TBHP as oxidants, C-C/C-N bond formation such as olefination of aldehydes with ethyl diazoacetate, cyclopropanation,



imidation and aziridination of alkenes by using conventional, ionic liquids, and PEG as reaction media.

### 1.3.2 Speciality Additives

Additives are an integral part of petroleum industries. These are complex synthetic chemicals, which are added to petroleum fuels and lubricants for upgradation of their performance in different end uses. Some of them are speciality polymers which are used as viscosity index improvers in lube oil and cold-flow property improvers for lube oils and diesel fuels with varied microstructures. Recently, due to reduction in sulphur and aromatic content of fuels and lubricants, the cold flow improver additives are not functioning up to the mark. A better understanding of the mechanism by which these polymers modify the wax structures is required to develop new-generation cold flow improver additives for diesel with new specifications including its blends with biodiesel.

#### Cold Filter Plugging Point (CFPP) additive

CFPP additive modifies the size and shape of the crystal and facilitates it to pass through 45 m standard filters at lower temperature. These semicrystalline polymers have the capacity to self-assemble in diesel and their effectiveness varies with diesel composition. CFPP additive for low-sulphur diesel fuels has been developed at laboratory scale.

#### Development of polymeric wax crystal modifier as dewaxing aid for lube oil base stocks

Polymers used in separation of paraffins from oils change the kinetics of nucleation of paraffins and delay the crystallization, while some change both the morphology and the granulometry of the paraffin crystals, making the filtration of paraffins easier.

These types of additives have been formulated or synthesized and commercialized.

#### Development of speciality polymer for oil industries

Under the CSIR Network Project, by participating with the NCL-Pune and the RRL-Jorhat, speciality polymers have been developed for wax crystal modification in crude oil and different petroleum products to improve

flow property in cold weather, including polymeric pour point depressant additives for crude oil and lube oil.

### 1.3.3 Speciality Products

#### Development of biodegradable lubricants from vegetable oils, sugars, starch and cellulose

Efforts were made for development of eco-friendly lubricants, additives and fuels. Studies were carried out to chemically modify various vegetable oils such as neem, karanja, rice bran, castor, mahua etc. into biodegradable lubricants. The chemical modifications included acylation, epoxidation and trans-esterification.

The modified vegetable oil base stocks were characterized and evaluated after mixing with commercial lube oil additive pack or the additive pack developed at IIP.

The products prepared from these vegetable oils were found to be fairly biodegradable and can be used as two-stroke engine oils, hydraulic oils, transformer oils, gear oils, metal working cutting oils etc.

### 1.3.4 Speciality chemicals and biomass conversion

This Group is working in the area of bio-fuels with special emphasis on bio-diesel from non-edible oils and greases for high-temperature applications such as in the cement & steel industries.

#### Bio-diesel production from *Jatropha* oil and its study on vehicles including field trials

For development of a process for production of bio-diesel from totally renewable resources i.e. *Jatropha curcas* oil and ethanol, studies were undertaken to optimize the parameters for ethyl ester production. By using the process thus developed, bulk samples of ethyl ester of *Jatropha* oil were prepared for field trials & engine performance evaluation.

#### Bio-diesel production from low-cost feed-stocks

Use of low-cost feed-stocks such as waste frying oils and non-edible oils is expected to make bio-diesel competitive in price with petroleum diesel. Therefore, studies were undertaken to explore the possibility for

utilization of waste cooking oil and restaurant grease for production of bio-diesel. The samples of waste cooking oil and oily layer (restaurant grease) of effluent treatment plants of different hotels were collected. Trans-esterification reactions for these samples are being optimized for production of bio-diesel.

### Value-addition of glycerol

Anticipating the availability of glycerol as a by-product of bio-diesel process to be in large quantities in future, studies for conversion of glycerol to high-value products such as 1,2 and 1,3 propane-diol were initiated. Laboratory-scale unit for dehydration of glycerol was set up and studies were carried out with different feed ratios of glycerol to different reaction temperatures. The diols obtained as crude products were dehydrated and distilled under vacuum and they are being characterized.

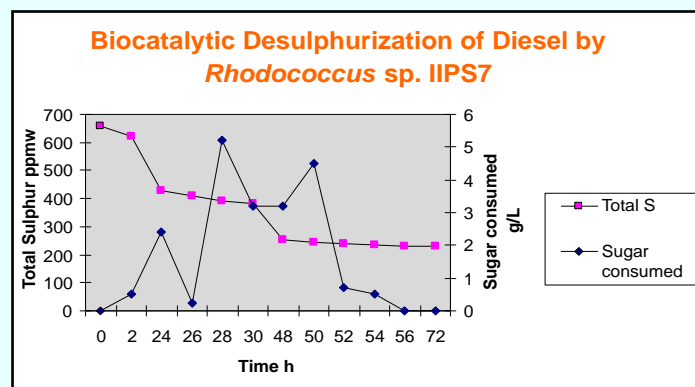
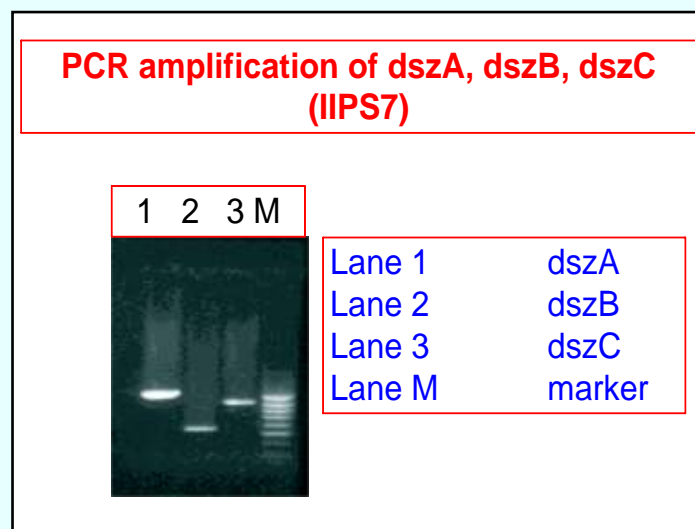
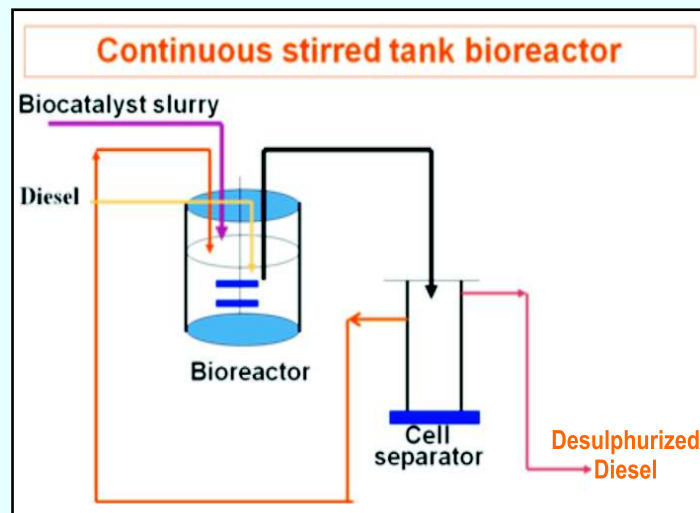
### 1.3.5 Bio-Technology

#### Bio-catalytic desulphurization of diesel

Bio-catalytic desulphurization is an alternative biotechnology-based process for reduction of sulphur in fossil fuels which exploits the versatility of certain bacterial strains to selectively desulphurize the sulphur compounds that are recalcitrant to conventional HDS process. The understanding of enzymology and genetics of metabolic pathways involved in desulphurization by these microbes has made it possible to genetically engineer them, so as to amplify the specific activity and stability of enzymes responsible for desulphurization. Bio-desulphurization process is environmentally benign which projects lower capital and operational cost in comparison to HDS process.

A process using indigenously isolated bacterial strain, *Rhodococcus* sp. IIPS7 (MTCC 5313), which showed desulphurization of model compounds like DBT, 4,6DMDBT and other alkylated DBTs present in diesel by 4-S metabolic pathway, has been developed. Almost 50% of sulphur present in the diesel feed could be removed by the continuous CSTR process within 12 hrs using wild type resting cells of *Rhodococcus* sp. IIPS7. The operon of desulphurizing genes (dsz ABC) of the strain has been cloned in *E.coli* and further modification for expression

of the operon in a suitable host is required to enhance the rate of desulphurization.



### Conversion of bio-mass to ethanol by thermophiles

Recent escalation of crude oil price has prompted major R&D effort on bio-ethanol production from agricultural waste globally. Bio-conversion of biomass to liquid fuels through saccharification and fermentation is projected as a sustainable eco-friendly process.

Multiple feedstocks such as sugarcane bagasse and cassava roots were hydrolysed under a project to hexose and pentose sugars using acid treatment and acid resistant thermozymes such as cellulose, xylanase and amylase at high temperature. The mixed sugars in biomass hydrolysate were fermented to ethanol at as high as 50°C by thermophilic yeast *Kluveromyces* sp. IPE453 under continuous fermentation process. Overall yield of ethanol obtained is 40% and 45% on sugars obtained from bagasse and cassava roots respectively. Further studies are in progress to increase yield and productivity of ethanol from biomass.

## 1.4 RESIDUE CONVERSION

### 1.4.1 Propane Deasphalting

#### Supercritical solvent recovery in propane deasphalting technology

Under a project sponsored by the CHT, IIP, EIL and HPCL worked together for up-gradation of IIP-EIL PDA technology for producing high-viscosity lube base-stock from vacuum residues. The supercritical PDA technology has so far been a proprietary technology of multinational companies.

The know-how for supercritical solvent recovery in place of conventional methods has been successfully developed and demonstrated on the PDA plant of HPCL, Mumbai. The modified IIP-EIL PDA technology involving supercritical solvent recovery is highly energy-efficient. Attempts are on to implement this at two Indian refineries having PDA units using conventional solvent recovery process.

### 1.4.2 Bitumen

#### Studies for making bitumen from petroleum pitch

Under sponsorship from PII, Mumbai, the Bahrain pitch

lying in open pond since the World War-II was converted to bitumen meeting the desired specifications (BIS, IRC and SHRP, PG Specs, USA). The study involved use of polymers to make the desired bitumen product. Studies were also carried out to make fuel oil from the pitch. The developed fuel oil meets the requirement as per BIS. The PII is pursuing this development for value addition to the pitch for their client.

#### Improved quality bitumen using low-value streams as feedstock

The studies were conducted under the CSIR Network Project for making a feedstock of the desired chemical composition through blending of various low-value streams, available at refineries. A process to convert this feedstock by air-blowing under pre-established process parameters to improved quality, multigrade bitumen was developed. The bitumen is being compared against commercial products.

#### Improved/modified quality bitumen through polymer addition and compositional control

The technology of making improved quality bitumen has been developed through the use of various types of polymers. The developed product meets the specifications prevailing in India as well as in USA & Europe. Although the developed product is initially expensive but the cost is offset due to the fact that the frequency of maintenance is reduced to two times inspite of three times within a period of six years and considerable reduction in pavement thickness.

## 1.5 ANALYTICAL SCIENCES

### 1.5.1 Crude oil evaluation

Crude oil evaluation is one of the areas of core competence of the Institute. The crude evaluation data is of immense use in petroleum and related industry for pricing and marketing of crude oils, transportation and absorption of new crude oils in operating refineries and in designing of new refineries or in expansion and modification projects. The crude and product blending strategies are also based on the data provided in crude assays. Detailed evaluation of Natural Gas Liquids (NGLs)



and refinery products such as naphtha helps industry in their processing and value addition.

Samples of crude oils listed below were analyzed:

- Kanwar Field, Gujarat
- Assam Crude Oil from NRL
- Niko Crude oil
- Crude oil sample from Sabarmati Field
- Ankleshwar Crude Oil Crude oil from Assam field
- Crude oil sample from Oil India Ltd., Duliajan (Assam) & Digboi.

Following petroleum products were analyzed

- High Speed Diesel as per IS 140:2005
- Naphtha samples of CPF Gandhar
- Naphtha samples of LPG plant, Ankleshwar.

## 1.6 AUTOMOTIVE FUELS AND LUBRICANTS APPLICATIONS

Effect of gasoline composition (olefins, aromatics and benzene) on exhaust mass emissions from Two-wheelers

Studies on the effect of gasoline compositions like benzene, aromatics, olefins, etc. on exhaust emissions from (new and in-use) 2-wheelers, 2-stroke and 4-stroke vehicles were conducted so as to help the oil industries to formulate their future gasoline quality to meet the stipulated emission norms.

Studies show that isolating the effect of an individual compositional characteristic may be difficult. Higher benzene content in the fuel led to higher benzene in the exhaust. High olefin gasoline resulted in higher CO and lower NOx emissions compared to high aromatic gasoline. The emissions from in-use vehicles were higher than those from new vehicles. It was seen that benzene emissions from in-use, 2-stroke vehicles were very high as compared to new 2-stroke vehicles. This was mainly because the in-use 2-stroke vehicles do not have catalytic converters. The study showed that lowering the benzene content in the fuel would greatly help reduce the exhaust benzene emissions. Multi-functional additives were

seen to be very effective to control in-take system deposits.

Study on the effect of fuel additives on light vehicles for performance and mass emissions

Two additive-doped fuels (Fuel A and Fuel B) supplied by a sponsor were tested and compared with the commercial diesel by using it in three in-use LCVs for performance, emissions and deposit rating of critical engine components.

Performance test on a chassis dynamometer after 0 km and 30,000 km mileage build-up of field trials showed a change in negative power output as compared to that at 0 km.

Fuel economy measured at different speeds under WTO mode showed that additive-doped fuels have improved fuel economy at all speeds (1.5-7.3%). In case of neat diesel, marginal improvement at 40 km/h was observed whereas at 50 and 60 km/h speed, marginal deterioration was seen.

The mass emissions of CO, HC, NOx and PM emissions at initial and final stages showed that for neat HSD, PM is increased by 48% and NOx decreased by 17%. For additive-doped Fuel-B, PM increased by 40% and NOx decreased by 5%. For Fuel-A, PM decreased by 14% and NOx increased by 7%.

## 1.7 TRIBOLOGY

Development of Bio-degradable Girth Gear Lubricant

Open gear drives are common methods of power transmission for rotating equipments. These equipments operate under different environments and operating conditions and require high load-carrying capacity and long service life under severe shock-loading conditions. These characteristics have made open gearing a popular drive for rugged, rotating equipments such as grinding mills, kilns, driers, etc. These equipments are lubricated with girth gear lubricants. In cement plants, generally girth gears are used for crushing raw materials.

Currently, sprayable greases are used for lubrication of girth gears in cement plants. The consumption of these greases is about 500 - 600 metric tonnes p.a., costing

around Rs. 20-30 crores. Moreover, *the entire quantity is imported*. These lubricants are mineral oil-based, are not bio-degradable and, hence, not environment-friendly. On account of environmental concerns and government regulations, these lubricants are in an urgent need of replacement.

An eco-friendly bio-degradable sprayable girth gear lubricant for cement plants has been developed at lab scale. The performance of this product is better than the existing commercial product, specially in load-carrying capacity and performance properties such as damaged load and wear weight loss. The products developed utilize low-value non-edible oil as raw material against imported products, which are based on mineral oils.

## 1.8 INDUSTRIAL & DOMESTIC COMBUSTION

### Evaluation of imported type LPG stoves marketed in the country

It is observed that during recent years the Indian market has been flooded with a number of imported LPG stoves with good aesthetic looks. A project was undertaken to evaluate eight of the selected imported-type LPG stoves marketed in the country, to see if they are suitable for use in Indian conditions and whether they conform to the applicable BIS specifications.

It was found that the thermal efficiency of the stoves ranged from a minimum of 41% to a maximum of 66%. As per BIS, the minimum specified thermal efficiency should be 64% (under revision to 68%). Only two stoves met the minimum thermal efficiency criteria for all the burners.

Normally, the existing indigenous LPG stoves (with the ISI mark) have a minimum of 64% thermal efficiency. Some stoves (green-label) are coming up with still higher thermal efficiency. IIP has also developed a stove with 70% thermal efficiency and its license has been released to some 80 entrepreneurs for commercialization.

### Preliminary combustion performance studies

The oil, burnt as a fuel in the burner officiously, and burner itself, could be fired trouble-free and the smoke

level in exhaust gases was found to be within limits. The estimated excess air was about 100% which could be brought down after stabilization of the furnace conditions.

The burner block coking and the burner choking were not observed during the aforesaid short- duration firing.

### Evaluation of kerosene lamp (round wick) and lantern at IOC (R&D Centre), Faridabad

Performance evaluation of kerosene lamps (round wick) and lanterns as per BIS standards was studied on parameters like mean horizontal luminous intensity (Lux), kerosene consumption rate (gm/h) and lighting efficiency (Cd/gm/h).

### Evaluation of fire-resistant hydraulic fluids, kerosine oil appliances and gas appliances

25 nos. of fire-resistant hydraulic fluids for various oil companies such as BPCL, Balmer Lawrie, Lubrichem, Quaker Chemicals, Fuchs Lubricants as well as pressure stoves, kerosene oil stoves, roti making tawas and LPG stoves, were evaluated on request.

### Improved gur bhatti for rural areas

Gur and khandsari are among the major agro processing industries found in the rural sector of our country. Nearly 50% of total sugarcane produced in the country is used for manufacture of jaggery (gur).

The conventional bhatti comprises of an underground horizontal furnace, made up of ordinary masonry bricks plastered with earth clay that are fabricated by local artisans. The bhatti mainly consists of an underground furnace over which sugarcane juice is boiled off in large boiling pans and the concentrate is cooled and homogenized to produce gur.

The bagasse left over is dried and used as fuel in the furnace. Exhaust gases are released into the atmosphere through a vertical chimney. This practice of gur-making has continued to be adopted for a long time by villagers.

Since the furnace/chimney is not properly designed, a lot of heat is wasted and black smoke is emitted through the

chimney, into the atmosphere. The bagasse consumption, too, is quite high.

The improved bhatti is based on the design popular in Dehradun and nearby areas of U.P. The design of the furnace and the chimney along with the material of construction have been improved upon for optimum combustion of fuel, resulting in about 10% reduction in bagasse consumption and lesser smoke emission through the chimney, besides increase in gur production. The know-how for the improved gur bhatti is available free of cost.

### Popularising energy-efficient *gur bhatti* in the rural areas of Dehradun

Efforts were continued to popularise IIP's improved gur bhatti technology in the rural areas around Dehradun by encouraging the plant owners to modify their chimneys/grating systems and firing platforms by availing financial assistance from the PCRA. About seventeen units have since been modified. This has resulted in a better management of, and increase in, gur (jaggery) production, reduction in pollution besides saving in fuel.



*Improved gur bhatti :  
furnace (above)  
and  
chimney (right)*



2

# Achievements



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- *Effect of Re on product yields and deactivation patterns of naphtha reforming catalyst*, N Viswanadham, R Kamble, Amit Sharma, Manoj Kumar and A K Saxena, *J of Mol Catal A: Chemical*, 282(1-2), 74-79, 2008

### Inclusion of Research Work as a Chapter in a Forthcoming Book

- *NMR Studies of FCC Feeds, Catalysts and Coke* by Babita Behera, S S Ray and I D Singh was accepted for inclusion as a chapter in the book 'Fluid Catalytic Cracking', edited by M L Occelli for publication by M/s Elsevier Publication.



## 2.2 PAPERS PRESENTED IN CONFERENCES

Mexican Congress of Chemical Reaction Engineering (MCCRE – 2006), organized by Instituto Mexicano del Petroleo at Mexico, April 19-21, 2006

- *Reformulation of FCC gasoline*, N Viswanadham, B S Negi and M O Garg

Seventh Tetrahedron Symposium – Challenges in Organic Chemistry, Kyoto, Japan, May 24-26, 2006

- *Highly efficient and selective oxidation of secondary alcohols to ketones under organic solvent and transition metal-free conditions*, Suman L Jain, Vishal B Sharma and Bir Sain

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- *Towards energy economy: nanotubes provide an alternative*, A Shahin, Manoj Srivastava, Ruchita Goel, U C Agarwal and M O Garg

Automobile Fuel Quality Workshop, organized by Asian Clean Fuels, Association and the Philippines Department of Energy (DOE), Manila, Philippines, August 22, 2006

- *Renewable Fuels: An Asian Perspective*, Mukesh Saxena

7<sup>th</sup> International Symposium on Advances in Fluid Catalytic Cracking Catalysts (FCCS) during 232<sup>nd</sup> National ACS Meeting, San Francisco, September 10-14, 2006

- *NMR studies of FCC feeds, catalysts and coke*, Babita Behera, Siddharth S Ray and I D Singh

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- *Naphthenic Acid Corrosion in Petroleum Refineries*, R C Saxena, Diptendu Seal and H B Goyal

International Workshop on Hydrogen Energy: Production, Storage and Application, Jaipur, November 5-9, 2006

- *Hydrogen production from glycerol obtained during bio-diesel manufacture*, Smita Darmora, A K Saxena, S Tripathi and A Datta
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- *Studies on Preparation of petroleum pitches under oxidative and non-oxidative conditions*, Manoj Srivastava, Manoj Kumar, A Shahin, Ruchika Goel, U C Agarwal and M O Garg
- *Prospects of bio-diesel production from some non-edible oil/non-conventional low-cost sources using heterogeneous catalyst*, Neeraj Atrey, A K Bhatnagar, Savita Kaul, M P Saxena, M S Negi and Abhishek Gupta, November 10-11, 2006

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- *Properties of ester from dextrose and karanja oil fatty acid*, A K Singh, O P Sharma and Shiva Gupta

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- *Effect of engine oil viscosity on fuel economy*, Devender Singh, Nishan Singh, A K Jain, V K Chibber and Mukesh Saxena

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- *Hydrocarbon soluble organo-metallic standard*, A K Singh, R K Chauhan, N K Pandey and A Datta
- *Fuel ethanol from biomass by acid hydrolysis and thermo-tolerant ethanologens*, Sachin Kumar and D K Adhikari, Chemcon 2006, December 27-30, 2006

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- *[bmim]BF<sub>4</sub> – immobilized – rhenium-catalyzed highly efficient oxygenation of aldimines to oxaziridines using solid peroxides as oxidants*, Suman L Jain, *et al.*

**6<sup>th</sup> International Symposium on Catalysis in Multiphase Reactors (CAMURE-6) and 5<sup>th</sup> International Symposium on Multiphase Reactors (ISMR-5), NCL, Pune, January 14-17, 2007**

- *Kinetics of naphtha hydro-desulphurization*, Gautam Das, A S Narayan, J Singh, V S Kukreti and Alok K Saxena

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- *Challenges & opportunities in refining and petrochemical industries*, M O Garg
- *Ethanol production from biomass by thermophiles*, Sachin Kumar and D K Adhikari
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- *Mechanism of acid-sites creation in alumina-based binary mixed oxides relevant to petroleum refining*, Manoj Kumar, J K Gupta, L D Sharma and G Murali Dhar
- *ZrO<sub>2</sub>-SBA-15 mesoporous supported molybdenum hydrotreating catalysts*, Shelu Garg, G Muthu Kumaran, Manoj Kumar, K S Rawat, L D Sharma and G Murali Dhar
- *Visbreaking : a flexible process for improving flow properties of heavy crude oils*, D Tandon, G S Dang and M O Garg
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- *Catalytic cracking studies on various biocrudes for liquid fuel maximization*, Neeraj Atheya, K K Singh and Mool Chand
- *Oxi-extractive desulphurization of VGO to produce improved quality LOBS and feed streams for secondary conversion*, Manoj Kumar, Susanta Mandal, Manoj Srivastava, U C Agarwal and M O Garg
- *Desulphurization of light cycle oil using innovative route*, B R Nautiyal, S M Nanoti, Bir Sain, T V Rao, Dharam Paul, Kriti, Y K Sharma and M O Garg
- *The catalytic functionalities of USY-zeolite supported WS<sub>2</sub> hydroprocessing catalysts*, K S Rawat, Manoj Kumar, J K Gupta, L D Sharma and G Murali Dhar
- *Vanadium-catalyzed direct hydroxylation of benzene to phenol using hydrogen peroxide as oxidant under solvent-free triphasic reaction conditions*, Suman L Jain, Vishal B Sharma, R Sivakumaran, Basant Kumar and Bir Sain
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- *Active barium phases as NO<sub>x</sub> traps in Pt/BaO-Al<sub>2</sub>O<sub>3</sub> /cordierite monolithic NSR catalyst for diesel exhaust emission abatement*, V S Dangwal, A K Jain, J K Gupta, S Kumar, B Lal, M Kumar, R Kumar, K S Rawat, S Tripathi, L D Sharma, G Murali Dhar and M O Garg

#### SIAT-2007, Pune, January 17-20, 2007

- *Effect of gasoline composition (olefins, aromatics and benzene) on exhaust mass emission from two-wheelers : an experimental study*, A K Jain, Sunil Pathak, Yograj Singh, Sarabjeet Singh and M Saxena
- *A CFD simulation study for optimum use of hydrogen-CNG blends in a constant volume spark ignition engine*, K A Subramanian, S K Singhal and Mukesh Saxena

#### NMR Symposium, NCL, Pune, February 4-7, 2007

- *In-situ NAS NMR and its application in helinogeneous catalysts*, Siddharth S Ray and Michael Hunger

#### 15<sup>th</sup> LAWSPS Symposium, March 15-17, 2007

- *Corrosion inhibition for oil-well acidizing equipments*, R C Saxena and H B Goyal,
- *Estimation of average carbon number of petroleum waxes by X-ray diffraction method : comparison with GC method*, Sanat Kumar, S P Srivastava and H U Khan

#### National Conference : Microbial Diversity : Avenues and Applications, SBSPGI of Biomedical and Sciences and Research, Dehradun, March 17-18, 2007

- *Thermostable analyses and its application*, Pratibha Dheeran, Amita Sinha and D K Adhikari

#### National Symposium on Recent Advances in Analytical Science and Applications, Simla, April 5-7, 2007

- *Determination of sulphur in dibenzothiophene (DBT) and 4,6-dibenzothiophene (4,6-DMDBT) by*

*UV-Vis spectroscopy*, Nisha, Dharam Paul, B R Nautiyal and S M Nanoti

- *Use of FTIR analysis to identify the completion of transesterification reaction*, A K Singh and Aruna Chamoli
- *Extraction of sulphur compounds present in diesel by room-temperature ionic liquids*, B R Nautiyal, Murali Krishnal Pillai, Nisha, Dharam Paul and S M Nanoti

#### 18<sup>th</sup> National Symposium and Indo-US Seminar on Catalysis, IIP-Dehradun, April 16-18, 2007

- *Studies on vanadium-catalyzed direct hydroxylation of benzene to phenol using hydrogen peroxide as oxidant*, Jomy K Joseph, Suman L Jain, Sweetly Singhal, R Sivakumaran, Basant Kumar and Bir Sain
- *Alumina-supported MoO<sub>3</sub> : an efficient and recyclable catalyst for regio-selective ring opening of epoxides under seven tree conditions*, Sweetly Singhal, Suman L Jain and Bir Sain
- *Simulation of a fixed-bed adsorber for thiophene removal*, Soumen Das Gupta, Vasudha Agnihotri, Pushpa Gupta, Anshu Nanoti, M O Garg and A N Goswami
- *Understanding the structure of FCC catalysts and associated coke from fresh to regeneration stages in an FCC refining unit : a multinuclear solid state NMR approach*, Babita Behera, M K S Aloopwan and S S Ray
- *Heterogeneous acid and base catalysts for efficient organic syntheses*, K Motokura, Y Iwasawa, K Kaneda (Japan), N Viswanadham and G Murali Dhar,
- *Hydrodesulphurization catalysis on SBA-15 supported molybdenum catalysts by homogeneous precipitation method*, Shelu Garg, Kapil Soni, G Muthu Kumaran, V V D N Prasad, Manoj Kumar, K S Rawat, L D Sharma and G Murali Dhar

## Achievements

- *Zeolite-catalyzed light naphtha upgradation process*, N Viswanadham, Lalji Dixit, M O Garg, R Manna, V Krishnan and S Makhija
  - *Development of indigenous catalyst useful for extractive sweetening of LPG and liquid-liquid sweetening of light petroleum fractions*, Gautam Das, Bir Sain, Sunil Kumar, G Murali Dhar, M O Garg and Swapan K Ghosh
  - *Effect of support in molybdenum containing catalysts for oxidative desulphurization of HDS diesel*, T V Rao, Manoj Kumar, B R Nautiyal, V V D N Prasad, Y K Sharma, S M Nanoti, Bir Sain, G Murali Dhar and M O Garg
  - *Bio-catalytic desulphurization of middle distillates*, D K Adhikari
  - *Synthesis of a novel VPO phase through surfactant assisted organization from an exfoliated solution of  $VOPO_4 \cdot 2H_2O$* , Arunabha Datta, S Sakthivel, Maninder Kaur, Shelly Mahendru and Sandeep Saran
  - *Synthesis, characterization and catalytic activity of sulphated zirconia supported over SBA-15*, Shelu Garg, Muthu Kumaran, Manoj Kumar, J K Gupta, L D Sharma and G Murali Dhar
  - *An efficient catalyst for etherification of bio-degradable polyol ester lubricants*, Nagendramma P and Savita Kaul
  - *Studies on upgradation of biomass material for transportation fuels*, Neeraj Atheya, K K Singh and Mool Chand
  - *Studies on reduction behaviour of  $ZrO_2-Al_2O_3$  mixed oxide-supported W-hydrotreating catalysts*, Manoj Kumar, J K Gupta, L D Sharma, K S Rawat and G Murali Dhar
  - *Trans-esterification of non-edible oils / non-conventional raw materials using heterogeneous catalyst*, Neeraj Atray, A K Bhatnagar, Savita Kaul and M S Negi
  - *Effect of acidity and Pt loading on the isomerization activity of mordenite*, Sandeep K Saxena, N Vishwanadham, J K Gupta, L Dixit and M O Garg
  - *Factors influencing the Di-branch isomer selectivity in n-hexane conversion over H-mordenite*, Raviraj Kamble, Sandeep K Saxena, Madhulika Singh and N Viswanadham
  - *Studies on mesoporous ZSM-5*, Madhulika Singh, Raviraj Kamble, Manoj Kumar and N Viswanadham
  - *Hydro-desulphurization studies on SBA-16-supported Mo, CoMo, and NiMo catalysts*, Kapil Kumar Soni, Shelu Garg, G Muthu Kumaran, Manoj Kumar, J K Gupta, L D Sharma and G Murali Dhar
  - *Studies on conversion of synthesis gas to middle distillates over cobalt-based Fischer-Tropsch catalyst*, P Vijayanand, Moolchand and M O Garg
  - *Hydroisomerization of n-pentane over Pd-promoted  $WO_x/ZrO_2$  catalyst*, P Vijayanand and H Knoezinger
  - *Thermo-catalytic decomposition of methane : a sustainable route for  $H_2$  production*, Pratheep T, Shailendra Tripathi, L D Sharma, G Murali Dhar and M O Garg
- [98<sup>th</sup> AOCs Annual Meeting & Expo and 27<sup>th</sup> ISF Congress, Canada, May 13-16, 2007](#)
- *Utilization of Jatropha curcas residue oil in the formulation of lubricating greases*, Savita Kaul and A K Bhatnagar
- [9<sup>th</sup> International Conference on Fundamentals & Adsorption, Giardini Naxos, Sicily, Italy, May 20-25, 2007](#)
- *Process studies for development of adsorption technology for furfural recovery from waste water*, Anshu Nanoti, Pushpa Gupta, S Dasgupta, M O Garg and A N Goswami



'आठवाँ विश्व हिंदी सम्मेलन', न्यूयॉर्क, अमेरिका, 13-15 जुलाई, 2007

- हिंदी, युवा पीढ़ी और ज्ञान-विज्ञान, दिनेश चमोला

XIV Refinery Technology Meet (RTM) on Energy & Environment Challenges for the Hydrocarbon Sector, Trivandrum, organized by CHT, September 20-22, 2007

- *Production or consumption: what contributes more to global warming? A simple way to estimate CO<sub>2</sub> emissions from a refiner*, Ankit Kala, SM Nanoti and MO Garg
- *Pinch analysis of fluid catalytic cracking unit: a case study of application of Pinch analysis in optimization of solvent extraction unit*, MO Garg, U C Agarwal, Manoj Srivastava, Ranvir Singh and Manoj Kumar
- *Development of indigenous LPG sweetening catalyst*, Gautam Das, Bir Sain, Sunil Kumar, G Murali Dhar, MO Garg, P V C Rao, N V Choudhary, Anirban Ray and M C Shah
- *Pinch analysis of fluid catalytic cracking unit: a case study*, Jasvinder Singh, S M Nanoti and MO Garg
- *Separation of propane from DAO phase in propane deasphalting (PDA) process under supercritical conditions*, Mohan Konde, G S Dang, MO Garg, S Banik and A K Agarwal
- *Technologies for CO<sub>2</sub> mitigation in the petroleum refinery*, A N Goswami, Anshu Nanoti and MO Garg

International Conference on Thermophiles-2007, Norway, September 24-27, 2007

- *Thermophiles on ethanol production and fruit juice clarification*, D K Adhikari, Pratibha Dheeran, Amita Sinha and Sachin Kumar

23<sup>rd</sup> National Convention of Chemical Engineers

(Theme: 'Recent Trends in Chemical Engineering'), IIT Roorkee, October 5-7, 2007

- *Utilization of syngas for energy stability and security*, P Mondal, G S Dang and MO Garg

'Go India', Gas & Oil Exposition and Conference, New Delhi, October 31- November 2, 2007

- *Studies on corrosive behaviour of bio-diesel on engine parts*, RC Saxena, and HB Goyal

2<sup>nd</sup> Uttarakhand State Science Congress, November 14-15, 2007

- *Bio-fuel production from bio-mass by using thermophiles*, Sachin Kumar, Pratibha Dheeran, Amita Singh and D K Adhikari

National Seminar on Green Chemistry and Natural Products, organized by Delhi University, Delhi, November 26-27, 2007

- *An efficient synthesis of 3,4-dihydropyrimidinones using [bmim]. inCl<sub>4</sub> ionic liquid as green recyclable solvent and catalytic system*, Sweety Singhal, Suman L Jain and Bir Sain

International Conference on New Horizons in Biotechnology, Trivandrum, November 27-29, 2007

- *Bio-refining of bio-mass for bio-fuels*, H B Goyal, Sachin Kumar, D K Adhikari and DV Naik

International Conference on Advances in Energy Research (ICAER)-2007, IIT-Bombay, December 12-14, 2007

- *Waste cooking oil/restaurant grease: A potential source for biodiesel production*, Savita Kaul, Neeraj Atray, M S Negi, N N Bahuguna and A K Bhatnagar

National Conference on Frontiers in Chemical Engineering-2007, IIT-Guwahati (Dept. of Chem. Eng.), December 12-14, 2007

- *Temperature-programmed reduction studies on ZrO<sub>2</sub>-Al<sub>2</sub>O<sub>3</sub> mixed oxide supported W-hydrotreating of catalyst*, Manoj Kumar, L D Sharma and G Murali Dhar

## Achievements

- *Physico-chemical characterization and catalysis on SBA-16-supported molybdenum catalysts*, Kapil K Soni, Shelu Garg, G Muthu Kumaran, Manoj Kumar, Anil K Sinha and G Murali Dhar

### Carbox-XXII, NIPER-Chandigarh (Mohali), December 13-17, 2007

- *Bio-degradable-soluble cutting oils from Sugar esters*, A K Singh and O P Sharma

### International Conference on Biotechnology for Sustainable Development, NLC, Pune, January 7-9, 2008

- *Thermoethanologens: Creating future fuels from agro waste*, Sachin Kumar and D K Adhikari

### NLGI- 10<sup>th</sup> Lubricating Grease Conference, Aurangabad, January 31- February 2, 2008

- *Mono-esters of high viscosity from vegetable oils*, A K Singh

### 5<sup>th</sup> International Conference on Bio-fuels, organized by WINROCK International Foundation, New Delhi, February 7-8, 2008

- *Bio-diesel taxation policies worldwide*, Suchit Singh, M K Shukla and Sudhir Singhal
- *Bio-ethers as transportation fuel: A Review*, M K Shukla, A K Jain, Thallad Bhaskar, M O Garg and S K Singhal

### Catworkshop-2008, National Workshop on Catalysis: Futuristic Materials as Catalysts & Adsorbents, February 18-20, 2008

- *Advanced solid-state NMR techniques for characterization of materials*, S S Ray
- *In-situ solid-state NMR in heterogeneous catalysis*, S S Ray and M Hunger

### 3<sup>rd</sup> All India Conference of CGLA on Recent Advances in Library Technology and Innovatives, Nagpur, February 25-27, 2008

- *Development of ICT infrastructure in a special library*, A K Suman and D K Pandey

### 6<sup>th</sup> International Symposium on Fuels and Lubricants (ISFL-2008), New Delhi, March 9-12, 2008

- *Heavy alkylate-based efficient gear oil*, A K Singh, O P Sharma and Aruna Chamoli
- *Fuel economy and emissions study on SI vehicle fuelled by ethanol/gasoline blends: investigating the role of engine oil viscosity (Paper No 009)*, Devendra Singh, Mritunjay K Shukla, Yograj Singh, S P Singh, A K Jain and S K Singhal
- *Effect of MTBE in gasoline on regulated exhaust emissions from Indian vehicles*, A K Jain, Y Singh, S Pathak and S K Singhal
- *Simulation study for energy optimization in solvent extraction unit*, Ranvir Singh, M O Garg, U C Agarwal, Manoj Srivastava, Manoj Kumar and S M Nanoti
- *Catalytic hydrothermal upgrading of wood biomass: effect of feed composition*, Thallada Bhaskar, Akino Muto, Yusaku Sakata and G Murali Dhar
- *Additive to improve the quality of cracked furnace oil*, A K Singh and Satish Kumar
- *Adsorptive removal of thiophene in liquid phase using rare earth exchanged zeolite*, Vasudha Agnihotri and A N Goswami
- *Effect of Mo loading on hydroisomerization of n-hexane over Pt/H-Mo catalysts*, Madhulika Singh, Sandeep Kumar Saxena, Raviraj Kamble and N Viswanadham

### Invited Lectures Delivered

- Dr M O Garg delivered an invited lecture at TECHNIP India, NOIDA, July 26, 2007
- Mr R C Saxena, Technical Officer, delivered an invited lecture on 'Studies on Internal Corrosion of Petroleum Product Pipelines' at CORCON-2007, organized by NACE International, Mumbai, September 26-28, 2007

## 2.3 PATENTS SEALED

### Patents Sealed Abroad

- *Process for preparing fatty acid alkyl esters suitable for use as biodiesel*, A K Gupta, A K Bhatnagar and Savita Kaul, Australia: 2003290414, 27.6.2006; Brazil: 01606008549, 29.6.2006 and Canada: 0526NF2003/CA, 30.6.2006
- *A process for preparation of vanadyl pyrophosphate catalysts with improved structural characteristics for selective oxidation of butane to maleic anhydride*, A Datta, S Dasgupta and M Agarwal, South Korea: Patent No 9-5-2007-001250416, dt 19.1.2007
- *Process for preparing vanadyl pyrophosphate catalyst*, A Datta, S Dasgupta and M Agarwal, Australia: Patent No 2003200849, dt 1.2.2007

### Patents Sealed in India

- *An improved process for preparation of novel FCC catalyst using modified crystalline molecular sieve and silica alumina matrix*, R P Mehrotra, S D Phatak, N Ray, J K Gupta, A Singh, Mool Chand, D S Rawat, V S Dangwal, S Suresh, Uma Shankar and T S R Prasada Rao, Indian Patent No. 194836, 3.3.2006
- *An improved process for preparation of hydrogenated polyalphaolefins*, M P Saxena, G N Kulshrestha, D P Bangwal, S K Sharma and G S Bhandari, Indian Patent No. 194996, 17.3.2006
- *A process for synthesis of porous crystalline vanadium silicate by sol-gel technique*, Prashant Kumar, G Murali Dhar, S N Suresh, T S R Prasada Rao, Indian Patent No. 195810, 21.4.2006
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- *An improved process for making electrode grade petroleum binder pitch*, Himmat Singh, Manoj Srivastava, I D Singh and T S R Prasada Rao, Indian Patent No. 197372, 11.8.2006
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- *A new eco-friendly sprayable girth gear lubricant for cement plants*, R P S Bisht, Savita Kaul, V R K Sastry, B M Shukla, Ajay Kumar and A K Bhatnagar, Application No 0265NF2005, 21.3.2007
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## 2.5 D. PHIL./D. LITT. DEGREES AWARDED

### D. PHIL. DEGREES

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- Mr Manoj Kumar, '*Studies on MgO, ZrO<sub>2</sub> Based Mixed Oxide Supported Hydrotreating Catalysts*', by the H N B Garhwal University, Srinagar, Garhwal, 2007. Supervisor: Dr G Murali Dhar
- Ms Babita Behera, '*Structural Studies & Coke Characterization of Some Petroleum Refining Catalysts by Multinuclear Solid State NMR*' by the HNB Garhwal University, Srinagar, Garhwal, 2007. Supervisor: Dr S S Ray
- Mr Muthu Kumaran, '*Studies on Microporous and Mesoporous Material Supported Hydroprocessing Catalysts*' by the HNB Garhwal University, Srinagar, Garhwal, 2007. Supervisor: Dr G Murali Dhar
- Mr D C Pandey, '*Study on the Effect of Composition of Different Group-Type Base Oils on the Response of New-Generation Additives*' by the H N B Garhwal University, Srinagar, Garhwal, 2008. Supervisor: Dr I D Singh.

## 2.6 HONOURS, AWARDS & RECOGNITIONS

### CSIR Technology Award-2006

CSIR Technology Award-2006 (Prize for Chemical Technology) was awarded to the Institute for developing Comb Type Polymeric Wax Crystal Modifier and Dewaxing Aid Additives for production of LOBS.

The wax crystal modifier is a versatile tailored comb-type polymeric filter aid additive to enhance slurry filterability during dewaxing/deoiling operations. It is very effective at small dosages for a wide range of feed-stocks and

## Achievements

offers many advantages over other commercial additives. It prevents agglomeration / amorphous lumping or gel formation during crystallization which may impede filtration and leads to higher unit throughput and lower consumption of solvent and other utilities. Dorf Ketal, Mumbai is producing and marketing this additive.



*CSIR Shield*

The research team, consisting Dr A K Chatterjee, Mr U C Agrawal, Dr V K Bhatia, Mr N N Kulsrestha & Mr R C Ghildiyal, received the prize from Mr Kapil Sibbal, Hon'ble Minister of Science and Technology, Govt. of India, on September 26, 2006 at the main CSIR Foundation Day function organized by the CSIR at New Delhi.



*Members of the IIP Team (viz. Mr N N Kulsrestha, Dr A K Chatterjee, Mr R C Ghildiyal & Mr U C Agrawal) flank Dr R A Mashelkar & Mr Kapil Sibbal*

### The First Technology Award for Innovation-2007

CSIR's newly constituted 'Technology Award for Innovation - 2007' was bagged by the Institute.

The award recognizes the development of new catalysts for sweetening of petroleum fractions by a team

consisting of Dr Bir Sain, Dr Gautam Das, Mr Sunil Kumar, Dr B B Agarwal, Late Mr S N Puri, Mr B P Balodi, Mr Anil Kumar, Mr V K Kapoor, Mr V K Bhatia, Dr T S R Prasad Rao, Dr O S Tyagi, Mr Jai Prakash and Mrs Pushpa Gupta. Late Mr S F Fish also contributed in the initial development of these catalysts.



*CSIR Shield*

The research team received the award on the occasion of the CSIR Foundation Day at New Delhi on September 26, 2007 from Mr Kapil Sibbal, Hon'ble Minister of Science and Technology, Govt of India & Vice President, CSIR. The award carries a cash prize of Rs 2 lakh, a plaque and a citation.



*Team-IIP with Mr Kapil Sibbal, Hon'ble Minister of Science and Technology, Govt of India, at the Award Ceremony*

### DST Award

Dr Suman L Jain, Research Associate, was selected for the DST award for participation in a meeting of Nobel Laureates in chemistry and students at Lindau, Germany. During June 24- July 7, 2006, she had the rare opportunity to be with 21 Nobel Laureates by way of round table discussion and informal small group meetings. She also visited premier German scientific institutes as well as various research institutes.

Dr Jain was awarded a six-month Post Doctoral scholarship of the Embassy of France in India. She worked at the Université de Rennes, France with the financial support provided by the French government during Sep. 2006 - Aug. 2007.

#### Doon Ratna 2005

Dr Arunabha Datta, Scientist, received Sh. Khurshaid Lal Science & Technology Award-2005 and 'DOON RATNA' Award for his outstanding contributions to science and technology. The Award was presented by the Nagrik Parishad, Dehradun, a leading social organization of Uttaranchal in a glittering function organized at Town Hall, Dehradun by the Chief Guest Mr Prakash Jha, a film-maker of international renown, director and writer.



Dr Arunabha Datta (third from left) being awarded the 'Doon Ratna-2005' by Mr Prakash Jha

#### Most Cited Paper 2003-2006 Award

Dr Bir Sain, Scientist was awarded the 'Most Cited Paper 2003-2006 Award' by Tetrahedron Letters, a leading journal of organic chemistry published weekly by M/s Elsevier Ltd. Oxford, U.K. for the paper entitled '*Cobalt phthalocyanine catalyzed aerobic oxidation of secondary alcohols: an efficient and simple synthesis of ketones*', authored by Vishal B Sharma, Suman L Jain and Bir Sain, published in Tetrahedron Letters, Volume 44, Issue 2,

Jan. 6, 2003 pages 383-386.

#### Members, Fellows, Referees etc.

- Dr Arunabha Datta, Scientist, was nominated as a Member of the Research Advisory Committee, Shriram Institute for Industrial Research, Delhi for two years.
- Dr Bir Sain, Scientist, was invited to become a referee for the Royal Society of Chemistry (RSC) Journal. RSC has more than 35 prestigious journals in the field of chemistry.
- Dr M O Garg, Director, IIP was nominated as a Member (Ex-Officio) for the 'Scientific Advisory Committee on Hydrocarbons' of the Ministry of Petroleum and Natural Gas with effect from 1.1.2007. Under the Terms of Reference, the Committee advises on *policies relating to Science and Technology* and measures to implement them in order to *ensure optimum processing of hydrocarbon raw material for use as fuels and chemicals*.

#### Technocrats Excellency Award

Dr G Murali Dhar, Scientist received the Technocrats Excellency Award 2006 from the Technocrats' Welfare Society of India in recognition of *his outstanding technocratic excellence and meritorious achievement in the field of 'catalytic applications to refining'*.

#### Best Paper / Oral Presentation

- Dr Neeraj Atrey, Scientist, received the Young Scientist Award for the Best Oral Presentation for his paper entitled '*Prospects of bio-diesel production from some non-edible oils/non-conventional low-cost sources using heterogeneous catalyst*' presented in the First Uttaranchal Science Congress organized by the



Uttaranchal State Council for Science & Technology held at Dehradun during November 10-11, 2006. The award includes a cash prize of Rs. 5000/- and the sponsorship of a two-month visit to any research institute or university in India.

- Mr A K Jain, Scientist, bagged the award for 'Best Indian Paper on Environmental Pollution' for the paper entitled '*Effect of Gasoline Composition on Exhaust Mass Emissions from Two-Wheelers – An Experimental Study*' (co-authored by Sunil Pathak, Yograj Singh, Sarabjeet Singh & M Saxena from IIP and M Subramanian & P C Kanal from IOC) in the 'Symposium on International Automotive Technology (SIAT 2007)', organized by ARAI, Pune; SAE, India and NATRIP at Pune, January 17-20, 2007.



Mr A K Jain receives the Best Paper Award from Dr R Chidambaram, Principal Scientific Advisor, Govt of India

- Ms Pratibha Dheeran, JRF won the Best Oral Paper Award for the paper entitled '*Thermostable amylase and its application*' (co-authored by Amita Sinha & D K Adhikari) at the 'National Conference on Microbial Diversity : Avenues and Applications', organized by the Sardar Bhagwan Singh Post Graduate Institute of Biomedical Sciences and Research, Dehradun, Mar 17-18, 2007.

### राजभाषा / Rajbhasha

- संस्थान को वर्ष 2006-2007 एवं 2007-2008 के लिए नगर राजभाषा कार्यान्वयन समिति, देहरादून द्वारा राजभाषा नीति के श्रेष्ठ कार्यान्वयन के लिए नगर राजभाषा शील्ड (प्रथम) पुरस्कार एवं प्रशस्ति-पत्र से सम्मानित किया गया। संस्थान ने यह सम्मान तीसरी बार अर्जित किया और पिछले दो वर्षों में लगातार द्वितीय स्थान प्राप्त किया।

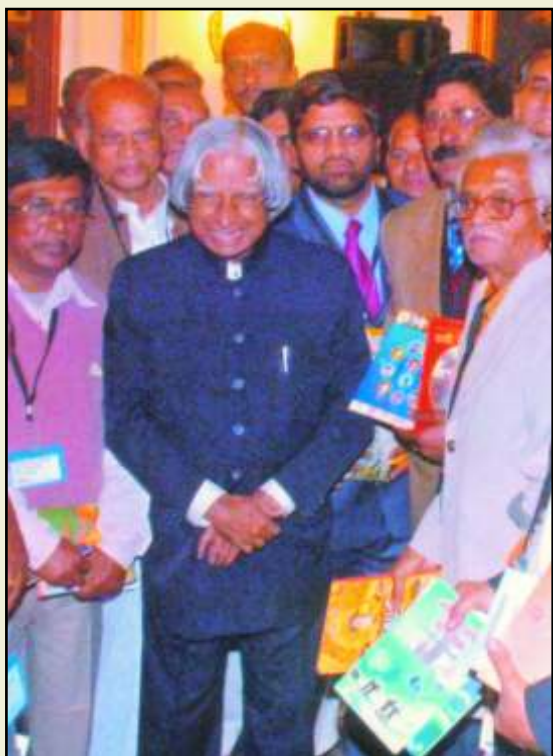


संस्थान की ओर से डॉ ए दत्ता, कार्यकारी निदेशक, श्री एम सी जोशी, मुख्य आयकर-आयुक्त, उत्तराखण्ड एवं अध्यक्ष, नगर राजभाषा कार्यान्वयन समिति से नगर राजभाषा शील्ड प्राप्त करते हुए

### साहित्यिक / Literary

- डॉ० दिनेश चमोला, वरिष्ठ हिंदी अधिकारी को भारत के परमश्रेष्ठ राष्ट्रपति डॉ० ए पी जे अब्दुल कलाम द्वारा गणतंत्र दिवस के अवसर पर आयोजित बाल साहित्य से सम्बन्धित नामचीन लेखकों के समागम में उत्तराखण्ड राज्य की ओर से सम्मिलित होने का अवसर प्राप्त हुआ।
- डॉ० दिनेश चमोला, वरिष्ठ हिंदी अधिकारी को अनुवाद चिंतन पर लिखित उनकी पुस्तक 'अनुवाद और अनुप्रयोग' के लिए अनुवाद की शीर्षस्थ संस्था भारतीय अनुवाद परिषद, दिल्ली द्वारा वर्ष 'राष्ट्रीय नातालि अनुवाद पुरस्कार' 2006-2007 प्रदान किया गया।
- केन्द्रीय हिन्दी समिति, देहरादून द्वारा श्री राजन कपूर, निजी सचिव को राज्य स्तरीय 'मुंशी प्रेम चन्द पुरस्कार' से सम्मानित किया गया।





भारत के परमश्रेष्ठ राष्ट्रपति महोदय सहित डॉ. दिनेश चमोला



इंदिरा गाँधी राष्ट्रीय मुक्त विश्वविद्यालय (इग्नू) के कुलपति प्रो. वी एस राजशेखरन पिल्लै डॉ. दिनेश चमोला को 'नातालि' पुरस्कार प्रदान करते हुए

## 2.7 MoU's/MoC's/AGREEMENTS SIGNED

### Foreign Collaborations

#### MoU with M/s Petroleum India International (PII)

An MoU was signed with M/s Petroleum India

International (PII), Mumbai to undertake a study on 'Preparation of on-grade fuel oils from pitch samples'. The objective of the study is to prepare on-grade fuel oil (viscosity 370 cSt at 50°C) from the available pitch by blending it with LVGO or other suitable diluents. PII is a consortium of 8 top petroleum and petro-chemical industries in India and provides technical, managerial, human resource training, development activities and information technology solutions to the petroleum industry world over in upstream as well as downstream sectors.

#### Collaborative Visit by a Korean delegation, December 1, 2006

A high-powered delegation from Korea, consisting of members from the Ministry of Commerce, Korea, Korean energy industry, oil refineries, the Korean Oil Association, ethanol manufactures and M/s Samsung Corporation visited the Institute. The delegation interacted with the scientists and discussed the fuel-ethanol business in India and related issues such as fuel-ethanol blending system, its storage, transportation and supply to the fuel stations etc.



Guests from Korea pose with the host IIP

#### MoU with M/s SINTEF, Norway

An MoU was signed with SINTEF (The Norwegian Ministry of Foreign Affairs), Oslo, Norway for co-operation in the field of 'Development of Low Carbon-Emitting Adsorption Technology for Ultra-low Sulphur Diesel Production' on Feb 12, 2008.

### MoU with M/s Patcham, UAE

An MoU was signed between IIP and M/s Patcham (FZC), Sharajah, United Arab Emirates on 'Evaluation of Metal-based FCC Passivator' on Feb 22, 2008.

### Inland Collaborations / Agreements

#### IIP-GAIL

An agreement on gasoline (NTGG) technology was signed between IIP & GAIL (Gas Authority of India Ltd.) on February 15, 2007 for conversion of NGL to gas and gasoline and value-added products. It formalizes a joint technology ownership to facilitate the commercialization of the technology jointly.



*Mr A K Purwaha, Director (Business Development), GAIL & Dr M O Garg, Director, IIP signing the IIP-GAIL agreement*

#### IIP/CSIR-ACPL/FCPL

The Institute entered into an agreement with M/s ACPL, which details the modalities and the terms and conditions for the grant of license by CSIR/IIP to ACPL/FCPL for utilizing the know-how for making bio-diesel from vegetable oil feedstocks.

#### IIP-CHT

Three MoU's were signed with the Centre for High Technology, Ministry of Petroleum & Natural Gas, New Delhi on the following:

- 'Development of solid acid catalyst for alkylation of isbutane with alkenes to form alkylates as gasoline blends'.

- 'Catalyst development for isomerisation of C<sub>7+</sub> hydrocarbons with industrial feedstocks'.
- 'Synthesis of room-temperature ionic liquids and to study their applications for extraction of sulphur, nitrogen and aromatic compounds from petroleum feedstocks'.

#### IIP-BPCL/LIL

An agreement was signed jointly with M/s Bharat Petroleum Corporation Ltd, Mumbai and M/s Lona Industries Ltd, Mumbai for production and sale of the sweetening catalyst based on the process know-how developed by the Institute.

#### IIP-JOL

An MoU was signed with M/s Jubilant Organosys Limited, Gajraula (U.P.) for 'Development of Technology for VOC Recovery from Chemical Storage Tank Emissions'.

#### Management of the 'Fuel Testing Laboratory' (FTL), NOIDA, assigned to the Institute on Long-Term Basis

For an effective management of pollution in the National Capital Region (NCR), the Government of India had set up the Environment Pollution Control Agency (EPCA) under the Ministry of Petroleum & Natural Gas. Thereafter in November 2000, under the Society for Petroleum Laboratory, the Fuel Testing Laboratory (FTL) was established at NOIDA (U.P.). The objective of setting up



*A handshake of agreement: Mr Anand Kumar (L) & Dr M O Garg (R) exchange documents at the signing ceremony of the MoU while Dr T Ramasami (M) looks on*

of FTL was to *perform physico-chemical & analytical tests* as per specifications on petroleum products being sold in the market for their quality check and *detection of the malpractice of fuel adulteration*.

Conducting R&D related to improving and devising new and innovative methods; preparation, formulation and compilation of comprehensive laboratory testing/ investigation reports and giving advice, inference and assistance regarding quality of petroleum products are the other major tasks assigned.

In association with IOC (R&D), IIP had been performing its designated role of *framing of specifications, selection, commissioning and calibration of equipments, as well as functioning, management & operation of the laboratory* on short-term agreements since its inception. On the basis of the successful track record of the Institute, and with the requisite experience, capabilities and well-established facilities, the Institute has now been given long-term management of the FTL. An MoU to this effect was entered into by the CSIR/IIP & the SFPL /FTL on October 22, 2007, at New Delhi. Dr M O Garg, Director, IIP and Mr Anand Kumar, President, SFPL and Director IOC, (R&D) signed the MoU in the presence of Dr T Ramasami, the then DG, CSIR and Secretary, DST.

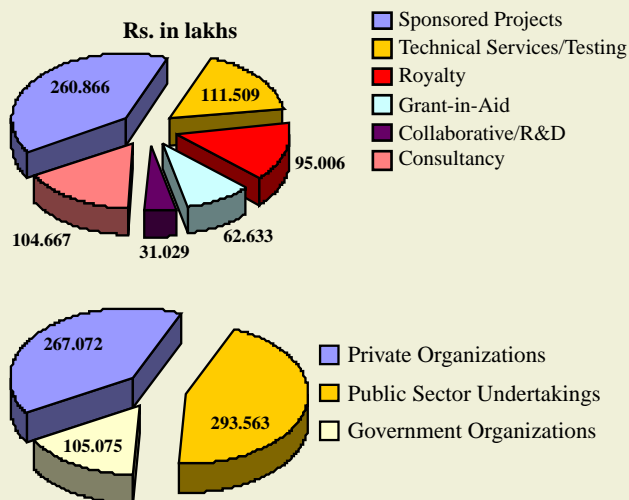
## 2.8 EXTRA-BUDGETARY RESOURCES

IIP's earnings from Extra-Budgetary Resources (EBR) during the year 2006-2007 stood at Rs. 665.71 lakhs

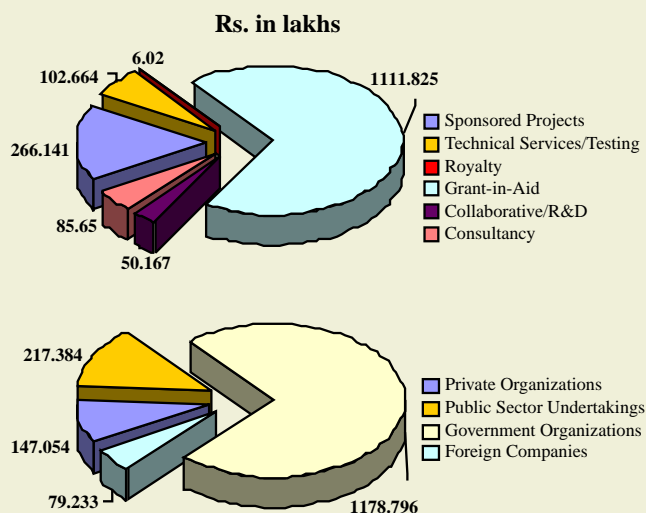
### Break-up of EBR

The Institute earned Rs. 1622.467 lakhs during 2007-2008. This includes a grant of Rs 995.0 lakhs received from the OIDB, New Delhi.

### YEAR 2006-2007



### YEAR 2007-2008







3

Human  
Resource  
Development



### 3.1 IMPARTING TRAINING TO THE OIL INDUSTRY PERSONNEL

Training the personnel from the oil industry & related fields like automobile industry, transport sector etc. is one of the most significant activities that the Institute engages in as per its mandate. Training programmes organized during this period are as follows:

**For Fluor Daniel India Pvt. Ltd., (FDPL), Gurgaon (A Fortune 500 Company)**

- A training programme on '*Petroleum Refining Technology*' for Chemical Engineers was held during May 15-26, 2006.
- A training programme on '*Petroleum Refining Technology*' for 15 Chemical Engineers of M/s Fluor Daniel and one participant from M/s Amkap Marketing Pvt Ltd, Raibareilly, was held between November 19-24, 2007.

**For Reliance Industries Ltd.**

- Training programmes for two batches of Sales Engineers on '*Petroleum Products : Specifications and Applications*' were held during May 22-26, 2006 and June 19-26, 2006.



*Aspirants from the industry: Training Programme for M/s RIL, Jamnagar, September 4-15, 2006.*

- Training programmes on '*Petroleum Refining & Petrochemicals Technology*' were held for Chemical Engineers during (i) June 26 - July 7, 2006, (ii) July 17-28, 2006, (iii) September 4-15, 2006 and (iv) September 25 - October 6, 2006.

**For UOP India Ltd., Gurgaon**

- Training programmes on '*Petroleum Refining Technology*' for Chemical Engineers were held on (i) August 7-25, 2006 and (ii) July 23- August 10, 2007.



*Aspirants from the industry: Training Programme for M/s UOP india Ltd., Gurgaon, August 7-25, 2006*

**For Indian Oil Corporation Ltd.**

- Training programmes on '*Petroleum Refining Technology*' for Chemical Engineers were held during (i) September 25 - December 1, 2006, (ii) December 17, 2007 - February 8, 2008 and (iii) February 18-April 11, 2008.

**For Essar Oil Ltd., Jamnagar**

- A training programme on '*Petroleum Refining Technology*' was organized for a batch of 21 Chemical Engineers between May 7-June 1, 2007.

**For Hindustan Petroleum Corporation Limited, Mumbai**

- A training programme on '*Petroleum Refining Technology*' was organized for a batch of 22 Chemical Engineers during June 4-22, 2007.

**For Bharat Petroleum Corporation Limited, Ernakulam**

- A training programme on '*Petroleum Refining Technology*' for 10 Chemical Engineers was organized during February 18-March 14, 2008.
- A training programme on '*Petroleum Refining Technology*' for 20 Chemical Engineers was organized during March 24 - April 4, 2008.

### Joint Training Programme for BRPL, CPCL, HPCL, IOCL, NRL and Sulzer at HRDC, Ghaziabad

- The Institute conducted a joint training programme on '*Heat Exchanger: Design, Operation and Troubleshooting*', during April 23-25, 2007, for 19 engineers.

### 3.2 IMPARTING TRAINING TO THE STATE TRANSPORT OFFICERS

- A training programme on Vehicular Pollution for officers of State Transport Departments, Ministry of Shipping, Road Transport & Highways (MSRTH), New Delhi, was held during Nov 26-30, 2007. Twenty participants from Haryana, Karnataka, Rajasthan, Chhatisgarh, Kerala, Orissa, Jammu & Kashmir, Uttar Pradesh and Tamil Nadu took part.



Participants and faculty of the training programme on Vehicular Pollution, Nov. 26-30, 2007

- A training programme for Officers of State Transport Departments, Ministry of Shipping, Road Transport & Highways, New Delhi, was held during January 7-11, 2008. 14 Road Transport Officers from Kerala, Maharashtra, Rajasthan and West Bengal States participated.

### 3.3 TRAINING AND MOTIVATION OF THE SCIENCE FACULTY

Teachers are considered to be nation builders. During the last few decades the underlying principles of science have undergone a dramatic change. So there is a need to upgrade the knowledge-base and skills of the science

teachers in schools and colleges. Under a CSIR scheme entitled '*Faculty Training and Motivation*', selected teachers of science are given an opportunity to upgrade their knowledge in new and emerging areas of science and to have interaction and exchange of ideas with the scientific community.



Participants of the 'Programme on CSIR Scheme for Training and Motivation of Science Faculty', June 12-16, 2006 along with the Faculty Members

One-week training programme under this scheme was held in the Institute between June 12-16, 2006, in which 30 teachers from different Kendriya Vidyalayas of the Dehradun region were invited. Visits to various laboratories, practical demonstrations and lectures on various subjects were organized.

### 3.4 HRD PROGRAMMES FOR THE IIP EMPLOYEES AT THE HRDC (CSIR), GHAZIABAD

- Dr Jasvinder Singh, TO and Ms Rekha Chauhan, TA, '*Research Methodology and Statistical Methods*,' July 18-21, 2006
- Mr Satish Bhatt & Ms Kusum Bhatt, Stenographers, '*Refresher Course for PA's*,' July 24-26, 2006
- Mrs Sushila Singhal, AO & Mr Pankaj Kumar, Section Officer, '*Service Jurisprudence for Personnel Management*,' July 25-26, 2006
- Mr Ranbir Singh & Mr D V Nayak, Scientists, '*Induction-cum-Training Programme for Newly-Recruited Scientists B & C*,' July 31- August 5, 2006

- Dr S N Sharma, Scientist & Mr S K Sadana, COA, *'Right to Information Act'*, August 30-31, 2006
- Dr Ajay K Gupta, Scientist, *'Implementation and Internal Auditor Course on ISO 17025 NABL Accreditation'*, September 18-20, 2006
- Mr C S Bisht, Section Officer (Finance & Accounts), *'Training Programme for SO's/ Assistants (F&A)'*, November 20-25, 2006
- Mr Yogender Kumar, Section Officer, *'Refresher Training Programme for Section Officers on Vigilance and Related Issues'*, December 18-22, 2006
- Mr V S Saini, Scientist, *'Training Programme on Information Security Management'*, organized by the HRDC and the CDC, February 26-March 1, 2007
- Dr N Viswanadham, Scientist, *'Training Programme on Enhancement of Managerial Efficiency for Scientists'* organized by the HRDC and the Fore School of Management, March 12-16, 2007
- Mr D C Pandey, Technical Officer, *'Towards a More Customer-Responsive CSIR'*, March 14-15, 2007
- Mr U C Agarwal and Dr S K Singhal, Scientists, *'2<sup>nd</sup> Advance Programme on Project Management Techniques and Practices'*, HRDC (CSIR) Ghaziabad, March 19-21, 2007
- Mr M K Jain, CFA, Mrs Sushila Singhal, AO, Mr K P S Yadav, Mr Yog Raj, Mr C R Srivastava and Mr Sarvanand Tiwari, Technical Officers, *'Training and Development of Engineers involved in Construction & Maintenance in National Laboratories'*, April 23-26, 2007
- Mr Arakshita Majhi and Mr Prasenjit Mondal, Scientists, *'Induction/Training Programme for Recently Recruited Scientists B & Scientists C'*, April 30-May 5, 2007
- Mr Suresh Kothari, PA to D-IIP, *'Orientation-cum-Training Programme for Private Secretaries/ Senior Secretarial Staff Working With Directors'*, June 14-17, 2007
- Mr Manmohan Kumar, TO and Mr Yogendra Kumar, SO, *'3<sup>rd</sup> Training Programme on Service Tax and TDS'*, July 12-13, 2007
- Mr Pankaj Maurya and Mr S P Saklani, Assistants, *'Training Programme for Assistants'*, July 23-28, 2007
- Dr Gautam Das and Dr Manoj Srivastava, Scientists, *'2-day Training Programme on Crafting Effective S&T Communications'*, August 3-4, 2007
- Dr S N Sharma, Scientist & Head, RPBD *'Training Programme on Leveraging Intellectual Property for Business Development'*, August 6-8, 2007
- Mr M C Ratori, Hindi Officer and Co-Editor, *'Sankalp', 'Hindi Training Programme'*, October 3-6, 2007
- Dr A K Jain, *'Training Programme on Drafting of Patent Applications etc.'*, October 8-10, 2007 and *'Training Programme on HR'*, October 12-14, 2007
- Dr D K Adhikari, Scientist, *'Workshop on US Patent Law and Practice'*, organized by IPMD, CSIR, in collaboration with the US Embassy, New Delhi, November 15-16, 2007
- Dr A K Jain and Dr S S Ray, Scientists, *'Training Programme on Leadership Development for CSIR'*, November 19-30, 2007
- Mr Rajiv Verma, Section Officer, *'Refresher Programme for Section Officers (Administration)'*, January 7-11, 2008
- Mr P Vijayanand, Scientist, *'Programme on Entrepreneurship Development'*, January 7-12, 2008
- Mrs Sushila Singhal, AO and Mr Pankaj Kumar, SO, *'Programme on Reservation for Persons with Special Abilities and Others'*, January 17-18, 2008
- Mr Gopal Chand, SPO, *'Training Programme on E-procurement'*, February 13-16, 2008



- Dr Anshu Nanoti, Scientist, '*Programme on Leadership Development for CSIR (Module-2)*,' February 17-29, 2008
- Dr SS Ray and Mr AK Jain, Scientists, '*Programme on Leadership Development for CSIR (Module-4)*,' March 2-6, 2008
- Dr AK Bhatnagar, Scientist, '*Training Programme on Valorization of R&D for CSIR*,' March 12-14, 2008
- Ranvir Singh and Mr Wittison Kamei, Scientists, '*Training Programme on Crafting Effective S&T Communication for CSIR*,' March 13-15, 2008
- Dr Savita Kaul, Scientist, '*Training Programme on Strategic R&D Management for CSIR*,' March 26-28, 2008
- Mumbai and the Indian National Academy of Engineering, New Delhi, March 17, 2007
- Dr Soumen Dasgupta, Scientist and Dr B R Nautiyal, Technical Officer, '*Training Programme on DST-SERC School: Advance Separation Processes in Chemical & Biochemical Process Industries*,' Mumbai, organized by the UICT, March 21-24, 2007
- Dr Neeraj Atray, Scientist, three-day training workshop on '*Understanding Technology & Business of Biodiesel*,' organized by the Centre for Alternate Energy Research and Energy Institute, India, New Delhi, Mar 22-24, 2007
- Mr D K Pandey, Technical Officer and Mr Narendra Negi, Library Staff, attended the '*First-Level Training Programme of LIBSYS Software*,' organized by the LIBSYS Corporation, New Delhi, June 18-28, 2007

### 3.5 OTHER HRD PROGRAMMES FOR THE IIP EMPLOYEES

- Mrs. Sushila Singhal, AO and Dr S K Khanna, Scientist, '*Right to Information Act*,' NBRI, Lucknow, July 10-11, 2006
- Dr O S Tyagi, Scientist, '*ISO/IEC 17025:2005 and Evaluation & Expression on Uncertainty in Measurements*,' NPL, New Delhi, July 25-28, 2006
- Mr Yogender Kumar, Section Officer, '*Industrial Security Course*,' Intelligence Bureau, New Delhi, September 4-8, 2006
- Mr Ranvir Singh and Mr Swapnil Divekar, Scientists, '*Short-Term Course on Novel Separation Techniques in Process Industry*,' IIT-Roorkee, organized by the IIT-Roorkee, December 4-8, 2006
- Mr V S Saini, Scientist, '*Nodal Officers' Meet*' at NISCAIR, New Delhi, March 11-13, 2007
- Dr M O Garg, Director, Dr S N Sharma, Dr A K Bhatnagar and Mr G S Dang, Scientists, '*National Seminar on Commercialization of Indian Technologies - Success and New Opportunities*,' organized by the Indian Chemical Council, Mumbai and the Indian National Academy of Engineering, New Delhi, March 17, 2007
- Mr Ranvir Singh and Dr T Bhaskar, Scientists, '*2<sup>nd</sup> Summer School Programme on Petroleum Refining & Petrochemicals*,' organized by PETROTECH Society, the Indian Oil Corporation Ltd and the Institute of Petroleum Management, Gurgaon, June 25-30, 2007
- Mr S Sivakumaran, Technical Assistant, '*5-day User Awareness Programme on Material Characterization Techniques*,' NPL, New Delhi, July 16-20, 2007
- Mr Vivek Kumar Sharma, Technician, '*Training on Sensors and Transducers With Its Application*,' Advance Training Institute, Kanpur, September 10-21, 2007
- Mr U K Jaiswal, Scientist, attended the '*Course on Spray and Combustion*,' IIT-Kanpur, December 3-7, 2007
- Mr V K Anand, Finance & Accounts Officer, '*Management Development Programme on Finance for Non-Finance Executives*,' organized by the NLFM and the CSIR, Faridabad, January 7-11, 2008



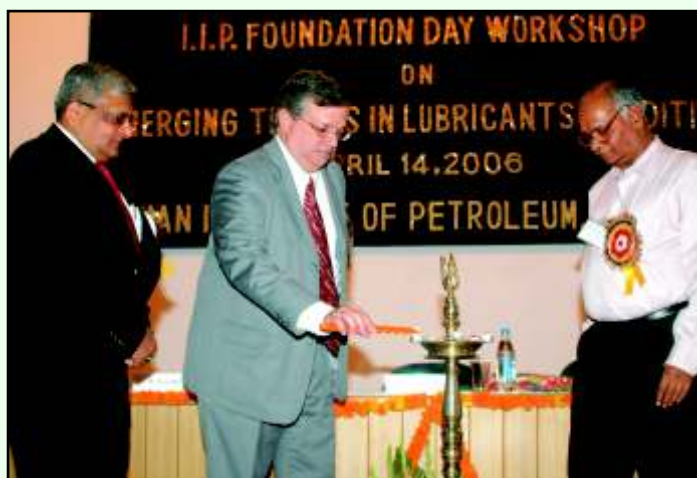
- Mr DK Pandey, Technical Officer and Mr NS Negi, Library Staff, 'Level-II Training Programme of LIBSYS Software,' organized by the LIBSYS, Gurgaon, February 11-15, 2008
- Mr V P Sharma, Scientist, 'CEP Course on Delivering High-Quality Services in Guest Houses,' IIT-Bombay, March 14-15, 2008

### 3.6 CONFERENCES / WORKSHOPS ORGANIZED

#### 46<sup>th</sup> IIP Foundation Day Celebrations & Workshop, April 14, 2006

The IIP Foundation Day, April 14, 2006 was celebrated enthusiastically by organizing events to identify the challenges before us and to stimulate the scientific workforce to cope up with these challenges. Mr Keith J Aspray, delivered IIP Foundation Day Lecture on 'Building a Sustainable Future with Innovative Technology'. Later in the day, a one-day IIP Foundation Day Workshop on 'Emerging Trends in Lubricants & Additives,' was organized. It was attended by more than 150 delegates from various oil and gas companies and petroleum sector organizations of India. Mr Keith J Aspray, Managing Director, UOP India Pvt Ltd., Gurgaon, the Chief Guest on this occasion, inaugurated the workshop.

Twelve papers were presented in three technical



IIP Foundation Day Workshop : Mr Keith J Aspray lights the inaugural lamp while Dr M O Garg & Prof M C Dwivedi look on

sessions devoted to Lubricants, Additives and Performance & Evaluation. In addition, a theme address was also given by Prof M C Dwivedi, Ex Prof, IIT-Mumbai.



IIP Foundation Day Workshop : Release of Souvenir by the Chief Guest. Seen on the dais (L-R) : Dr S N Sharma, Dr M O Garg, Mr Keith J Aspray, Dr A K Gupta & Prof M C Dwivedi

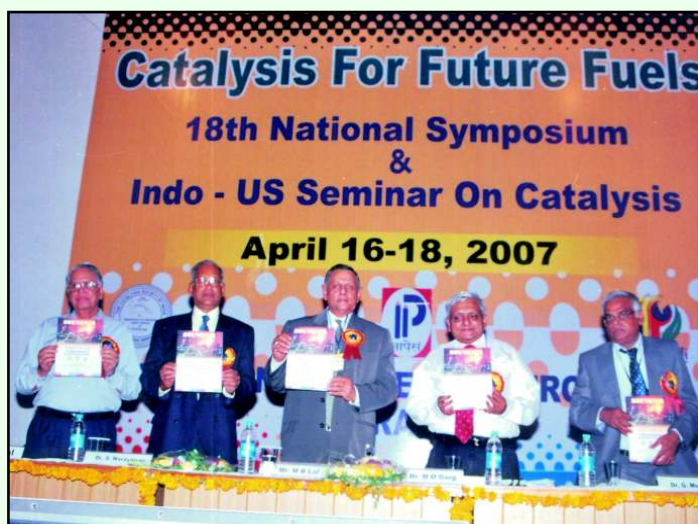
#### 18<sup>th</sup> National Symposium & Indo-US Seminar on Catalysis, April 16-18, 2007

The Institute had the honour to host the 18<sup>th</sup> National Symposium and Indo-US Seminar on Catalysis, a three-day event of the Catalysis Society of India (CSI), held once every two years. The event with the theme 'Catalysis for Future Fuels' was organized by IIP & CSI in association with the PetroTech Society of India and the Indo-US Science & Technology Forum (IUSSTF) during April 16-18, 2007.



Mr M B Lal, Chairman, SAC, MPNG, Govt, lighting the inaugural lamp at the Catalysis Symposium. Also seen (L-R) Mr S Sarpal, Dr M O Garg, Dr S Narayanan & Dr G Murali Dhar

More than 400 delegates including those from USA, UK, Japan, Mexico, Denmark and Norway, discussed the issues related to catalysis, particularly the challenges for its application in production of cleaner fuels.



*Dignitaries releasing the Souvenir of the Symposium*

### Technical Session

Totally 81 papers were presented in eleven thematic sessions, namely, 'Catalysis in FCC and Hydroprocessing,' 'Microporous and Mesoporous Materials,' 'Catalysis by Mesoporous Materials,' 'Catalysis in Petroleum Refining,' 'Catalysis in Organic Transformations I, II and III,' 'Catalysis by Novel Materials,' 'Desulphurization of Petroleum Fractions,' 'Photo Catalysis,' 'Catalysis by Oxides / Mixed Oxides I, II and III,' 'Catalysis by Nano Materials and Natural Gas Conversion'.



*Technical session in progress*

### Workshop On Grassroots Innovations, July 23, 2007

Some people, very rich in traditional knowledge but not



*Mrs Vibha Puri Das, Principal Secretary and Commissioner, Forest & Rural Development, Govt. of Uttarakhand, voicing her thoughts in the Grassroots Innovation Workshop*

well educated or financially not very sound, have given practical shape to their knowledge as grassroots innovations on different areas like Herbal Products, Mechanical Engineering, Energy Technologies, Nutraceuticals etc. The objective of the workshop was to bring such grassroots innovations to lime-light. The programme was organized jointly by the Grassroots Innovation Augmentation Network (GIAN)-North, Jaipur, the Indian Institute of Petroleum, Dehradun and the National Innovation Foundation (NIF), Ahmedabad.

### A One-Day 'Workshop on Popularization of Improved Gur Bhatti', September 12, 2007

A 'Workshop on Popularization of Improved Gur Bhatti' was organized in association with the Petroleum Conservation Research Association (PCRA).



*(L-R) Mr M S Chaudhary, President, Uttarakhand Ganna Samiti, Mr A K Goel, Director, PCRA, Dr M O Garg & Dr Rajendra Dobhal on the occasion of Workshop on Gur Bhatti*



About 80 participants consisting of *gur bhatti* owners, Gram Pradhans, Presidents of *Ganna Sahkari Samitis*, *Ganna Vikas Samitis* and representatives of NGOs of UP and Uttarakhand region were present. One entrepreneur from Maharashtra also attended.



Mr A K Goel, along with Dr M O Garg, presenting a cheque of Rs 20,000 to Mr Prakash Chand of Biharigarh who adopted the technology recently

The owners of the *gur bhattis*, who had adopted the technology, discussed their experiences. Other problems of the *gur bhatti* owners were also discussed.

### 3.7 COLLOQUIA

- Dr Shreeram Oak, NULAB, New Delhi, '*FTIR Spectroscopy – Application in Petroleum and Environmental Science*', April 27, 2006
- Dr Rajeev Tyagi, MBBS, MD, DM, Endocrinologist, Dehradun '*Diabetes*' and Miss Renu Jain, Dietician, CMI, Dehradun, '*Diet in Diabetes*', May 10, 2006
- Dr V V Mahajani, Professor, Chemical Engineering Department, UICT, Mumbai University, '*Intensifying Profits Through Process Intensification*', June 8, 2006
- Dr Adarsh Kumar, RMO, IIP, '*Introduction, Impact and Management of Osteoporosis*', July 6, 2006
- Dr (Ms) Jhuma Sadhukhan, Lecturer, Centre for Process Integration (CPI), School of Chemical Engineering & Analytical Sciences, University of Manchester, '*Process Integration Extends Its Reach*', August 28, 2006
- Dr M Laxmi Kantam, IICT, Hyderabad, '*Green Chemical Approaches to Organic Synthesis*', September 25, 2006
- Dr Madhav P Maithani, Consultant, Disha Hospital, Dehradun, A talk on '*How to be happy and satisfied with what we have, yet keep working for what we want*', November 9, 2006
- Prof Jan Andersson, Institute of Inorganic and Analytical Chemistry, University of Munster, a series of lectures on '*Analytical Aspects of Petroleum Hydrocarbons*', November 14 - 15, 2006
- Prof Ramesh Chandra, Nano Technology Centre, Instrumentation Research Centre, IIT-Roorkee, '*Nano-structured coatings by physical vapour deposition for tribological applications*', December 1, 2006
- Prof Krishna Rajagopal, Department of Chemical Engineering, Federal University of Rio-de-Janeiro, Brazil, '*Modelling Pyrolysis & Carbonization of Petroleum Distillation Residues for Producing more Diesel*', January 10, 2007
- Prof B Leucke, Dr Andreas Martin, and Dr Angela Koeckritz from Leibniz-Institut für Katalyse e.V. an der Universität Rostock, Außenstelle Berlin, talks on '*Catalytic selective oxidation of aromatic compound; ammoxidation of methylaromatic compounds : mechanistic insights by in situ studies*' and '*Catalysis applied to fine chemicals*' (respectively), February 19, 2007
- Dr Rakesh Gilhotra, MD [Chest Medicine], Gold Medallist, PGI MS-Chandigarh, practicing at Dehradun, '*High Blood Pressure*', February 22, 2007
- Mr Sanjay Kale, SPO, IIP, '*Information on Amended Purchase Procedure of CSIR*', May 14, 2007

- Mr M A Khan, Technical Officer and Mr Balamurugan, Scientist, NAL, Bangalore, Demonstration of the 'Arogya' Software (installed at the Institute's Medical & Health Centre), May 16, 2007
- Dr B R Nautiyal and Dr Manoj Srivastava, Scientists, Colloquium-cum-awareness programme on 'Web of Science, Derwent Innovative Index and Delphion', May 29, 2007
- Prof S K Brahmachari, Director, Institute of Genomics and Integrative Biology, New Delhi, 'Institutional Transformation', June 8, 2007
- Dr Lalji Dixit, Scientist, IIP, 'Science of Beauty and Flora & Fauna of IIP', June 25, 2007
- Mr Suresh Kumar, Senior Consultant, CAMO Software India Pvt Ltd, Bangalore, 'Multivariate Data Analysis and Unscrambler, Products of CAMO Software Inc., Norway', July 11, 2007
- Dr V R Bhate, Dionex India, New Delhi, 'Advances in Ion Chromatography', August 9, 2007
- Petrochemicals, UK, June 25-July 2, 2006
- Dr A N Goswami, Scientist, 'Annual Project Review Meeting' of the Indo-Norway project at SINTEF, Oslo, Norway and to visit NTNU, Statoil R & D Centre, Trondheim, Norway, June 25-June 30, 2006
- Dr Mukesh Saxena, Scientist, 'Automobile Fuel Quality Workshop', Manila, Philippines, August 22, 2007
- Dr Soumen Dasgupta, Scientist, SINTEF, Oslo, Norway under the IIP-SINTEF collaborative project (supported by INPIC/NORAD), Norway, August 31-September 30, 2006
- Dr A Datta, Head, ASD, visited Germany under the DST-BMBF Indo-German project on 'Hydrogen production by catalytic reforming of glycerol in aqueous medium' during Oct. 22-November 5, 2006
- Mr A K Aigal and Mr Sunil Pathak, Scientists, visited the Czech Republic and Austria for pre-acceptance test and operational training for the Dynamic Test-Bed (Chassis Dynamometer), November 20-24, 2006

### 3.8 DEPUTATION OF IIP'S S&T PERSONNEL ABROAD

- Mr G S Dang, Scientist, '7<sup>th</sup> European Gasification Conference' and a workshop on 'Something for Nothing', Barcelona, Spain, April 26-27, 2006
- Dr Suman Lata Jain, Research Associate, 'Seventh Tetrahedron Symposium – Challenges in Organic Chemistry', Kyoto, Japan, May 24-26, 2006.
- Dr Suman Lata Jain, Research Associate, attended a meeting of the Nobel Laureates and Students in Chemistry at Lindau and visited various research institutes under the DST/ DFG sponsorship, Germany, June 24- July 8, 2006
- Dr M O Garg, Director, 'Annual Project Review Meeting' of the Indo-Norway project, SINTEF, Oslo, Norway and to visit NTNU, Statoil R&D Centre, Trondheim, Norway, June 25-July 2, 2006
- Dr M O Garg, Director, M/s Huntsman
- Dr M O Garg, Director, the Centre for Management Technology, Singapore 'Asia Fuels 2007 Conference,' organized by Singapore, March 1-2, 2007, and meetings with the Petrochemical Corporation of Singapore Ltd, the Singapore Refinery Company and the National University of Singapore, February 27 and the Criterion Asia Pacific, February 28, 2007
- Dr V V D N Prasad, Scientist, visited South Korea for one year (15.03.2007 to 14.03.2008) under the Brain Pool Programme of the Korean



- Federation of Science & Technology (KOFST) at the Korea Research Institute of Chemical Technology
- Dr A N Goswami, Scientist, '*Sixth Annual Conference on Carbon Capture & Sequestration*', the Department of Energy, USA organized by Pittsburgh, Pennsylvania, May 7-11, 2007
  - Dr Anshu Nanoti, Scientist, '*9<sup>th</sup> International Conference on Fundamentals & Adsorption*', Giardini Naxos, Sicily, Italy, May 20-25, 2007
  - Dr M O Garg, Director, visited UK and Norway under the UK-India Energy Research Initiative (UKIERI) scheme. He visited the Imperial College, London, University of Manchester and University of Newcastle-upon-Tyne and held discussions for preparation of joint research proposals. He was invited by the Indo-Norway Programme for Institutional Cooperation (INPIC) to attend its '*Programme Closure Workshop in Oslo, Norway*', May 22-29, 2007.
  - Dr G Murali Dhar, Scientist, to deliver a lecture at the '*Seminar on Nano-catalysis*' organized by the Indo-French Centre for the Promotion of Advanced Research (IFCPAR), Poitiers, France, May 23-25, 2007
  - Dr J K Gupta, Scientist, training on equipment C-80 Microcalorimeter at M/s SETRAM Instrumentation, France June 4-8, 2007
  - डॉ॰ दिनेश चमोला, वरिष्ठ हिंदी अधिकारी एवं संपादक '*विकल्प*', '*आठवाँ विश्व हिंदी सम्मेलन*', न्यूयॉर्क, अमेरिका, 13-15 जुलाई, 2007
  - Mr G S Dang, Scientist & Head, RCD, accompanied the Engineers India Ltd team and visited the Sohar Refining Company (SRC), Sohar, Oman, August 21-22, 2007
  - Dr T Bhaskar, Scientist, '*4<sup>th</sup> International Symposium on Feedstock Recycling of Plastics and other Polymeric Materials*', Jeju Island, South Korea, September 16-20, 2007
  - Dr D K Adhikari, Scientist, '*International Conference on Thermophiles 2007*' organized by the University of Bergen, Norway, September 24-27, 2007
  - Dr A Datta, Scientist-G & Head, ASD, visited the Instituto dei Materiali Nanostrutturati-Sezione di Palermo (CNR-ISMN), Italy, October 28 – November 8, 2007
  - Mrs Pushpa Gupta, Technical Officer, '*30<sup>th</sup> Course of International School in Geophysics on CO<sub>2</sub> Capture and Storage: Towards a UK-Italy Common Strategy Within a Global Framework*', Erice, Italy, November 1-7, 2007
  - Dr J K Gupta, Scientist, for research work on '*Light Alkane Alkylation Over Solid Acid Catalysts*' with Prof Dr J A Lercher, Technische Universitat Munchen, Garching, Germany, under Scientific Bilateral Exchange Programme of INSA, March 1 to May 31, 2008
  - Dr Asha Masohan, Scientist, '*Annual Meeting*' of the National Petrochemical & Refiners Association (NPRA), San Diego, California, USA, and to visit Prof Gary T Rochelle, University of Texas, the Research Triangle Institute, North Carolina, the Worcester Polytechnic Institute, Worcester, Massachusetts, Mar 9-16, 2008

The background features a light purple color with several overlapping circles of varying shades. A white grid pattern is visible in the lower half of the image, consisting of both horizontal and vertical lines.

4

# Research Activities: On-Going & Completed

## 4.1 'SUPRA-INSTITUTIONAL' PROJECT (SIP) -19

The CSIR-IIP proposed a project under the XI Five-Year Plan known as 'Supra-Institutional' Project (SIP) entitled "To develop know-how technology for environment-friendly conversion and utilization of bio-mass to fuels, lubricants and additives". The project takes the concept of sustainable & renewable energy, energy-efficient processes as well as reduced environmental pollution. This Supra project aims at the involvement of all the human resources of the Institute and consists of twenty sub-projects without deviating from the main objective. These sub-projects are:

- ❖ Development and improvement of heterogeneous catalyst for bio-fuels
- ❖ Pilot plant, scale-up and commercialization of bio-diesel process
- ❖ Development of technology/process for the 2<sup>nd</sup> generation transport fuels (green diesel)
- ❖ Development of suitable catalysts for 1, 2-propanediol and/or hydrogen production through aqueous phase reforming of glycerol
- ❖ Important chemical intermediates from glycerol
- ❖ Modified alkyd resin development for value addition to glycerol
- ❖ Development of catalyst for production of ether from glycerol
- ❖ Development of process know-how for bio-ethanol production from cellulose and starchy bio-mass using thermophilic micro-organisms
- ❖ Process & technology for production of liquid and gaseous fuels by fast pyrolysis of bio-mass
- ❖ Development of eco-friendly additives and lubricants
- ❖ PSA process development for CO<sub>2</sub> recovery from bio-mass pyrolysis
- ❖ Development of absorption-based technologies for CO<sub>2</sub> capture from bio-mass gasification flue gases
- ❖ Development of life cycle analysis model for bio-mass conversion to bio-fuels
- ❖ Development of methods for compositional analysis of bio-fuels, bio-lubricants & additives
- ❖ Engine performance studies on bio-fuels, bio-lubricants and additives

- ❖ Tribological studies of bio-lubricants & fuels
- ❖ Corrosion behaviour studies on bio-fuels, bio-lubricants and additives
- ❖ Additive development and oxidative stability studies on bio-fuels and bio-lubricants

The Supra project kick-started in March, 2007 with a tenure of five years and a cost of Rs. 35 crores.

## 4.2 CSIR NETWORK AND NMITLI PROJECTS

### CSIR Network Projects

IIP participated in several CSIR network projects.

A joint meeting of the Review Committee and the Steering Committee of these projects for setting up modernized emission measurement facility at IIP was held at the Institute on Dec. 13, 2006.

#### Meetings under the CSIR Network Project '*Developing New-Generation Fuels & Lubricants*'

The Monitoring Committee of the above project met in the Institute campus on December 29, 2006. Dr A K Bhatnagar, Chairman, Dr K K Bhattacharya and Dr P Ratnasamy, Members, were present.

A day prior to this, the Steering Committee meeting of the project was held at the Institute. Dr KV Padmaja, IICT-Hyderabad; Dr A Pardhy, NCL-Pune; Dr S R K Rao, CFRI-Dhanbad; Dr Rajinder Parshad, RRL-Jammu; Dr R K Sukumaran, RRL-Trivandrum; Dr T Raja, and Mr B B Bokade, NCL-Pune attended the meeting.



*The Monitoring Committee of the CSIR Network Project on 'Developing New Generation Fuels & Lubricants' in session (year 2006)*

### NMITLI Projects

- ❖ Oxidation of aromatic compounds
- ❖ Non-oxidative conversion of methane to ethylene



- ❖ Development of catalyst for selective oxidation of light hydrocarbons
  - ❖ Environmental catalyst-DeNO<sub>x</sub> for Diesel Euro IV/V compliance
  - ❖ Development of Gas-to-Liquid technologies for DME and Fischer-Tropsch fuels
  - ❖ Development of liquid fuels and ethanol production from biomass
  - ❖ Development of biodegradable lubricants from vegetable oils, sugars, starch and cellulose
  - ❖ Development of catalyst for atmospheric residue processing
  - ❖ Performance evaluation of new-generation automotive fuels to meet emission norms
  - ❖ Development of a polymer-based oil additive like the pour point depressant, the viscosity index improver and the polymeric dispersant
  - ❖ Development of modified bitumen through molecular alteration in short residue (polymerization & condensation)
  - ❖ Development of compositionally controlled multigrade bitumen
  - ❖ Development of adsorption technology for treatment of furfural and N-methyl pyrrolidone (NMP)-laden aqueous streams
  - ❖ Development of pressure swing adsorption technology for recovery of VOC'S from refuelling emissions from storage tank
  - ❖ Support aqueous/liquid phase absorbents and adsorption for gas separation
  - ❖ Globally competitive chemicals, processes and products
  - ❖ Physico-mechanical, electrical and electronic standards
  - ❖ Thermo-catalytic conversion of biomass to hydrogen
  - ❖ Hydrogen production by thermo-catalytic decomposition of methane
- #### 4.3 SPONSORED PROJECTS
- Completed
- Application of ribotyping technique of DNA for the characterization and enumeration of oil reservoir bio-diversity
  - Studies on effect of gasoline composition (benzene, aromatics and olefins content) on exhaust emissions from two-wheelers
  - Studies on the effect of fuel additives for performance and mass emissions on light commercial vehicles
  - Evaluation studies on crude oils from IOCL
  - Study of shear stability property of hydraulic oils
  - Evaluation of lubricating oils for their EP & wear properties
  - Short evaluation studies on crude oil sample from Kanwara Oil Field, Gujarat
  - Studies on the quality of HSD samples as per BIS 1460:2005 (BIS Stage-II) and composition of sediments in sample
  - Feasibility study for setting up NTGG unit at Hazira plant
  - Studies on the RAM rocket fuel T-6 from DRDL, Hyderabad
  - Catalyst development for isomerization of light naphtha
  - Evaluation of pipeline corrosion inhibitor
  - Short assay of Ankleshwar crude oil
  - Study of the deposit characteristics of four-stroke two-wheeler engines
  - Studies on development of regenerative process for sulphur-di-oxide removal from lean gas streams
  - Short evaluation studies on Assam Mix crude oil
  - Short evaluation studies on two crude oil samples and also the Digboi crude oil sample from Oil India Ltd., Duliajan, Assam
  - Studies on the naphtha samples of CPF, Gandhar and LPG plant, Ankleshwar
  - Preparation of carbon spheres from petroleum pitch precursor
  - Generation of basic design data for NTGG process and setting up of a demo plant at Vaghodia
  - Development of catalysts for ultra-deep desulphurization of gas oil

- Evaluation of lubricating grease
  - Sulphur reduction in naphtha product obtained by fluid catalytic cracking (FCC) (Part II)
  - Study on diesel buses for evaluation of fuel efficiency at different speeds
  - Development of methodology for measurement of CNG consumption on-board CNG bus
  - Preparation of on-grade fuel oil (REO 370) from pitch sample
  - Evaluation of fuel saving pill of M/s Fire Power Energy (India) Pvt. Ltd. for fuel economy on gasoline passenger car
  - Studies on the quality of bio-diesel used as an additive coded (Bio Super-12) as per BIS 15607:2005 (Bharat Stage-II) including particle size distribution
  - Studies on the composition of gasoline and comparison with BIS 2796:2005 specification parameters from the Central Excise Office, Raibareilly, India
  - Development of bio-catalytic process for desulphurization of diesel
  - Evaluation of thermophilic bacteria as potential bio-catalysts
  - Feasibility of producing high specification aromatics from straight-run naphtha using IIP's NMP extraction technology
  - Studies on use of bio-diesel (B-100) in an automotive diesel engine for performance & emissions [Phase-I]
  - Feasibility studies for making on-grade bitumen, using pitch
  - Short evaluation studies on four crude oil samples from ONGCL, Assam
  - Scientific and technical support for improving benzyl alcohol plant
  - Development and commercialization of Catalyst-I and Catalyst-II
- On-going**
- Development of catalysts for ultra deep desulphurization of gas oil
  - Studies on now-how for super-critical solvent recovery in PDA technology
  - Studies on development of regenerative process for sulphur dioxide removal from lean gas streams
  - Development of polymer modified bituminous binder
  - Development of low-capacity LAP burners for ceramic/pottery industry at Khurja
  - Bio-diesel from *Jatropha curcas* oil and its study on vehicles including field trials
  - Development of process for oxidative desulphurization of diesel
  - Pinch analysis of FCC units
  - Setting up modernized emission measurement facility
  - New absorption-based approaches for CO<sub>2</sub> recovery
  - Utilization of waste cooking oil restaurant grease for production of bio-diesel
  - Optimization studies of HPCL NMP lube extraction unit
  - Development of mesoporous vanadium phosphates as potential catalysts for selective oxidation of hydrocarbons
  - Development of pressure swing adsorption technology for CO<sub>2</sub> capture
  - Study on performance improvement of the small *gur*-making plant by improving the fuel-feeding platform, fuel gratings and chimney systems
  - To study the deposit characteristics of four-stroke, two-heeler engines
  - Development of catalyst and process for the conversion of waste plastic & low polymer wax into value added hydrocarbon
  - Studies and detailed evaluation of NIKO crude oil sample
  - Popularization of 'Sona ESV' in *dhabas* in and around Dehradun
  - Detailed evaluation studies on crude oil samples from Sabarmati Field of Oilex, Vadodara
  - Study on stock losses at ROs/COCOs
  - Studies on re-refining of used oil through MP

- extraction for production of Group-II base oil
- Utilization of glycerol to 1, 3/1, 2 propane diol
- Synthesis of room temperature ionic liquids and study n heir applications for extraction of sulphur, nitrogen & aromatic compounds from petroleum feedstock
- Optimization study on food-grade hexane production unit at HPCL, Mumbai
- Feasibility study for integration of adsoprtive desulphuriztion with DHDS
- Preparation of novel mesoporous vanadium phosphate phases as potential catalyst from selective oxidation
- Hydrogen production by catalytic reforming of glycerol in aqueous medium

#### 4.4 IN-HOUSE PROJECTS

##### Complete

- Development of girth gear lubricant
- Development of corrosion inhibitor for petroleum product pipe-lines
- Development of catalyst and process for conversion of plastic waste into value-added hydrocarbons
- To study and optimize the combustion process of diesel-water and diesel-water-ethanol emulsions in a diesel engine
- Utilization of glycerol to 1,3/1,2 propane diol
- Studies in transition metal-mediated organic transformation
- Development of an environment-friendly re-refining technology for used lubricating oils
- Studies on modified ZSM-5 zeolite for the aromatization reactions of normal paraffins
- Development of additives for FCC process
- Upgradation of light cycle oil using solvent extraction
- Synthesis of polyol esters for market evaluation
- Structural studies and coke characterization of some petroleum refining catalysts (FCC/DC) by multinuclear solid state NMR
- Exploratory studies on novel material supported Co-Mo hydrodesulphurization catalysts

- Study of failure phenomena in thin film lubrication regime as a function of contact temperature
- Development of natural gas conversion system for portable gensets to run on domestic natural gas

##### On-going

- Development of an environment friendly re-refining technology for used-up lubricating oils
- CFD studies on two-phase flow patterns in industrial flow contractors
- Development of environment-friendly extraction technology using room temperature ionic liquids
- Development of technology for production of pure benzene using extractive distillation route
- To study the feasibility for removal of PCA from FGH for meeting the PCA specifications in FGH
- Development of water soluble catalyst for fixed-bed sweetening process
- Development of bottom cracking additives for FCC process
- Biotechnological approach for upgradation of petroleum crude oil
- Investigations into the aspects of engine performance, emissions, durability & lubricant requirements of HCNG fuelled passenger cars
- Investigating the effect of engine oil viscosity on fuel consumption and exhaust emission
- Lubricated wear of steel
- Studies on the mechanism of degradation behaviour of distillate fuels
- Physico-chemical characterization of automotive and industrial lubricants
- Preparation, characterization and catalytic activity of new and metal-incorporated vanadium phosphates
- Trace metal analysis of petroleum products and related materials
- Characterization of refinery streams by gas chromatography
- Development of HPLC methods for characterization of petroleum and related products.



The background features a light blue color palette. It includes several overlapping, semi-transparent circles of varying shades of blue. At the bottom of the page, there is a white grid pattern that curves upwards, resembling a dome or a perspective view of a grid. The overall aesthetic is clean and modern.

5

Addition of  
R&D  
Facilities

## 5.1 FACILITIES CREATED / UPDATED

### Biomass Fast Pyrolysis Unit

Mr V Subramanian, Chairman, Research Council dedicated the Biomass Fast Pyrolysis Unit to the Institute. This unit is designed and tailor-made to study the pyrolysis of biomass for products of liquefied bio-oils and its further processing to yield transportation fuel and valuable chemicals.



*Mr V Subramanian with the inaugural plaque*

### Delayed coking studies

A lab-/bench-scale Delayed Coking Unit was set-up with a feed capacity of about 4 lit/hr for undertaking delayed coking studies on vacuum residues to produce anode/needle coke. The unit was successfully commissioned.

### Setting up of GTL Lab

State-of-the-art facilities for development of catalysts and processes for gas-to-liquid fuels have been created in the Institute for the first time. This includes Syngas generator, microprocessor-based high-pressure fixed-bed reactor unit for Fischer-Tropsch fuels and DME synthesis with on-line GC analyzer and gas distribution system with gas leak detectors. These facilities are being utilized for various catalytic reaction studies with gaseous hydrocarbon feedstocks with a view to evaluate key process parameters and conditions associated with catalyst activity/selectivity, catalyst development and regeneration.



*Overview of GTL lab containing Synthesis gas generation unit, high-temperature fixed-bed reactor and high-pressure fixed-bed reactor units for FT and DME synthesis*

### Automated Titrator

'Metrohm Model 808 Titrando' was installed which is used to carry out different types of titrations as given below:

- Aqueous / Non-aqueous pH titrations
- Precipitation titrations
- Redox titrations
- SET titrations

Titrations are required to determine sulphur content, mercaptan, hydrogen sulphide, Acid and Base Number, chloride content, salt content, Bromine Number/Index, Iodine Number, Diene Value and pH Value etc. of different samples.

### Bomb Calorimeter

An automatic and sophisticated Bomb calorimeter was installed and commissioned. The instrument is capable of determining gross calorific value of all types of solid and liquid fuels with an accuracy of 0.001 cal / gm. It has many advanced features with automatic operations (firing, bomb rinsing, wash discharge etc.) except the fuel sample loading.

### Fermentation Units

Fermentation units consisting of 3l and 5l working capacity vessels can be operated simultaneously by single controller to control agitation, temperature, pH, dissolved oxygen, redox potential, foam, liquid level and four-inlet gas mix in each unit. The fermentors are



*Automatic Bomb Calorimeter*

hooked up with a computer to monitor and control the different operating parameters including the exhaust gas from each unit.

#### Multi-specimen Tribo-Tester

The rig was installed which would be utilized for both basic and applied types of research in the area of tribology addressing, mainly, the aspects related to lubricant and machine components. The rig has provisions for a wide range of operating conditions of load and speed and a large number of contact geometries of the test specimen.

#### Atomic Absorption Spectrometer (AAS) for Trace Metal Analysis

'Solar M6 Dual Zeeman Atomic Absorption Spectrometer' has Flame as well as Graphite Furnace facilities. Flame provides trace analysis facilities for ppm/ppb whereas Graphite Furnace provides trace analysis facilities (sub-ppb) when used with Zeeman Furnace Spectrometer and Data Station. Graphite Furnace can be used with Zeeman as well as Quadline Deuterium Background Correction. Flame and Furnace Auto Sampler provides automatic sampling, standard presentation and preparation for both Flame and Graphite Furnace systems. AAS also has a new intelligent dilution system for both samples as well as standard in Flame and Furnace system which minimizes the analysis time significantly.



*Atomic Absorption Spectrometer*

#### Medical & Health Centre Computerized

To provide faster and quality services the Medical & Health Centre of the Institute has been now fully computerized by installation of a versatile IT tool, viz. the 'Arogya' software.

The software was developed in-house by the National Aerospace Laboratories, Bangalore, one of the constituent laboratories of CSIR where it is being used for the last two years. The Institute is thankful to the Director, NAL for providing the software and the NAL team consisting of Mr M A Khan, Technical Officer, Mr R Balamurugan, Scientist and Dr Amar Narayanan, Medical Officer, who installed and implemented the software at IIP.



*Dr (Mrs) Lalita Bakaya, Sr. RMO, IIP, giving a demonstration of the software to Dr Rakesh Kumar (third from Left).*





6

In and Around  
the Campus

## 6.1 IMPORTANT EVENTS

### Contribution to Rural Development

Dr M O Garg, Director, IIP presented a cheque of Rs 5000/- as an incentive to Mr Mohammed Yasin of Kurkawala, Derhadun on behalf of PCRA for adopting IIP Technology for improvement of his Jaggery plant (*Gur Bhatti*)



*Dr M O Garg presenting a cheque of Rs 5,000/- to Mr M Yasin*

### Visit to Industries as Members of the SCMC Committee

Dr M O Garg, Director, IIP and Mr G S Dang, Scientist, visited various industries in UP and Bihar as members of the Sub-committee of the Hon'ble Supreme Court Monitoring Committee on Hazardous Waste Management in the Country (May 22-27, 2006).

### Programme on CSIR E-journal Awareness

Representatives of various publishers, viz. John Wiley & Sons, Taylor & Francis, Oxford University Press, American Society of Mechanical Engineers, Royal Society of Chemistry, Black Well, Emerald and Springer gave presentations on accessing e-journals on August 11, 2006.

### Vigilance Awareness Weeks

During the Vigilance Awareness Weeks celebrated in this period, different activities were organized like the Vigilance Pledge, Quiz Competition, and the staging of a

Hindi play entitled '*Office ka Ek Din*' (in 2006) by the IIP staff. Dr M O Garg, Director, IIP, administered a pledge against corruption on the employees.



*A scene from the Hindi play 'Office ka Ek Din' during Vigilance Awareness Week, 2006*

## सामाजिक एवं सांस्कृतिक गतिविधियां/SOCIAL & CULTURAL ACTIVITIES

### वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद् स्थापना दिवस समारोह

26 सितंबर, 2006 को भापेसं स्टाफ क्लब द्वारा एक सांस्कृतिक संध्या आयोजित की गई, जिसमें संस्थान के कर्मचारियों व उनके परिवारों और साथ ही स्थानीय विद्यालयों के द्वारा स्थानीय संस्कृति पर आधारित विभिन्न प्रस्तुतियां जैसे-- '*जागर*', '*नंदा देवी राजजात यात्रा*', गीत, गजलें एवं नृत्य आदि मंचित की गई।



*वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद् स्थापना दिवस 2006 पर आयोजित सांस्कृतिक संध्या में प्रस्तुत एक कार्यक्रम की झलक*

26 सितंबर, 2007 को सांस्कृतिक गतिविधि के रूप में भापेसं स्टाफ क्लब के सदस्यों द्वारा स्थापना दिवस की पूर्व संध्या पर एक नाटक 'आस औलाद' का मंचन किया गया।



वैऔअप स्थापना दिवस, 2007: नाटक 'आस औलाद' का एक भावपूर्ण दृश्य। (दाएं से) वृद्ध पिता की भूमिका में श्री प्रमोद जोशी, पौत्र की भूमिका में मास्टर शुभम्, पुत्रवधू की भूमिका में श्रीमती अनीता एवं पुत्र की भूमिका में श्री संजय पोखरियाल

#### अंतर्राष्ट्रीय महिला दिवस पर वाक् प्रतियोगिता, 8 मार्च, 2007

अंतर्राष्ट्रीय महिला दिवस (8 मार्च) के अवसर पर महिलाओं से संबंधित मुद्दों पर जागरूकता बनाए रखने की दृष्टि से भापेसं स्टाफ क्लब द्वारा संस्थान में 'राष्ट्रीय विकास में महिलाओं की भूमिका - वर्तमान परिदृश्य' विषय पर एक वाक् प्रतियोगिता का आयोजन किया गया, जिसमें सुश्री भावना पारीख ने प्रथम, श्री हरभजन सिंह ने द्वितीय एवं श्रीमती एस पद्माकुमारी ने तृतीय स्थान प्राप्त किया।



अंतर्राष्ट्रीय महिला दिवस, 2007: प्रथम पुरस्कार-प्राप्त प्रतियोगी को पुरस्कृत करते हुए श्री वी एस सैनी, वरिष्ठ वैज्ञानिक, भापेसं

#### विश्वकर्मा पूजा

17 सितंबर, 2006 एवं 2007 को विश्वकर्मा पूजा के अवसर पर सामूहिक भोजों का आयोजन किया गया जिनमें सभी कर्मचारियों ने उत्साहपूर्वक भाग लिया।



विश्वकर्मा पूजा, 17 सितंबर, 2007

#### खेल गतिविधियां/ SPORTING ACTIVITIES

(भापेसं स्टाफ क्लब के तत्वावधान में / Under the auspices of the IIP Staff Club)

- श्री देवेन्द्र राय (बैडमिंटन), सर्वश्री सतीश चन्द्र भट्ट व मयंक मिश्र (टेबल टेनिस-युगल-पुरुष) एवं सर्वसुश्री आशा पंत व स्मिता दरमोड़ा (टेबल टेनिस-युगल-महिला) ने अपने-अपने क्षेत्र में राष्ट्रीय धातुकर्म प्रयोगशाला, जमशेदपुर (झारखंड) में सितंबर 15-17 के मध्य आयोजित '38वें शान्ति स्वरूप भटनागर स्मृति ज़ोनल (इंडोर) टूर्नामेंट' में प्रथम ज़ोनल प्रतियोगिताओं में विजयश्री प्राप्त की।
- केंद्रीय यांत्रिक इंजीनियरी अनुसंधान संस्थान, दुर्गापुर (प० बंगाल) में 16-18 नवंबर, 2007 के दौरान संचालित '39वें शान्ति स्वरूप भटनागर स्मृति ज़ोनल टूर्नामेंट (बाह्य)' में भापेसं (स्टाफ क्लब) के वॉलीबॉल दल ने अपने समूह की स्पर्द्धाओं पर सर्वश्रेष्ठता सिद्ध की। इसी टूर्नामेंट में भापेसं (स्टाफ क्लब) के क्रिकेट दल ने भी प्रतिभागिता करते हुए उत्तम खेल भावना एवं स्पर्द्धात्मक प्रतिभा का प्रदर्शन किया।
- 18-20 दिसंबर, 2007 के मध्य एन ई आइ एस टी, जोरहाट में आयोजित लीग प्रतियोगिताओं में भी आगे रह कर भापेसं (स्टाफ



क्लब) के वॉलीबॉल दल ने पूर्वान्तिम प्रतिद्वंद्विता में केंद्रीय भवन अनुसंधान संस्थान, रुड़की को पराजित किया और अंतिम स्पर्द्धा में प्रवेश किया। राष्ट्रीय वांतरिक्ष प्रयोगशालाएं, बंगलौर से हुई अंतिम स्पर्द्धा में भापेसं (स्टाफ क्लब) का दल उप-विजेता रहा। श्री राजीव पंवार तथा श्री राजेंद्र बडोला का, पूरी प्रतियोगिता के दौरान उनके बेहतरीन प्रदर्शन के आधार पर, वै.औ.अ.प. की वॉलीबॉल टीम में चयन हुआ। भापेसं (स्टाफ क्लब) वॉलीबॉल दल के अन्य सदस्य थे:- सर्वश्री देवेंद्र बुटोला, राजवीर नेगी, जी सी बहुगुणा, आर एन शर्मा, पुष्पराज शर्मा एवं शिव सिंह रावत।



39वां शांति स्वरूप भटनागर स्मृति टूर्नामेंट : भापेसं (स्टाफ क्लब) का वॉलीबॉल दल निदेशक डॉ. एम ओ गर्ग सहित



केन्द्रीय सरकार कर्मचारी कल्याण समन्वय समिति क्रिकेट टूर्नामेंट: संस्थान का विजेता क्रिकेट दल ट्रॉफी के साथ

- Mr S C Bhatt, Sr. Steno, participated in the 'Uttaranchal State Table Tennis Championship' organized by the Uttaranchal State Table Tennis Association (November 4-6, 2006) as a member of the Team of the Dehradun Zone which won the Men's Team Event. In the Men's Individual Event, Mr Bhatt reached the quarter-finals.
- फरवरी-मार्च, 2008 के दौरान 'केन्द्रीय सरकार कर्मचारी कल्याण समन्वय समिति,' देहरादून द्वारा आयोजित क्रिकेट टूर्नामेंट माह में 24 टीमों ने भाग लिया और इसमें संस्थान की क्रिकेट टीम प्रथम रही। इसने फाइनल मैच में महालेखाकार, उत्तराखंड की क्रिकेट टीम को 29 रनों से हरा कर विजयश्री प्राप्त की तथा श्री विपिन चंद्र, निदेशक (वित्त), भारतीय सर्वेक्षण विभाग, देहरादून, से 19 मार्च, 2008 को आयोजित समारोह में पुरस्कार प्राप्त किया।

- वैज्ञानिक एवं औद्योगिक अनुसंधान परिषद् (सी एस आइ आर) के पूर्व महानिदेशकों प्रो० वाइ नायडम्मा तथा डॉ० जी एस सिद्धू की स्मृति में प्रति वर्ष सी एस आइ आर स्पोर्ट्स प्रमोशन बोर्ड द्वारा आयोजित 'प्रो० वाइ० नायडम्मा स्मृति क्रिकेट' तथा 'डॉ० जी एस सिद्धू स्मृति टेबल टेनिस टूर्नामेंट' का आयोजन इस वर्ष संस्थान में 14-16 फरवरी, 2008 के दौरान हुआ। इसका शुभारम्भ अंतर्राष्ट्रीय ख्याति प्राप्त क्रिकेट खिलाड़ी एवं 1983 में विश्व कप जीतने वाली टीम के सदस्य श्री यशपाल शर्मा द्वारा 14 फरवरी, 2008 को किया गया।



नायडम्मा टूर्नामेंट :श्री यशपाल शर्मा (बाएं से दूसरे) स्मारिका का विमोचन करते हुए। अन्य (बाएं से दाएं) श्री यू सी गुप्ता, वैज्ञानिक, भापेसं, डॉ एम ओ गर्ग, निदेशक, भापेसं एवं श्री ए के राजदान, प्रशासन नियंत्रक, भापेसं

## In and Around the Campus

दोनों टूर्नामेंटों का समापन समारोह संस्थान के अतिथि गृह में श्री पी के भौमिक, एक्सीक्यूटिव डायरेक्टर, के.डी.एम.आइ.पी.ई., ओ.एन.जी.सी., देहरादून के मुख्य अतिथित्व में संपन्न हुआ।



नायुडम्मा टूर्नामेंट : श्री पी के भौमिक एवं डॉ. ए दत्ता के साथ डी आइ टी, नई दिल्ली का विजेता क्रिकेट दल

## Health - Related Activities

### Free Heart Check-up Camp, 2007

A two-day Free Heart Check-up Camp was organized in the Institute by the Escorts Heart Institute and Research Centre (EHIRC), New Delhi during Mar 24-25, 2007. The camp was a part of the Community Outreach Programme of the Escorts Heart Institute.



Dr M O Garg, Director, welcomes Dr Rakesh Kumar, DM, Dehradun to the Free Heart Check-up Camp as its Chief Guest

The programme was inaugurated by Dr Rakesh Kumar, District Magistrate, Dehradun. More than 350 persons were screened for heart-related ailments.



Medical Staffs of EHIRC and IIP Dispensary

## Voluntary Blood Donation Camps

Hon'ble Mr Sudarshan Agarwal, HE the Governor of Uttaranchal, inaugurated the camp and addressed a large gathering consisting of donors, volunteers and the staff of the Institute. He congratulated the entire staff of the IIP for organizing this blood donation camp and appreciated the efforts of Dr M O Garg, Director, IIP and his team for motivating such a large number of donors.

Medical support was provided by the Indian Medical Association (IMA) Blood Bank, Dehradun.



FOR A NOBLE CAUSE : The First Citizen of Uttaranchal is exuberant at the inauguration of the Blood Donation Camp





*A scene from the Blood Donation Camp, year 2006  
Dr Lalita Bakaya, Sr. RMO, is seen in foreground*

### Bone Mass Density Screening Camp

It was organized by the Institute's Medical & Health Centre on July 7, 2006, followed by counselling and treatment. Nearly, 200 patients were screened for osteoporosis and treatment was initiated for them.



*HEALTH FOR ALL : Dr Arunabha Datta (standing, front, rightmost) keenly discusses the function of the Bone Mass Densitometer*

### Technology in Practice

**Inauguration of Test Road Section Built with Polymer Modified Bitumen (PMB) Developed by the Institute, May 2007**

The performance of bitumen used in the making of roads is enhanced through the use of polymers such as elastomers, plastomers and crumb rubber. Thus, making Polymer Modified Bitumen (PMB) is becoming a standard practice. However, the performance enhancement depends upon the recipe, that is, the combination of the various polymers in a particular concentration, as well as on the physico-chemical characteristics of the raw bitumen. In the studies conducted at the Institute under a project funded by the Centre for High Technology (CHT) with Chennai Petroleum Corporation Limited (CPCL) as the industrial partner, desired quality bitumen was got made from the CPCL refinery using low-value streams available in the refinery. A recipe of making PMB suitable for this bitumen was developed by conducting exhaustive experimental work. On-grade PMBs were produced by M/s Hindustan Colas Limited, Chennai with three types of polymer recipes through complete homogenization of the polymers into bitumen.



*Dr K S Balaraman & Dr M O Garg jointly inaugurate the test road section. Mr U C Gupta & Dr (Mrs) Sangeeta Singh are seen at the right*

In order to establish the efficacy of these unique PMBs, the Institute got made a one-km-long test road section on the Delhi-Yamunotri road at Km No 223-224 by the



Public Works Department, Uttarakhand. The construction work of the test section was completed in May, 2007. The road section is being monitored jointly by the Institute and the Central Road Research Institute (CRRI), New Delhi for its physical conditions such as wear, deformation etc.



A view of the test road section on the Delhi-Yamunotri road at Km No 223-224

## 6.2 CELEBRATION OF IMPORTANT DAYS

### गणतंत्र दिवस समारोह

इन दोनों वर्षों में सदा की भाँति 26 जनवरी को गणतंत्र दिवस के अवसर पर राष्ट्रध्वज, राष्ट्रगान, राष्ट्रीयता व भारतीय संस्कृति के सम्मान स्वरूप विविध कार्यक्रम आयोजित किए गए। इन गतिविधियों में केंद्रीय विद्यालय, भापेसं के विद्यार्थी, अध्यापक तथा अन्य कर्मचारी सक्रिय रूप से सम्मिलित थे।



गणतंत्र दिवस 2007: निदेशक डॉ एम् ओ गर्ग सम्मान गारद का निरीक्षण करते हुए। कै० आर जे साइमन, सुरक्षा अधिकारी साथ दे रहे हैं



गणतंत्र दिवस 2008 के अवसर पर राष्ट्रगान के साथ राष्ट्र और राष्ट्रध्वज को सम्मान प्रदान करते हुए डॉ एम् ओ गर्ग

### National Science Day Celebrations (February 28)

On this occasion in 2007, Dr Lalji Dixit, Senior Scientist, IIP, delivered a lecture entitled '*Raman Spectroscopy of Nano Cars and Nano Trucks*'. Dr Dixit explained the Raman Spectroscopy for the characterization of materials in general, and nano-materials in particular.



Dr A Datta, Acting Director, IIP, lights the inaugural lamp at the National Science Day Celebration, 2007. Dr Lalji Dixit (R) looks on along with Mrs Sushila Singhal, Administrative Officer (Middle). Ms Vasudha (right-most) assists.

An absorbing lecture on '*Science and World View*' delivered by Dr D M Kale, Executive Director (R&D) and Chief, Energy Centre, Oil and Natural Gas Corporation, New Delhi, marked the celebration of the day(2008).



Dr D M Kale inaugurating the National Science Day Celebrations, 2008

#### IIP Foundation Day and Dr B R Ambedkar Jayanti Celebrations (April 14)

14<sup>th</sup> April is celebrated as the IIP Foundation Day which coincides with the birth anniversary of the great architect of the Indian Constitution, Dr B R Ambedkar.

The celebrations started with the garlanding of a photograph of Dr Ambedkar by the Chief Guest Mr Bipin Vora, Consultant & Ex-Fellow, UOP, USA and the staff led by Dr M O Garg, Director, IIP. A brief account of the life of Dr Ambedkar and his teachings was narrated by Mr Babu Lal, Technical Officer.

In his Foundation Day Lecture entitled 'Energy Challenges of the 21<sup>st</sup> Century for R&D', Mr Vora said that



Mr Bipin Vora of UOP, USA lighting the lamp on IIP Foundation Day, 2007. Others (L-R) Dr M O Garg, Director, Mr A K Razdan, CoA and Mrs Pratima Bagga

economic issues warrant CO<sub>2</sub> reduction, cheaper and more plentiful energy sources and lesser physical and chemical process steps. The industry must also capitalize on relevant progress in chemistry, catalytic science, computational horsepower, new materials discovery, more powerful R&D methodologies, new process miniaturization and intensification concepts.

#### National Technology Day Celebrations (May 11)

Dr Kirit S Parikh, Member Planning Commission, Government of India, delivered a lecture on 'R&D for Energy Technology' on May 11, 2006.

Dr Parikh said that the country is facing the challenges of uplifting the poor, reducing poverty and improving literacy. All this needs energy which should be safe, convenient and comparative.



(L-R) Mr V S Saini, Dr Kirit S Parikh, Dr M O Garg, Director and Mr M K Jain on the National Technology Day Celebrations, 2006

Dr Parikh suggested the creation of a National Energy Fund and exhorted R&D institutions to establish technology missions in energy in the fields like coal bed methane, coal gasification, carbon sequestration, IGCC, zero-emission initiative, thorium, solar/thermal/photovoltaic cells, bio-fuels, coal-to-gas and coal-to-liquids technologies.

A quiz competition and National Technology Day Lecture marked the celebration of National Technology Day-2007. Prof Rakesh Agrawal, Distinguished Professor, Department of Chemical Engineering, Purdue University, USA, enthralled the audience by his lecture on



'Environmentally Friendly Energy Solutions'. A brief presentation on 'Splitting the Atom for Energy' made by Dr Lalji Dixit, Scientist added another dimension to the main function.



National Technology Day 2007 (L-R) : Prof Rakesh Agrawal, Dr M O Garg, Director and Dr Lalji Dixit



Quiz competition in progress during National Technology Day 2007 Celebrations. Dr(Mrs) Asha Masohan, Scientist, in the role of the Quiz Master

### World Environment Day Celebrations (June 5)

In the year 2006, a lecture on 'Emerging Trends in Chemical Engineering With Reference to Environment' was delivered by Dr B D Kulkarni, Shanti Swarup Bhatnagar Awardee & Deputy Director, NCL, Pune, who said that scientists and engineers have a greater role to play in the conservation of environment by way of developing environment-friendly technologies and improving the existing technologies to minimize waste generation.



Planting for environment on World Environment Day 2006 : Dr B D Kulkarni, Dr M O Garg, Director & Mr S K Sadana, Controller of Administration

Petroleum industry is the world's sixth largest chemical industry. It is also a major contributor in CO<sub>2</sub> production. For IIP, working in developing cleaner fuels, the World Environment Day has a greater significance. This year (2007) Dr Ram B Gupta, Professor, Department of Chemical Engineering, Auburn University, Auburn, USA, delivered a talk on 'Hydrogen Fuel for a Cleaner & Sustainable World' on this day.



Dr Ram B Gupta talking about hydrogen as the future fuel on World Environment Day 2007

### CSIR Foundation Day Celebrations (September 26)

On the occasion of the CSIR Foundation Day 2006, the first half of the day was observed as an OPEN DAY and laboratories were kept open for visits by the school children. More than 300 students from 10 schools visited the Institute. They interacted with the scientists and





*OPEN DAY : Students from local schools get a peep into the research work being carried out at the Institute on CSIR Foundation Day 2006. Mr Satish Kumar, Technical Officer (Left, holding stove), explains*

showed keen interest in the exhibition, especially arranged for the students on this occasion.

In the main function later in the day, the Chief Guest Mr D M Katre, Senior Vice President, Reliance Industries, delivered the CSIR Foundation Day Lecture on 'A Journey to Excellence: the Life at Reliance Jamanagar'.

In 2007, Mr L Mansingh, Chairperson, Petroleum & Natural Gas Regulatory Board, Govt. of India, New Delhi delivered the CSIR Foundation Day Lecture on 'Regulatory Framework in Oil & Gas Sector'.

In his lecture Mr Mansingh said that while the indigenous



*Mr L Mansingh lighting the lamp on CSIR Foundation Day 2007*

production of crude oil has been stagnant over the last 6 years the demand is increasing at an exponential rate. The demand of petroleum is expected to rise to 368 million tonnes per annum and that of natural gas to 125 billion cubic metres by 2025.

### Oil and Gas Conservation Fortnight (January 14-31)

Under the theme 'Save Oil, Save Gas, Save Our Children', the inaugural function of the Oil and Gas Conservation Fortnight-2008 was held at the Institute on January 15th. The Fortnight is organized all over the country every year by all public sector oil marketing companies in association with the Petroleum Conservation Research Association (PCRA). The Institute participates actively in the fortnight activities.

Mr S Ramaswamy, IAS, Secretary to H.E. the Governor of Uttarakhand, and Secretary, Ministry of Transport, Govt. of Uttarakhand inaugurated the Fortnight and administered a pledge on the audience for the conservation of petroleum products.

The school-children and the IIP staff formed a human chain at the end of the function and dedicated themselves for the conservation of petroleum products.



*Dignitaries on the occasion of Oil and Gas Conservation Fortnight 2008 (L-R) : Mr R K Sinha, State-Level Coordinator (Oil Industry), Mr S Ramaswamy, IAS, Dr M O Garg, Director, Mr R S Chauhan, PCRA & Mr Subodh Batra, CRM, HPCL*

The background features a light purple gradient with two large, overlapping circles. The bottom portion of the image is filled with a white grid pattern that curves upwards, creating a dome-like effect. The number '7' is centered in the upper half of the page.

7

# Committees

## 7.1 RESEARCH COUNCIL

January, 2005

### Chairman

Mr Subir Raha  
Chairman & Managing Director  
Oil and Natural Gas Corporation Ltd.  
Jeevan Bharati, Tower II, 124-Indira Chowk  
NEW DELHI- 110 001

### Members

Mr P M S Prasad  
CEO-Petroleum Business  
Reliance Industries Ltd.  
Maker Chambers IV, 9<sup>th</sup> Floor  
222, Nariman Point  
MUMBAI – 400 021

Prof D K Sharma  
Centre for Energy Studies  
Indian Institute of Technology  
New Delhi – 110 029

Mr B S Negi  
Director (Planning)  
Gas Authority of India Ltd.  
GAIL Building, 16, Bhikaji Cama Place  
R. K. Puram, NEW DELHI - 110 066

Dr P Ratnasamy  
Scientist (Director's Scale)  
National Chemical Laboratory  
Pashan Road, PUNE – 411 008

Dr H L Zutshi  
Former CMD, HPCL  
D-25, Defence Colony  
NEW DELHI - 110 024

Mr B Sam Bob  
Secretary  
Oil Industry Development Board  
301, World Trade Centre  
3<sup>rd</sup> Floor, Babar Road  
NEW DELHI – 110 001

Mr M K Dalal  
Managing Director  
Engineers India Limited  
Engineers India Bhawan  
1, Bhikaji Cama Place  
NEW DELHI – 110 066

Prof I M Mishra  
Department of Chemical Engineering  
Indian Institute of Technology  
ROORKEE – 247 667

Dr M O Garg  
Director  
Indian Institute of Petroleum  
DEHRADUN – 248 005

Dr A K Gupta (Member-Secretary)  
Scientist G  
Indian Institute of Petroleum  
DEHRADUN – 248 005



July, 2007 onwards

### Chairman

Shri V Subramanian, IAS  
12-E, HUDCO Place (Old)  
Andrews Ganj  
NEW DELHI- 110 049

### Members

Dr M Ganapati  
President – Corporate Planning  
GMS, RTEC-D Block  
C/o Reliance Petrochemicals  
5 TTC Industrial Area  
Thane-Belapur Road, Ghansoli  
Mumbai - 400 701

Shri B N Bankapur  
Director, Refineries  
Indian Oil Corporation Limited  
Scope Complex, Core-2, Lodi Road  
New Delhi –110 003

Dr D M Kale  
Executive Director (R&D)  
Oil & Natural Gas Commission  
Chief, Energy Centre, 5<sup>th</sup> to 15<sup>th</sup> Floor  
South Tower, Scope Minar  
Laxmi Nagar  
Delhi- 110 092

Professor I M Mishra  
Department of Chemical Engineering  
Indian Institute of Technology  
Roorkee – 247 667

Dr K S Balraman  
Executive Director  
Centre for High Technology  
Ministry of Petroleum & Natural Gas

5<sup>th</sup> Floor Core-6, Scope Complex  
Lodhi Road  
New Delhi – 110 003

Shri S N Sharma  
Consultant  
Human Resource Development Centre  
Sector-19, Central Government Enclave  
Kamla Nehru Nagar, P.B. No. 10  
Ghaziabad – 201 002

Dr A K Shukla  
Director  
Central Electrochemical Research Institute  
CECRI Nagar  
Karaikudi – 623 006

Head or His representative  
R&D Planning Division  
CSIR, Rafi Marg  
New Delhi – 110 001

Dr M O Garg  
Director  
Indian Institute of Petroleum  
Dehradun – 248 005

Dr S N Sharma (Member-Secretary)  
Head, RPBD  
Indian Institute of Petroleum  
Dehradun – 248 005

## 7.2 MANAGEMENT COUNCIL

### January, 2005 onwards

#### Chairman

Dr M O Garg  
Director

#### Members

Dr A K Gupta  
Scientist-G  
Central Building Research Institute  
Roorkee  
(External Member)

Dr S N Sharma  
Scientist E-II  
Head, RPBD

Dr S M Nanoti  
Scientist-F

Mr P N Bhaskar  
Scientist-F

Mr K P S Yadav  
Sr. Supdt. Engineer

Mr P Vijayanand  
Scientist C

Sr. CFA/CFA/F&AO  
(Mr M K Jain)

Sr. COA/COA/AO  
(Member-Secretary)  
(Mr S K Sadana)

### July, 2007 onwards

#### Chairman

Dr M O Garg  
Director

Dr A Datta  
Scientist-G  
Head ASD/CCPD

Dr A N Goswami  
Scientist G

Dr Savita Kaul  
Scientist E-I

Dr S N Sharma  
Scientist E-II  
Head, RPBD

Mr Nishan Singh  
Scientist-F

Dr Raja Ram Bal  
Scientist C

Sr. CFA/CFA/F&AO  
(Mr V K Anand)

Sr. COA/COA/AO (Member-Secretary)  
(Mr A K Razdan)  
Scientist-F

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**राजभाषा**



## 8.1 संगोष्ठियां / कार्यशालाएँ

### सूचना-प्रौद्योगिकी विषय पर राष्ट्रीय हिंदी संगोष्ठी, 8-9 जून, 2006

राजभाषा अनुभाग, भापेसं तथा 'वैज्ञानिक तथा तकनीकी शब्दावली आयोग', भारत सरकार, नई दिल्ली के संयुक्त तत्वावधान में सूचना-प्रौद्योगिकी विषयक राष्ट्रीय हिंदी संगोष्ठी का आयोजन किया गया। समारोह के अध्यक्ष प्रो० सूरजभान सिंह, पूर्व अध्यक्ष, वैत०श० आयोग ने संस्थान के 'डॉ० लवराज कुमार प्रेक्षागृह', में आयोजित उद्घाटन समारोह में कहा कि कंप्यूटर के इस युग में भाषा के मानदंड तथा शब्दावली निर्माण के सिद्धांत टूट रहे हैं। भाषा को मनुष्य के



दीप प्रज्वलन करते हुए प्रो० सूरजभान सिंह व डॉ० अरुणाभा दत्ता, प्रो० शंकर बुंदेले (सबसे बाएँ) और श्री दीपक कुमार (सबसे दाएँ)

### आंतरिक हिंदी वैज्ञानिक संगोष्ठियाँ

राजभाषा अनुभाग द्वारा प्रत्येक तिमाही में एक आंतरिक हिंदी वैज्ञानिक संगोष्ठी का आयोजन किया जाता है। वर्ष 2006-08 में आयोजित संगोष्ठियों का विवरण इस प्रकार है :-

लेखक/प्रस्तुतकर्ता	विषय
डॉ० दीपक टंडन	श्यानता भंजन--कच्चे खनिज तेल के अवशेषों को परिवर्तित करने की एक साधारण तथा उपयोगी तकनीक
श्री दिनेश प्रसाद बैंगवाल	तरल अवस्था में हाइड्रोकार्बन ऑक्सीकरण का महत्व
डॉ० एल डी शर्मा	उत्प्रेरण का पेट्रोलियम परिष्करण एवं ऊर्जा उत्पादन में महत्व

साथ-साथ मशीन की मांगों को भी पूरा करना है। प्रो० सूरजभान ने 'कंप्यूटेशनल लिंग्विस्टिक्स' की भी चर्चा की।

प्रो० शंकर बुंदेले, अध्यक्ष हिंदी विभाग, अमरावती विश्वविद्यालय, अमरावती, समारोह के विशिष्ट अतिथि रहे।

आयोग के वैज्ञानिक अधिकारी श्री दीपक कुमार ने शब्दावली के मानकीकरण और सभी विज्ञानों, विशेषतः इंजीनियरी, चिकित्सा और कृषि विज्ञान के क्षेत्रों के ज्ञान को हिंदी में उपलब्ध कराने के लिए किए जा रहे आयोग के प्रयत्नों की जानकारी दी।

तकनीकी सत्रों में प्रो० आर पी श्रीवास्तव, मुजफ्फरपुर प्रो० शंकर बुंदेले, अमरावती डॉ० सुरेंद्र पाठक, भोपाल डॉ० देवव्रत ओझा, गाजियाबाद श्री सत्यपाल अरोड़ा, दिल्ली डॉ० जयंती प्रसाद नौटियाल, मँगलूर श्री ए पी श्रीवास्तव, दिल्ली डॉ० एस एस भट्ट, उड़ीसा एवं श्री जय सिंह, नई दिल्ली ने सूचना प्रौद्योगिकी से संबंधित विविध पहलुओं पर सूचनात्मक एवं प्रभावी प्रस्तुतियाँ दीं।

### 'प्रयोजनमूलक हिंदी एवं अनुवाद' पर प्रशासनिक हिंदी कार्यशाला का आयोजन, 2 नवंबर, 2007

राजभाषा अनुभाग द्वारा 'प्रयोजनमूलक हिंदी एवं अनुवाद' विषय पर प्रशासनिक हिंदी कार्यशाला का आयोजन किया गया। रोजगारपरकता एवं व्यावहारिकता के इस युग में हिंदी की विशाल संभावनाओं की चर्चा करते हुए प्रो० सूर्य प्रसाद दीक्षित, पूर्व अध्यक्ष, हिंदी विभाग, लखनऊ विश्वविद्यालय, लखनऊ ने पत्रकारिता, जनसंपर्क, विज्ञापन आदि के क्षेत्र में हिंदी की बड़ी भूमिका को रेखांकित किया।

लेखक/प्रस्तुतकर्ता	विषय
डॉ० आशा मसोहन	सल्फरडाइऑक्साइड निकालने के लिए अवशोषण आधारित नये उपगम मार्ग
श्री सुधीर कुमार भारती	मानव निर्मित जलाशय और पर्यावरण
श्री वी एस सैनी	मानव क्लोनिंग
श्री सिया राम	पराबैंगनी दृश्य स्पेक्ट्रममिति द्वारा डीजल तेल में मोनो-, डाइ- तथा पॉली-एरोमैटिक्स की प्रतिशतता का आकलन करना
सुश्री निशा	विलायक निष्कर्षण विधि द्वारा विमानन तेल
श्री दिनेश प्रसाद बैंगवाल	हरित रसायन
श्री डॉ० जी एस भंडारी	पेट्रोल व डीजल में उपस्थित तत्व एवं उनका प्रदूषण में सहयोग
डॉ० एच बी गोयल	जैव-मात्रा
श्री आनंद सिंह	पॉलीमरयुक्त बिटुमेन प्रौद्योगिकी
सुश्री सुधा कफोला	औद्योगिक विकास में जैव-प्रौद्योगिकी का योगदान
डॉ० सुमन लता जैन	वैनेडियम उत्प्रेरक की उपस्थिति में हाइड्रोजन परॉक्साइड द्वारा बेंजीन की एक-पदीय हाइड्रॉक्सीकरण विधि द्वारा फिनॉल का निर्माण
श्री चंचल कुमार तिवारी	पवन चक्की में स्नेहक की चुनौतियाँ
डॉ० ओ एस त्यागी	रसायन विज्ञान में मापिकी: सामयिक प्रसंग एवं संक्षिप्त परिचय
मृत्युंजय कुमार शुक्ल एवं अमर कुमार जैन	डाइमिथाइल ईथर : स्वच्छ वैकल्पिक ईंधन
कु० रेखा चौहान एवं डॉ० वाइ के शर्मा	गैसोलीन का अपमिश्रण
डॉ० एन विश्वनाथम्	एफ.सी.सी. गैसोलीन का मान श्रेण्योन्नयन
कु० पूजा यादव, डॉ० भगत राम नौटियाल एवं डॉ० श्रीकांत नानोटी	पादप जैव-प्रौद्योगिकी
डॉ० मनोज कुमार	पेट्रोलियम परिष्करण उद्योग में उत्प्रेरक
डॉ० लालजी दीक्षित	गैसोलीन की रचना एवं उसको बनाने की विधियाँ
श्री सर्वजीत सिंह	गैस क्रोमैटोग्राफी का पेट्रोलियम के क्षेत्र में महत्व
कु० कृति, डॉ० श्रीकांत नानोटी एवं डॉ० भगत राम नौटियाल	औषधीय विकास में जैव-प्रौद्योगिकी
डॉ० एच यू खान, श्री प्रतीक सेठ एवं कु० मनीषा सहाय	अनुपयोगी पेट ( पीईटी ) का उपयोग: एक समीक्षात्मक अध्ययन
श्री सुनील पाठक	हाइड्रोजन एवं प्राकृतिक गैस का मिश्रण-हाइथेन: वाहन प्रयोग के लिए उपयोगी गुण

लेखक/प्रस्तुतकर्ता	विषय
डॉ० ओ एस त्यागी	वायु जनित ठोस कण ( एसपीएम )
श्रीमती पुष्पा गुप्ता	ग्रीन हाउस प्रभाव: कारण और निवारण
श्री जी एस डंग	विलायक विस्फॉल्टन प्रक्रम में विलायक की अतिक्रांतिक अवस्था में पुनःप्राप्ति
श्री मृत्युंजय कुमार शुक्ल	डाइ-इथाइल ईथर : परिवहन ईंधन के रूप में संभावनाएँ
डॉ० बी आर नौटियाल	रिफॉर्मेट फीडस्टॉक से विशुद्ध एंरोमैटिक अवयवों का निष्कर्षण
श्री सचिन कुमार	जैव-परिष्करण
डॉ० डी के अधिकारी	वैश्विक ताप तथा जैव-विविधता की प्रतिपालितता
श्री आनंद सिंह	सड़कों के निर्माण में बिटुमेन की उपयोगिता
श्री सुदीप कुमार गांगुली	एनटीजीजी प्रक्रम विकास
डॉ० गौतम दास	देशज एलपीजी मधुरण उत्प्रेरक का विकास
डॉ० ए के भटनागर	निम्न गंधक पेट्रो-ईंधनों हेतु स्नेहकता को बढ़ाने वाले योज्य
सुश्री ज्योति जोशी	द्रव प्रवाहिकी: एक समीक्षात्मक परिचर्चा
श्री आलोक यादव	जैव तेल: तेजी से उभरता हुआ ऊर्जा स्रोत
सुश्री भावना बिष्ट	निष्कर्षण के क्षेत्र में आयनिक द्रवों का प्रयोग
श्री मृत्युंजय कुमार शुक्ल	यूटेनॉल-गैसोलीन और इथेनॉल-गैसोलीन संमिश्र: परिवहन ईंधन के रूप में तुलनात्मक अध्ययन
श्री दिलीप कुमार जेना	जलवायु परिवर्तन: अधिशोषण द्वारा CO <sub>2</sub> का नियंत्रण

## 8.2 समारोह

### हिंदी दिवस समारोह, 14 सितम्बर, 2006

समारोह के मुख्य अतिथि, प्रबुद्ध साहित्यकार एवं प्रमुख विद्वान डॉ० पूरन चंद टंडन ने अपने ओजस्वी भाषण में हिंदी भाषा के साहित्य से ऊपर उठकर प्रयोजनमूलक बनाने हेतु इसे अधिक उदार और उपादेय बनाने पर बल दिया। उन्होंने कहा कि यदि जन व जीवन तक अपनी अभिव्यक्ति को स्वर देना है तो हिंदी व भारतीय भाषाओं को नकारा नहीं जा सकता।



हिंदी दिवस (2006) के मुख्य अतिथि के रूप में अपने उद्गार व्यक्त करते हुए डॉ० पूरन चंद टंडन।



### हिंदी माह समापन समारोह, 29 सितम्बर, 2006

हिंदी माह समापन समारोह में मुख्य अतिथि, साहित्यकार प्रो० सूरज पालीवाल ने वैश्वीकरण एवं भू-मंडलीकरण के इस युग में भाषा और संस्कृति पर चारों ओर से हो रहे हमले की चर्चा करते हुए अपनी भाषाओं के महत्व पर प्रकाश डाला। उन्होंने कहा कि भारतीय पेट्रोलियम संस्थान जैसे वैज्ञानिक प्रतिष्ठानों में किया जा रहा अनुसंधान भारत की 80 प्रतिशत ग्रामीण जनता तक केवल हिंदी के माध्यम से ही पहुँच सकता है।

मुख्य अतिथि का स्वागत करते हुए संस्थान के कार्यकारी निदेशक डॉ० एम पी सक्सेना ने आह्वान किया कि हमें वैज्ञानिक शोधपत्रों व उपलब्धियों को राजभाषा हिंदी में प्रचारित-प्रसारित करना चाहिए।



हिंदी माह समापन समारोह (2006) के अवसर पर दीप प्रज्वलन करते हुए मुख्य अतिथि प्रो० सूरज पालीवाल।

### हिंदी माह समापन समारोह 28 सितम्बर, 2007

'हिंदी माह समापन समारोह' संस्थान के प्रेक्षागृह में आयोजित हुआ। इस अवसर पर प्रो० शैलेंद्र कुमार शर्मा, अध्यक्ष, हिंदी विभाग, विक्रम विश्वविद्यालय, उज्जैन, विशिष्ट अतिथि के रूप में एवं प्रख्यात पत्रकार एवं साहित्यकार और 'दैनिक ट्रिब्यून' के पूर्व संपादक डॉ० राधेश्याम शर्मा, समारोह अध्यक्ष के रूप में उपस्थित थे। अध्यक्ष महोदय ने हिंदी माह के दौरान आयोजित प्रतियोगिताओं के विजेताओं को पुरस्कृत किया। इसके अतिरिक्त वर्ष-भर हिंदी में काम-काज करने वाले कर्मचारियों को भी नकद पुरस्कारों से सम्मानित किया गया।



हिंदी माह 2007 के अवसर पर 'विकल्प' के जैव-प्रौद्योगिकी विशेषांक के लोकार्पण का दृश्य। (बाएँ से) डॉ० दिनेश चमोला, डॉ० राधेश्याम शर्मा, प्रो० शैलेंद्र कुमार शर्मा, डॉ० ए० दत्ता एवं श्री ए० के० राजदान, प्रशासनिक नियंत्रक।

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