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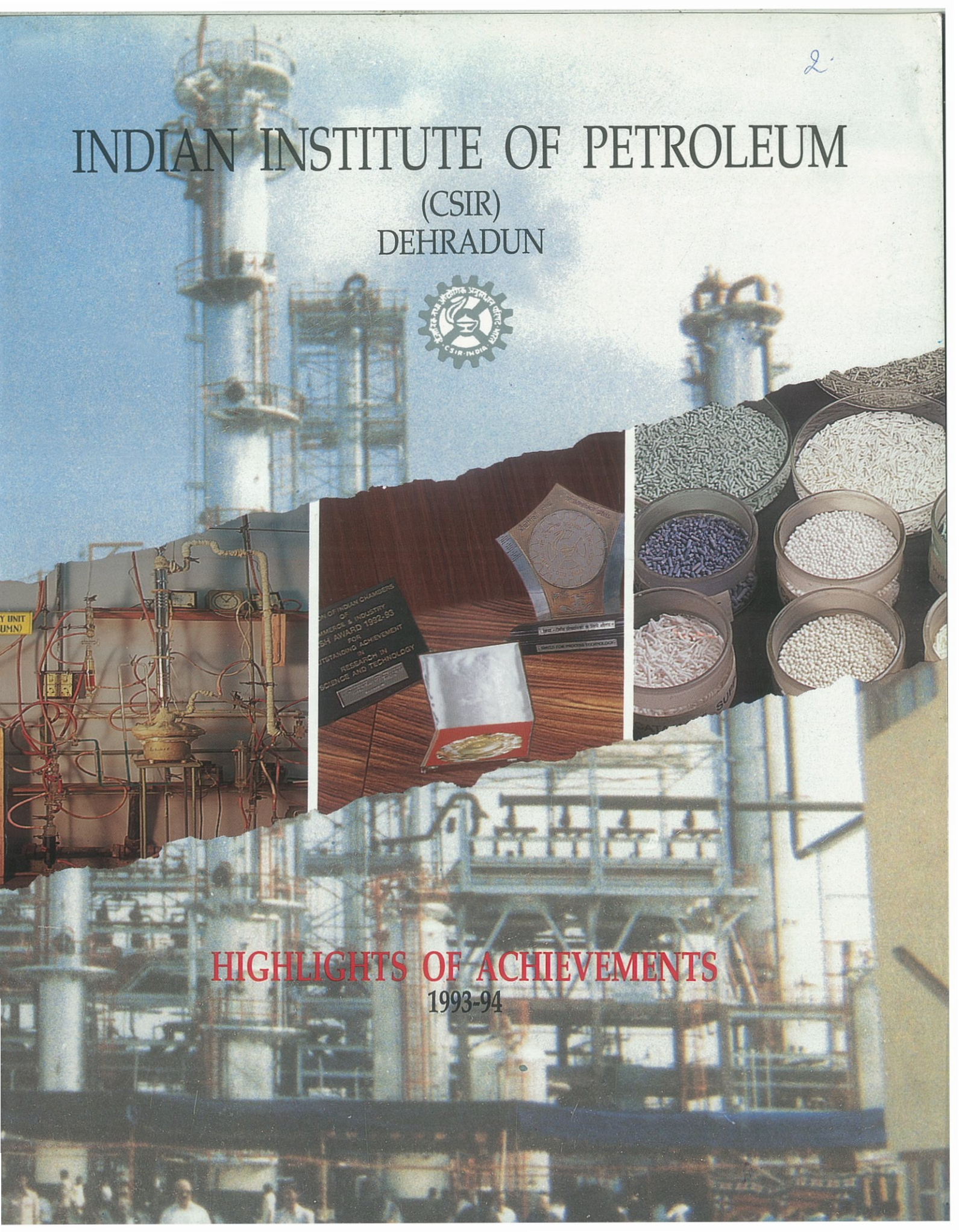
INDIAN INSTITUTE OF PETROLEUM

(CSIR)

DEHRADUN



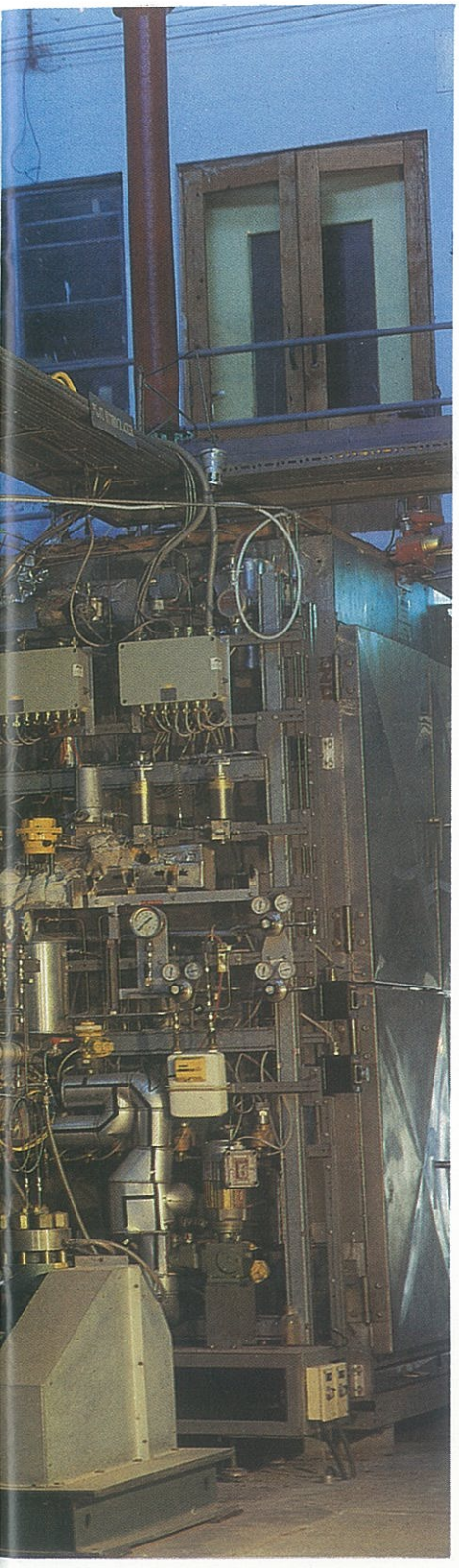
HIGHLIGHTS OF ACHIEVEMENTS

1993-94


Technologies For Growth

PILOT REFORMER

The Indian Institute of Petroleum

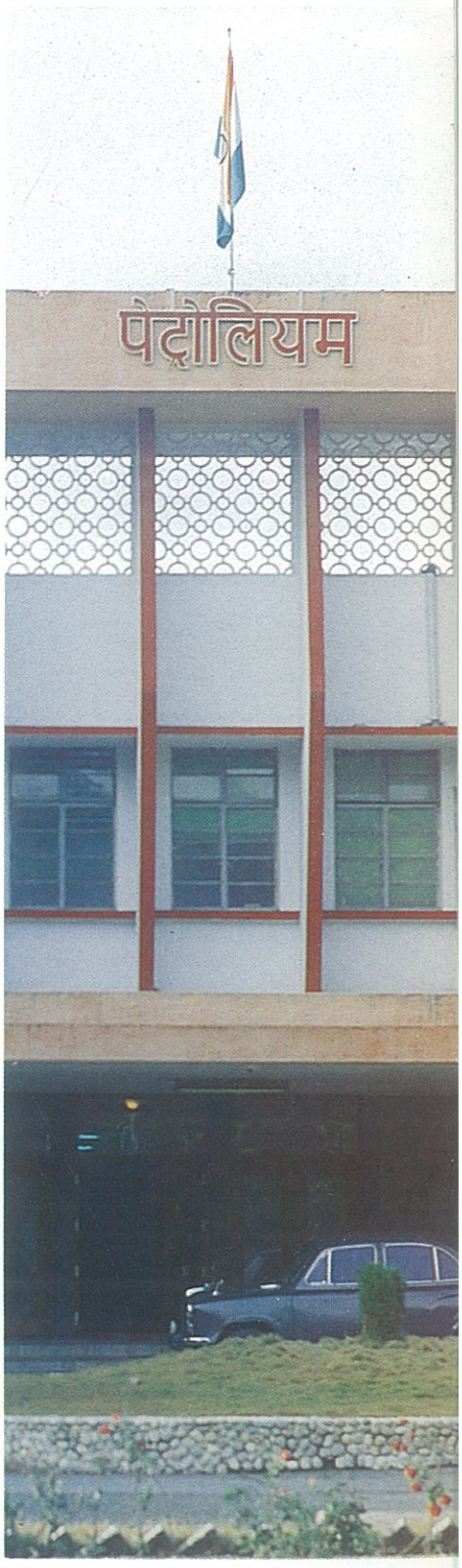


Situated in Doon Valley, eight kilometers from the city of Dehradun, in the serene environment of a 200 acre tea garden and fruit orchard, in the picturesque surroundings at the foothills of Shivalik and Garhwal ranges of Himalayas, is a constituent laboratory of the Council of Scientific and Industrial Research (CSIR) was established in 1960 by the Act of Parliament. The Institute has grown over the years into a premier institution for research and development in the area of petroleum processing, allied chemistry, petroleum-products applications and petrochemicals. In the last 34 years IIP has provided valuable service to the oil, chemical, petrochemical and automotive industries in the country in the form of state-of-the-art technology and process know-how. The Institute is supported by a group of dedicated scientists and engineers and modern research facilities.

The seeds of growth had been sawn with Dr T.S.R. Prasada Rao taking over as the Director of IIP in 1990. The Institute has seen manifold growth in External Budgetry Resources (EBR) ever since.

The year 1993-94 was also an year of awards with IIP receiving the CSIR Technology Shield for second consequitive year and IIP scientists being conferred with two most prestigious awards—the FICCI Award to Dr. T.S.R. Prasad Rao, Director and the CSIR young Scientist Award to Mr. A.K. Gondal.

From this strong position, IIP is now poised to face new challenges emerging from economic and technological globalization to take the country into the twenty-first centuary.



In Full Bloom

The R&D activities at IIP cover the fields of petroleum refining, seperation processes, chemical sciences, products applications, combustion, and biotechnology.

In **Catalysis & Conversion Processes** area IIP is engaged in developing catalytic and thermal processes for different aspects like reforming, hydrocracking, hydrotreatment, fluid catalytic cracking, visbreaking, and delayed coaking, in order to develop indigenous capabilities in these fields in view of their monopolization by select few multinational companies. Besides this, the help has been extended to several Indian refineries in commissioning, start- up and trouble shooting of their processing plants.

As the development of catalysts is kept a guarded secret by the inventors world over, their indigenous development has become essential for the growth of hydrocarbon industry in the country. The Catalysis Division at IIP has therefore been working to develop expertise in both the basic and applied aspects of catalysis research aimed at petroleum refining, particularly the secondary conversion processes like reforming, hydrocracking, fluid catalytic cracking, dehydrogenation, and hydrotreatment. Excellent facilities for preparation, characterization and evaluation of catalysts and various support materials have been established.

In **Separation Processes** area the main objective is to develop separation-based technologies for petroleum refining and petrochemical industries with emphasis on production of benzene, toluene, foodgrade hexane and dearomatized kerosene by solvent extraction, petrochemical-grade hexane by adsorption process, effluent treatment by membranes, desulfurization of fuel gases, propane deasphalting, and solvent dewaxing (deoiling) for production of oil (wax). The rheological and morphological aspects of crude oil transportation and basic studies on liquid-liquid equilibrium and

vapour-liquid equilibrium for hydrocarbon-solvent systems of commercial significance are other active areas of R&D.

The **Lubes and Bitumen** area covers process development for production of Lube Oil Base Stocks (LOBS) by solvent extraction, high BMCI carbon black feed stock, and electrode-grade impregnating pitch, and conversion of asphaltics into paving-grade bitumens.

In **Chemical Sciences** area the major emphasis is on speciality chemicals, petrochemicals and bulk intermediates. The development of processes for production of phenol-based high-temperature antioxidants and sulfolane are the hallmarks of achievements of this area in recent years.

In **Petroleum Products Application** area the major thrust has been on:

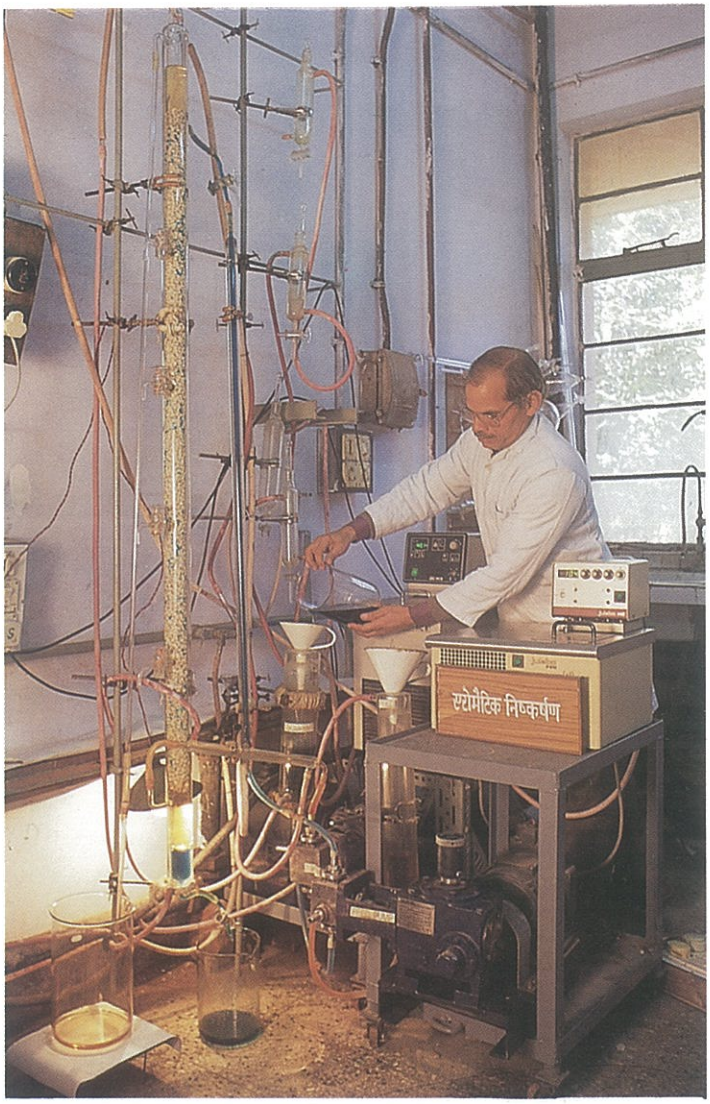
(i) laboratory and field investigations to (a) study the effect of fuel quality on the performance of diesel and gasoline vehicles, (b) use of compressed natural gas, alcohols, etc. as alternative fuels, and (c) monitor and control of vehicular emissions;

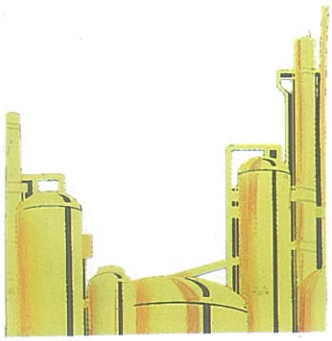
(ii) design and development of energy-efficient engines;

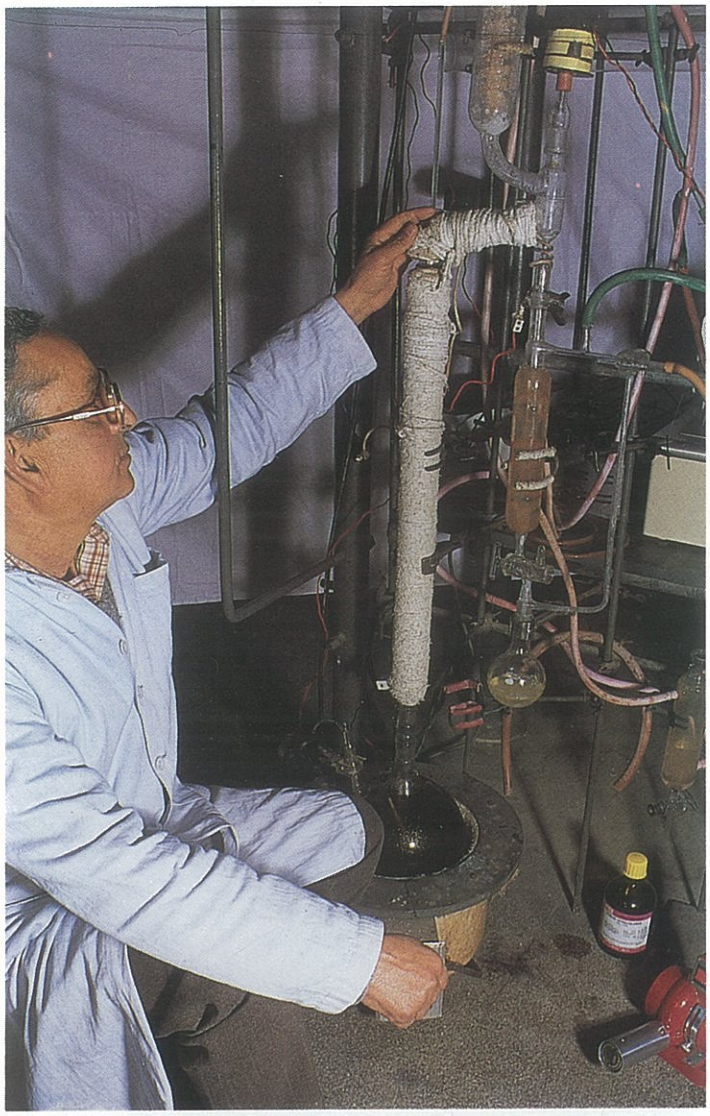
(iii) basic studies on engine processes, industrial tribology related to lubrication and wear of industrial machines, and their lubrication requirements; and

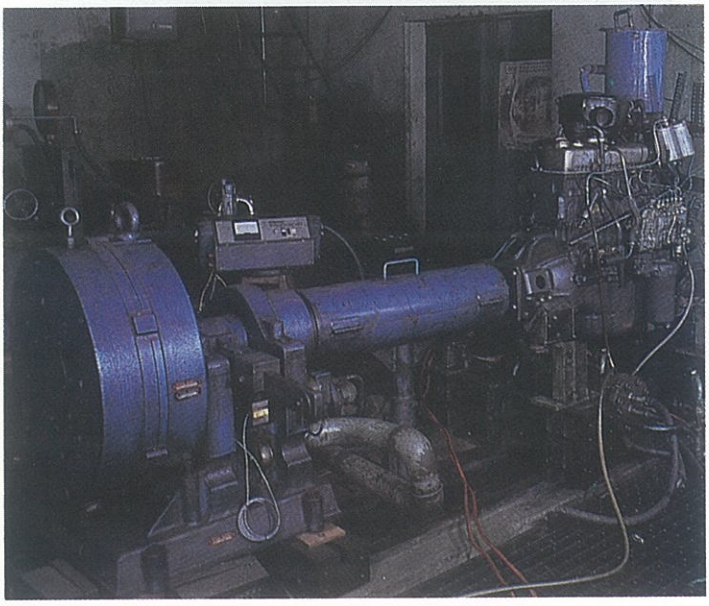
(iv) certification of vehicles as per Central Motor Vehicle Act/Rules.

The **Industrial and Domestic Combustion** area undertakes sponsored work related to development of burners, furnaces and waste incenerators as well as modelling of burners and furnaces for industrial combustion. The other activity includes development of appliances having improved performance and capable of using non-conventional fuels for domestic use.







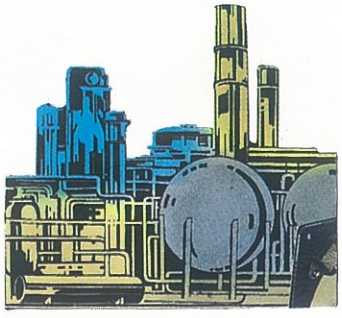


Biotechnology is now taking deeper roots in petroleum industry. As renewed and concerted efforts are being made world-wide to develop economically viable and environment-friendly energy-saving processes, IIP has also ventured into an ambitious programme to employ living micro-organisms for developing energy—efficient hydrocarbon-processing techniques for conversion of petroleum feed stocks to value added products and production of biosurfactants for enhanced oil recovery.

Analysis & Analytical Spectroscopy is the backbone of quality control, process optimization, monitoring of refining and petrochemical processes and product evaluation. With this rationale to provide strong analytical backup to R&D projects, IIP established analytical laboratories at its campus, fully equipped with sophisticated instrumental facilities for detailed characterization of crudes and their products, petrochemical feed stocks, refinery products, petrochemicals, catalysts, effluents etc. The analytical laboratories are being continuously updated at par with international standards by addition of front-line, state-of-the-art analytical instruments.

The **Engineering Services** is responsible to provide engineering back-up for design, fabrication, erection, operation, maintenance and upgradation of process equipments, maintenance of electrical and electronic apparatuses, captive power generation, pilot plants and other infrastructure facilities including civil works, with the help of dedicated team of engineers and trained technicians and well-equipped engineering workshops.

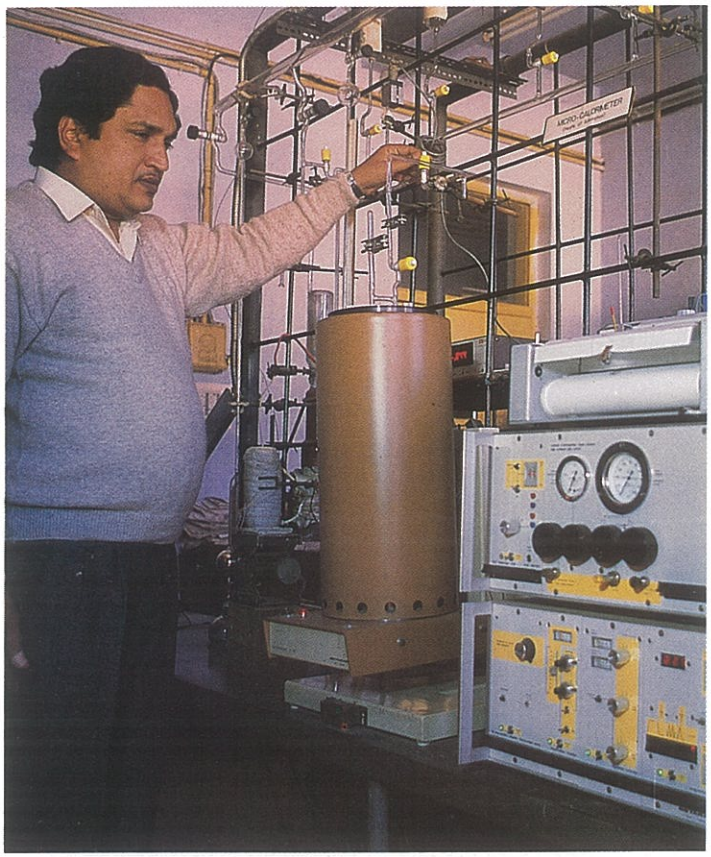
The **Training** of technical personnel is treated as an important facet of IIP's responsibility towards hydrocarbon industry in the country. The training programmes are therefore designed to meet specific needs of user industry in the areas of petroleum refining, petrochemicals, petroleum-products applications, quality control and quality assessment procedures.

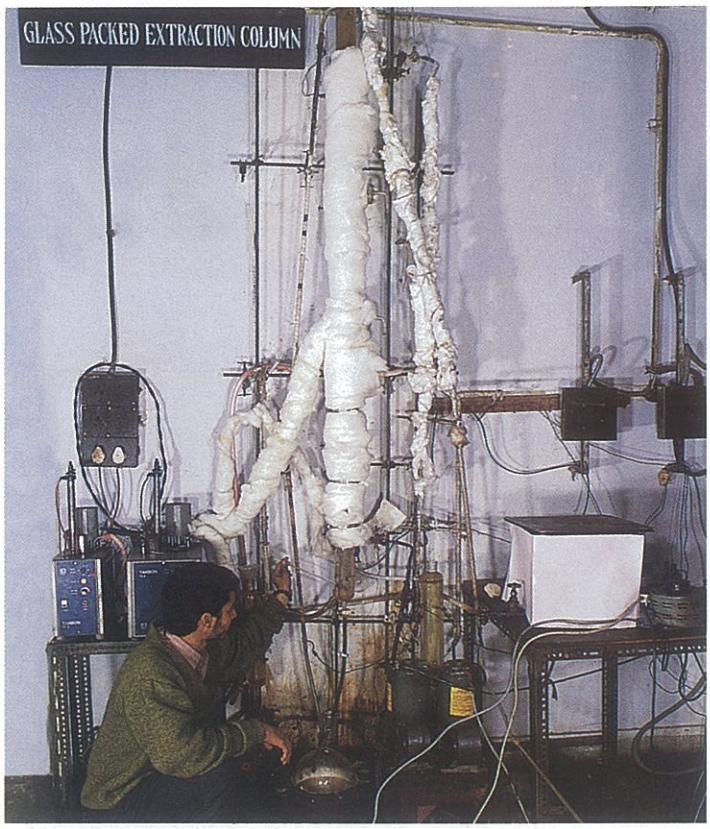


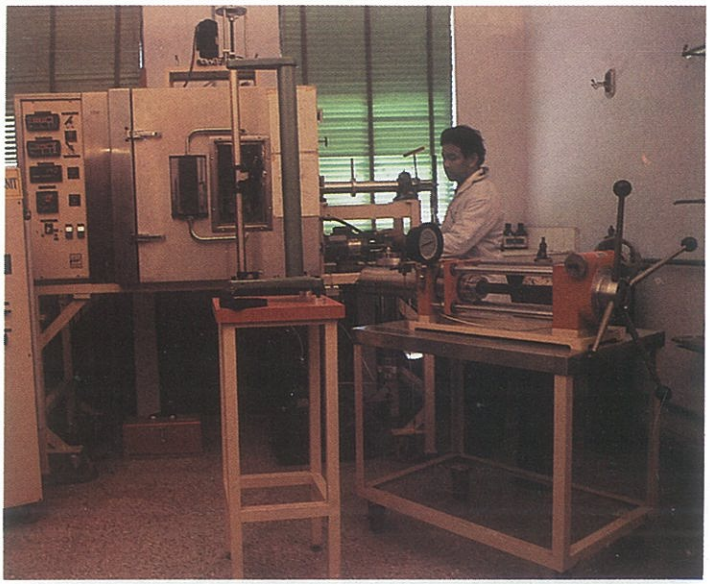
Milestones in Development

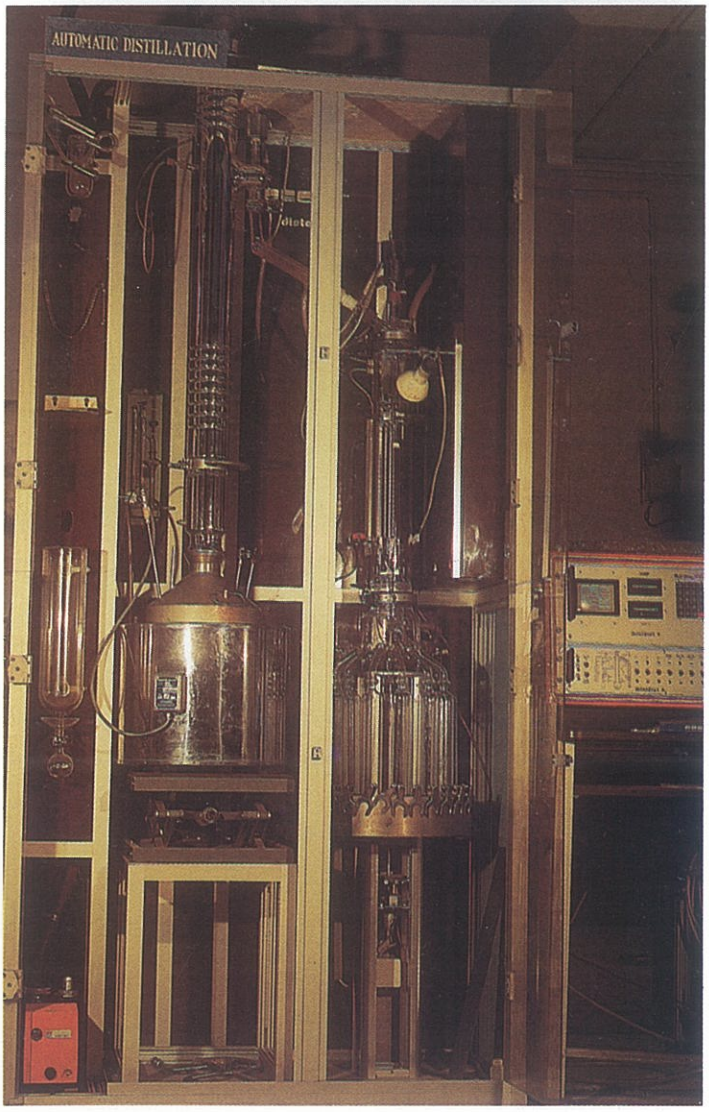
Catalysis and Conversion Processes

- The Reforming catalyst RG-451 obtained after seventh regeneration from BRPL Reformer plant was evaluated in our pilot plant.
- Two commercial Reforming catalysts IPR-2001 (developed jointly by IIP and IPCL) and RG-482 (imported) were evaluated in our pilot plant. Their activity, selectivity and stability were found to be comparable.
- Successfully completed the commissioning and start-up of a new grass-root unit for naphtha hydrodesulphurization at BPCL, in collaboration with IFP, France.
- Prepared a alumina support having 8% volume in pores of radius greater than 1000 Å, suitable for preparation of a skewed Pt-Re reforming catalyst.
- Prepared a catalyst formulation for production of high-octane aromatic hydrocarbons and LPG from feed stocks rich in n-paraffins.
- Computer modelling and simulation of visbreaking process were carried out for—
  - (a) development of a module for product-property prediction;
  - (b) estimation of gas and liquid phases at different levels of conversion using a simple and appropriate flash module; and









(c) computation of the liquid-phase-residence-time distribution at different vapour-liquid split and throughput rates.

- Developed a new formulation of Fluid Catalytic Cracking (FCC) catalyst formulation having high attrition resistance, better selectivity and conversion efficiency for middle distillates and coke.
- Prepared spinal supports for catalysts for dehydrogenation of lower alkanes.
- Aromatization reaction on modified pentasil zeolite indicated less coke formation on the steamed catalyst. Ga and Zn modified catalysts were found to have higher aromatic selectivity as compared to ZSM-5 zeolite.

Separation Processes

- Developed a solvent-extraction process for production of food-grade hexane from full-range naphtha using NMP as the solvent.
- Feasibility studies have been carried out to replace sulfolane by NMP for dearomatization of full-range kerosene, using re-extraction route.
- Undertook a sponsored research for increasing plant throughput for production of benzene and toluene from reformates using the cosolvent technique.
- Sponsored study was undertaken for production of microcrystalline wax from Bombay High short residue through solvent deoiling process.
- Persued fundamental studies on the crystallization process (ordered-disordered phenomenon) in petroleum waxes in solutions through pour-point depressant additives.

Lubes & Bitumens

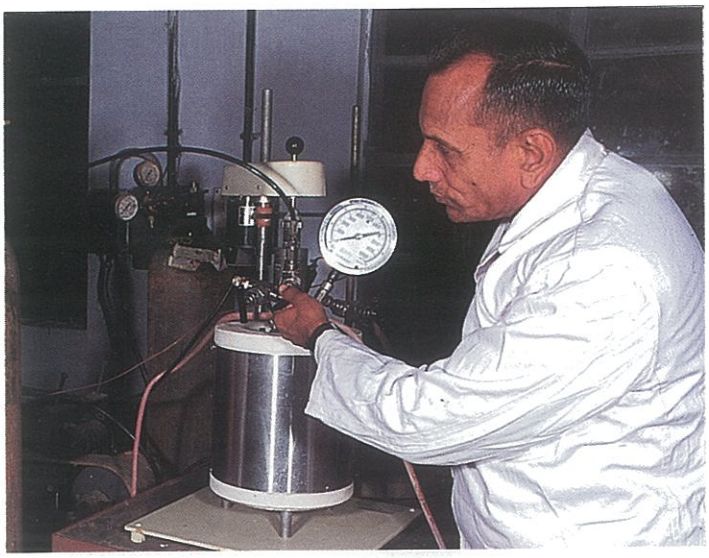
- Developed a NMP based solvent extraction process for production of LOBS from various lube distillates/deasphalted oil stocks, in collaboration with EIL and MRL.
- Feasibility studies were carried out for production of high BMCI carbon black feed stock from Bombay High Vaccum Gas Oil (VGO).
- Developed a process for converting asphaltics into paving-grade bitumens.

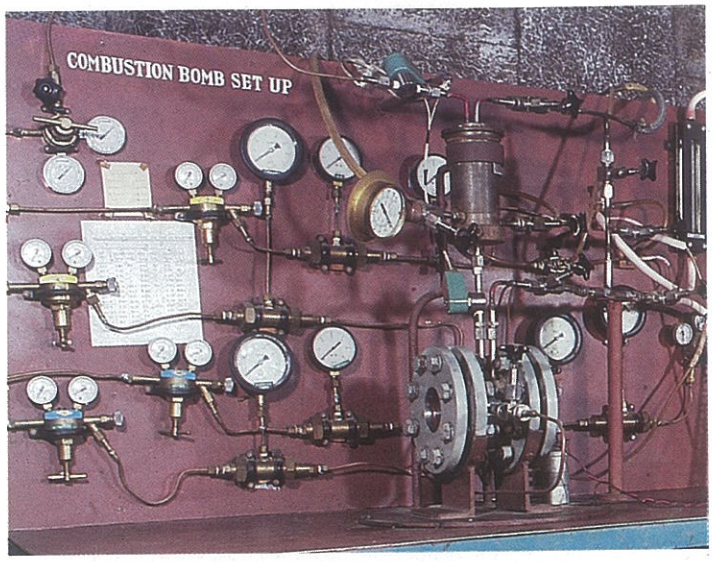
Chemical Sciences

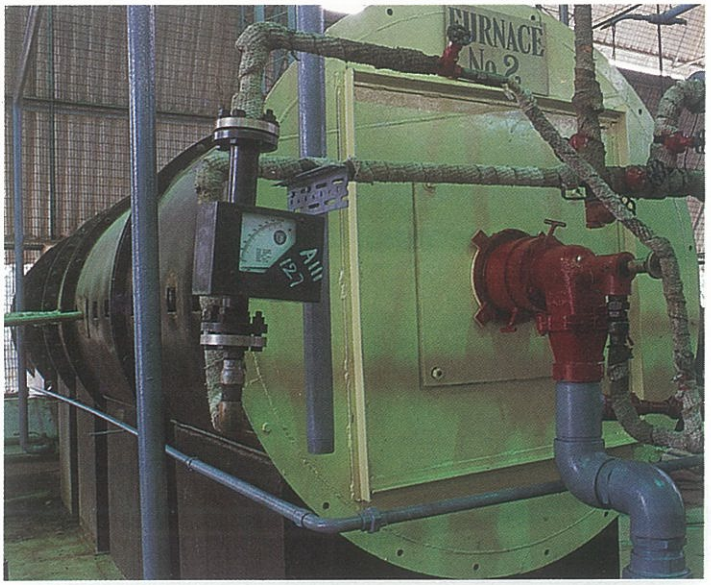
- Basic engineering package for commercial plant for production of high temperature antioxidents transferred to the sponsorers M/s AEC India Ltd. Five basic engineering packages for speciality chemicals (viz. BHT, PTBP, ODBHC, PDBHC & MHHC) were prepared and handed over to the user industries.
- Developed a laboratory scale technology for one-step oxidation of cyclohexane to adopic acid.
  (An international patent filed.)
- Developed a process for production of unsaturated fatty alcohol (C_{18}-C_{24}) from nonedible vegitable oils.
  (An international patent filed.)
- Developed comb-type acrylate polymers for flow improvement of summer grade diesel fuel.
- Developed eco-friendly, homogenous catalyst system for quantitative oxidation of toxic substituted-phenols to lesser toxic quinones, under ambient conditions.

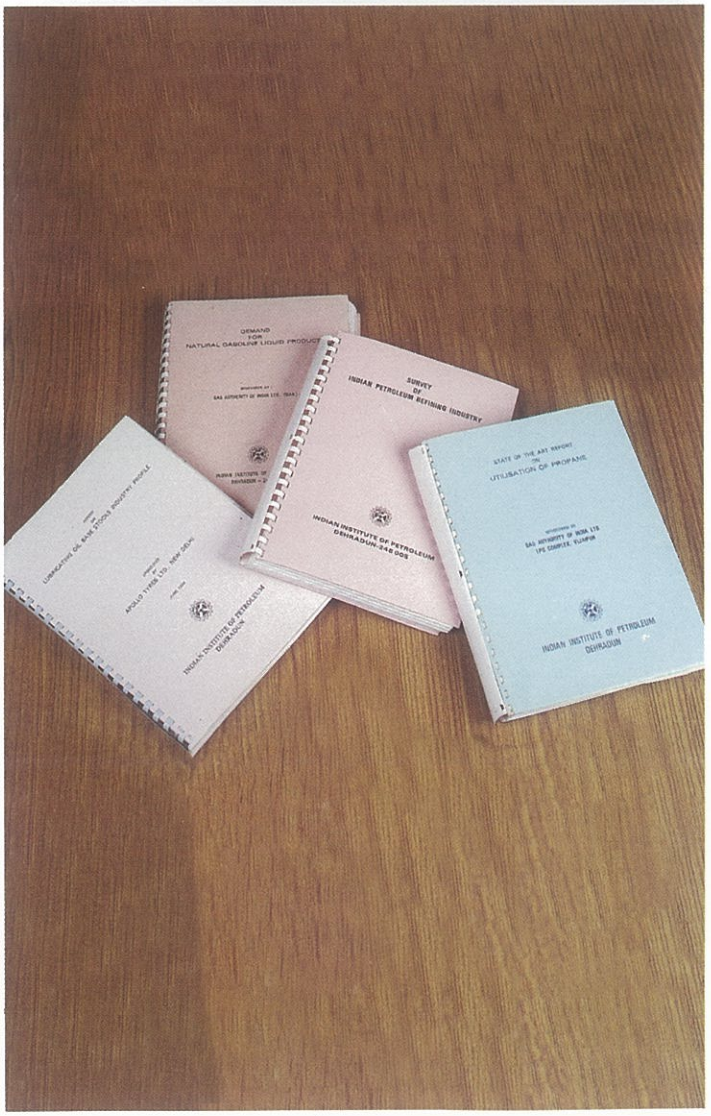
Petroleum Products Applications

- Prepared a comprehensive report for Ministry of Petroleum and Natural Gas, Government of India, recommending revisions in specifications of diesel and gasoline fuel characteristics.
- Developed a prototype CNG-operated 2-stroke gasoline engine for 3-wheeler vehicles, in non-captive mode.
- Tested and approved carbon monoxide analyzers submitted for certification.
- A comprehensive state-of-the-art report on vehicle-emission-control strategy for all classes of engines and vehicles prepared.
- Basic studies for development of a 2-stroke fuel-efficient engine undertaken.
- Study on reduced oil-to-fuel ratio in 2-stroke engines carried out.
- A report on used-oil management strategies recommending specifications of used oils for import control (for oil industries) was prepared.
- Studies for development of aqueous cutting oils and cold rolling oils persued.









- Work on upgradation of the hot rolling oil carried out. Basic studies related to wear processes in plastic deformation, running-in wear of piston-liner materials, and modelling of wear in lubricated contacts persued.

Industrial and Domestic Combustion Appliances

- A reheating burner which could burn fuel oil with 10% excess air with air-preheat temperatures raning from ambient to 520 °C has been developed.
- A model test furnace developed for studying the changes in heat transfer patterns as function of burner-design parameters.
- Developed an air recuperator capable to supply hot air at temperatures upto 520 °C to reheating burners.
- Successfully used the film-burner as dual-fuel burner for burning natural gas along with fuel oil with 40% excess air.
- Developed a highly fuel-efficient kerosene gas stove suited to rural areas.

Biotechnological Processes

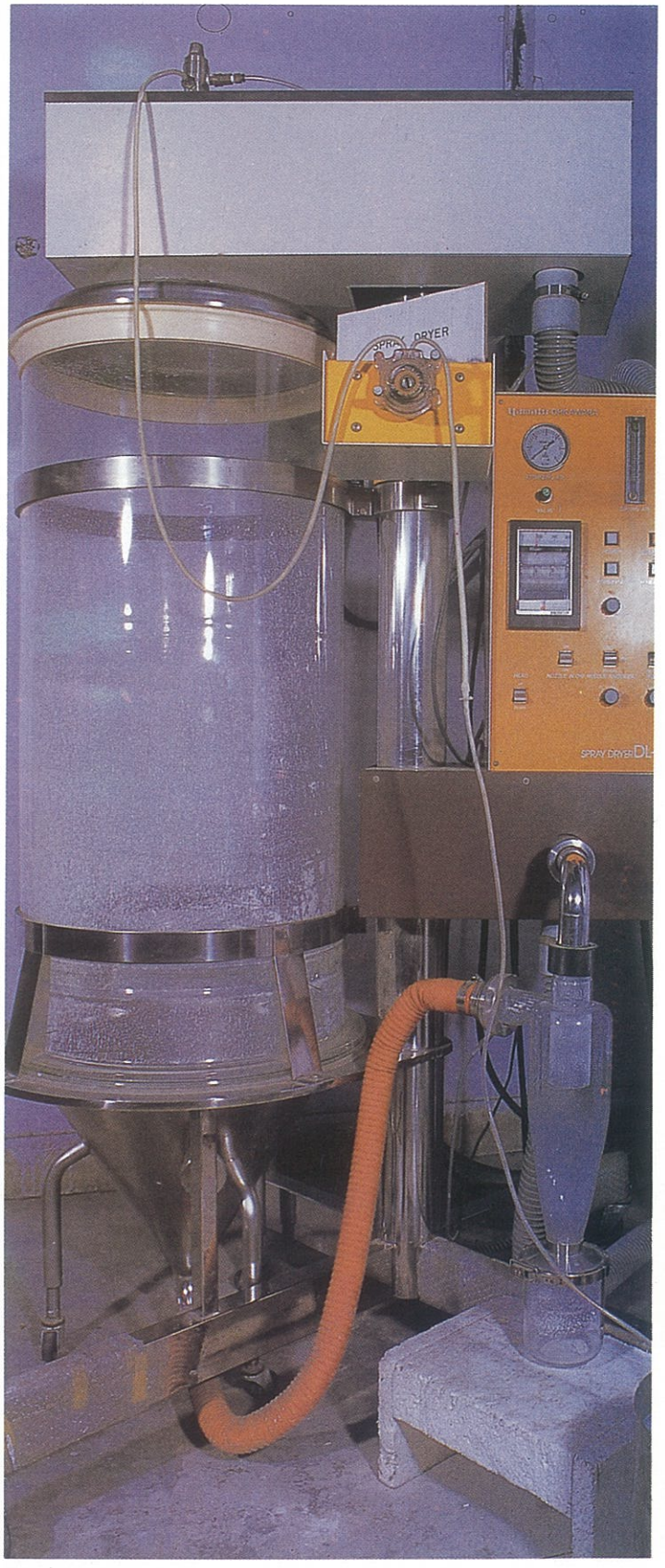
- Developed a bench-scale process for microbial dewaxing of heavier petroleum-fractions using specially developed yeast strains, as an alternative to conventional energy-intensive dewaxing processes. This technique was applied for upgradation of foots oil.
- Seventy hydrocarbon-utilizing bacterial strains were isolated and screened for their ability to produce biosurfactants useful in enhanced oil recovery; five of them have been found promising.

Analysis and Analytical Spectroscopy

- Detailed hydrocarbon analysis of LPG, NGL and aviation fuels.
- Quality assessment of motor gasoline from Indian refineries for blending with multifunctional additives.
- Quality assessment of Bombay High Setallite crudes and composite-Bombay-High crude; and their comparision with crudes evaluated earlier.
- Identification and estimation of hydrocarbon and sulfur types available in LOBS and VGO by mass spectrometery.
- Calibration of mercury and selenium Reference Standard Solution. (IIP is a participant laboratory in CSIR Thrust Area Programme on Indian Reference Materials.)
- Indentification of carrier solvents of the blue dye used for blending with kerosene; optimisation of dose and development of specifications for the blue dye in order to distinguish the kerosene sold through the Public Distribution System (PDS) from that sold in open market. (A report was submitted to IOC for the implementation.)

Technology Information, Forecast and Assessment

- Carried out pre-feasibility study for white oil production using adsorption technique.
- Software development work done for profitability analysis based on 'Discounted Cash Flow' technique.
- Techno-economic feasibility studies were carried out for lithium complex greases and IIP's catalysts for application in sweetening of gasoline and conversion of natural gas liquids (NGL) to LPG, high-octane gasoline and/or aromatics.



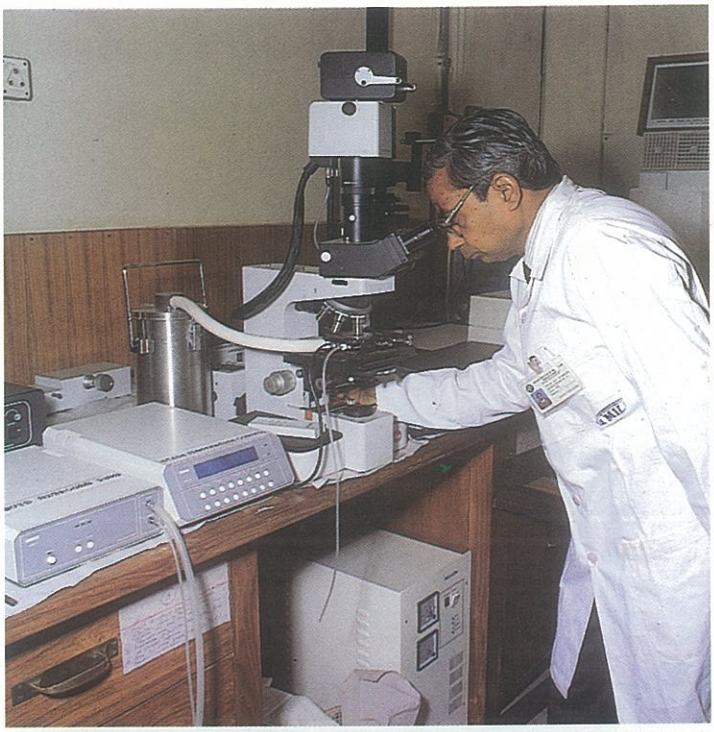
Landmarks of the Year

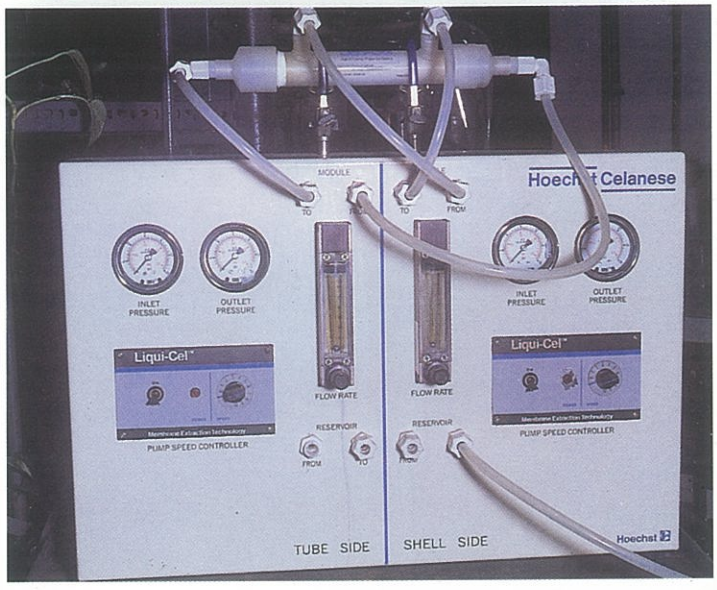
- Technology for desulphurisation of fuel gases was demonstrated to the sponsorer (CRL) using a continuous bench scale unit.
- Technology for making electrode-grade impregnated pitch from petroleum base feed stocks was demonstrated to M/s Graphite Industry.
- Commissioned a pretreater unit for removal of sulphur from naphtha at BPCL.
- Developed a reformer-optimization package for on-line applications, loaded it at BPCL Refinery and evaluated for the toluene-mode of the Reformer operation.
- A process package (jointly with IFP, France) for continuous Catalytic regenerative Reformer for Panipat Refinery was developed.
- Know-how developed for single step oxidation of cyclohexane to adipic acid.
- A laboratory-prototype 2-stroke gasoline engine developed for 3-whealers to operate on CNG.
- Based upon IIP's R&D work, the Ministry of Petroleum and Natural Gas, Government of India have started marketing 3% methanol-gasoline blends (Petrol-M) in Baroda region.
- Approved as a test laboratory for certification of automotive vehicles for road worthiness and emissions as per Motor Vehicles Act/Rules 1989 of the Government of India, as updated in 1993.
- Commercial production of Hot Rolling Oil formulation licensed by IIP has been started by M/s HPCL.
- Highly stable yeast strain developed for dewaxing of vacuum distillates having boiling range upto 500°C.
- Developed a biosurfactant having low CMC and high tolerance towards salinity, temperature and wide variation in pH, necessary for application in enhanced oil recovery.
- Mass spectrometery method employed successfully to identify six group-type components of LOBS/VGO not possible by existing ASTM methods.

Towards Growth

New Facilities Added

- Pulse reactor-cum-temperature programmed desorption (TPD) unit.
- Two gas chromatographs.
- Image analyser with a multiple-programmed heating-cooling facility for studying wax morphology.
- Hollow-fibre-membrane unit for separation of components of gaseous and liquid streams.
- Test Set-up for evaluating multifunctional gasoline additives for carburetor and intake system cleanliness.
- Infrastructure for research and evaluation of CNG kits for passenger cars and diesel engines/ vehicles.
- Noack's apparatus for determination of evaporation losses in lubes.
- FTIR spectrometer having accessories for in-situ investigations on catalysts and variable temperature studies on solids and fluids.
- Air plasma system for cutting both ferrous and non-ferrous metals.





Technologies and Processes Transferred

- A process for development of two butylated phenol based antioxidants transferred to M/s AEC (India) Ltd., New Delhi.
- A process for aluminium complex grease and lithium complex grease transferred to M/s Siddharta Lubricants Pvt. Ltd. , Visakhapattnam.
- Total know-how for liquid phase adsorption technology for petrochemical grade hexane transferred to M/s Oriental Containors, Bombay.
- A collaboration proposal has been signed with UCIL to develop an indigenous hydrostabilization catalyst.
- A basic engineering package for commercial plant for high temperature antioxidants was handed over to the sponsorer (AEC).
- A commercial plant for production of sulpholane (based on IIP process) is being erected at Cadila for commissioning this year.
- Five basic engineering packages for speciality chemicals (BHT, PTBP, ODBHC, PDBHC & MHHC) were proposed and handed over to the industry (M/s AEC (I) Ltd., and Tri-Fine Chemicals Ltd.).

Technologies/ Products Developed

- NMP based lube extraction technology.
- Speciality lubricants like white oils, turbine oils, rubber reclamation oils and rubber processing oils.
- Technology for making petroleum based impregnating pitch for graphite industry.
- Technology of making paving-grade bitumens from waxy crudes.

New Tasks

MAJOR PROJECTS TAKEN UP

- Development of low metal/skewed Pt-Re semi-regenerative reforming catalyst (sponsored by CHT; Rs. 78.0 lakhs).
- Technical services for BPCL on new NHDS plant (sponsored by BPCL; Rs. 11.0 lakhs).
- NMP from gama Butyrolactone (sponsored by M/s Adarsh Chemicals; Rs 18.0 lakhs).

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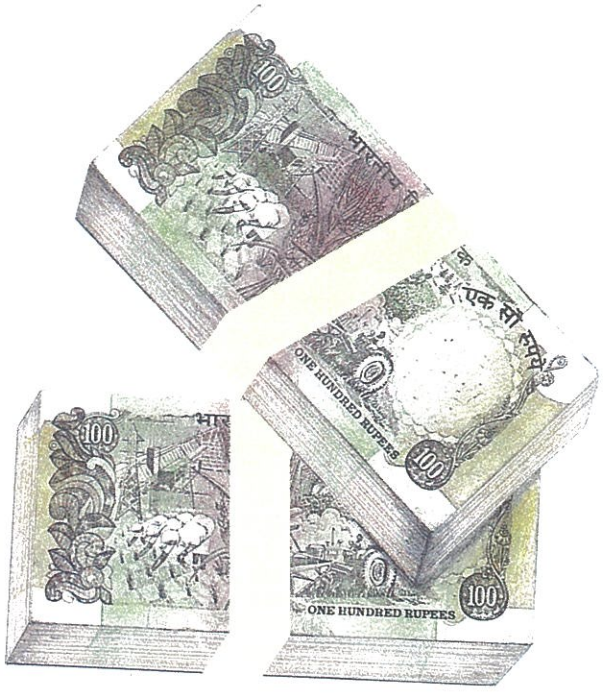
Resources

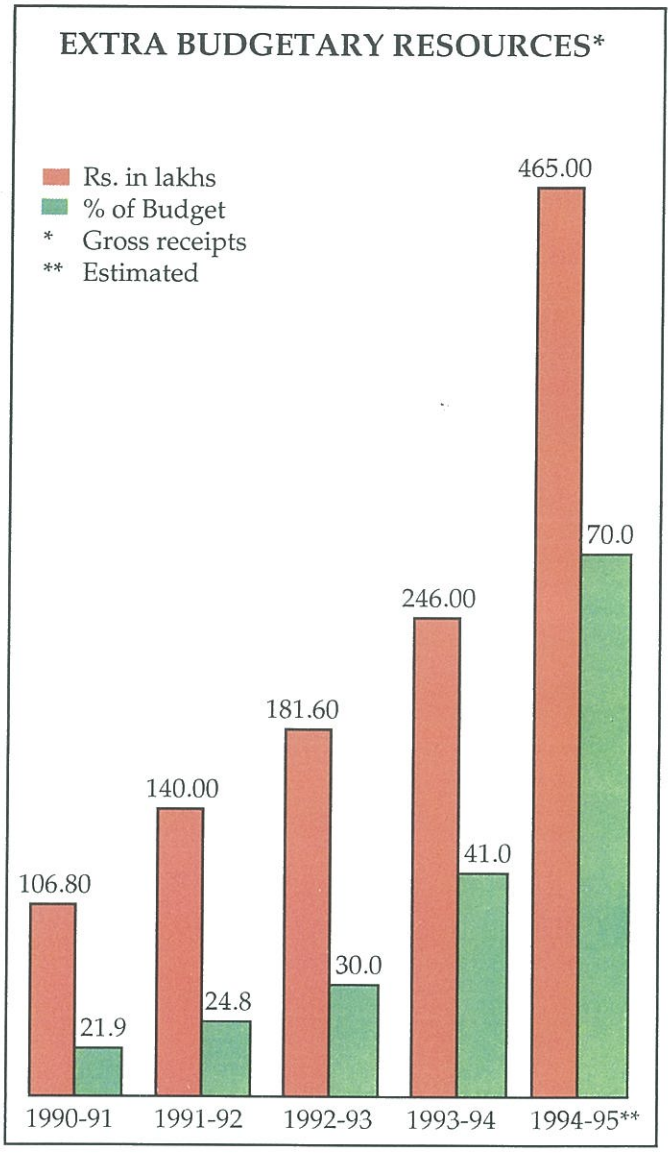
Sponsored Research

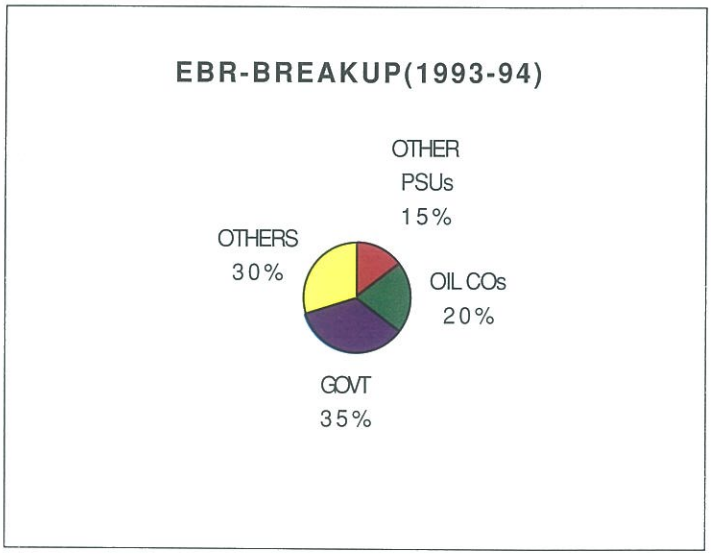
Item	Number	Rupees (lakhs)
Projects in hand	65	447.76
Assignments completed	36	129.76
New assignments taken	35	158.39
Projects proposed		1485.00

Extra Budgetary Resources

Agency	Rs. (lakhs)
Public Sector	85.81
Private Sector	72.99
Government	87.91
Total	**246.71**







International Collaboration

A three-member Saudi Arabian delegation, led by Mr. Fahad A Bin Salamah, Director General of Met Laboratories and including Mr. Sarni A.K. Mirza, Director of Building Materials Research Laboratory and Mr. Abdullah M Al-Yabis, Director of the Follow-up Department, visited IIP on November 22, 1993, in connection with the Programme of S&T Cooperation with Saudi Arabian Organisation, signed in June 1993.

The Institute also participated in various bilateral exchange and cooperation programmes with DAAD, KFA, UK, CNRS, Egypt, Poland and CIS countries to name a few.

Eleven Scientists from Hungary, France, Australia, Germany, Ukrain, USA and UK visited the Institute during this year.

The Institute deputed fourteen Scientists/Engineers to France, U.K., Germany, USA, Costa Rica, Belgium, Hungary, Poland and Itly, under various programmes.

Patents & Publications

Six patents were filed during the year and a patent on solvent extraction process for the separation of aromatics and non-aromatics from feed stock of kerosene-range petroleum fractions was sealed. In its continuing endeavour, IIP submitted 18 patents for filling.

The Institute has been on forefront of scientific publications in journals as well with 54 papers published in reputed international journals and 52 papers presented in national and international conferences/symposia.

The Human Factor-HRD

Sponsored Training Programmes Conducted by IIP for Industries

Petroleum Refining and Petrochemicals Technology for Chemical Engineers from M/s Reliance Industries Ltd.: April 12-23, 1993

Participants included 15 Graduate Engineer Trainees (GETs) of RIL led by their two co-ordinators and a faculty member of Jawaharlal Nehru Technological University, Hyderabad. The valedictory function was graced by Shrimati Lalitha B. Singh, Adviser (Petrochemicals), Department of Chemicals & Petrochemicals, Government of India, New Delhi by delivering the valedictory address.

Petroleum Refining Technology for Chemical Engineers: July 19-August 6, 1993

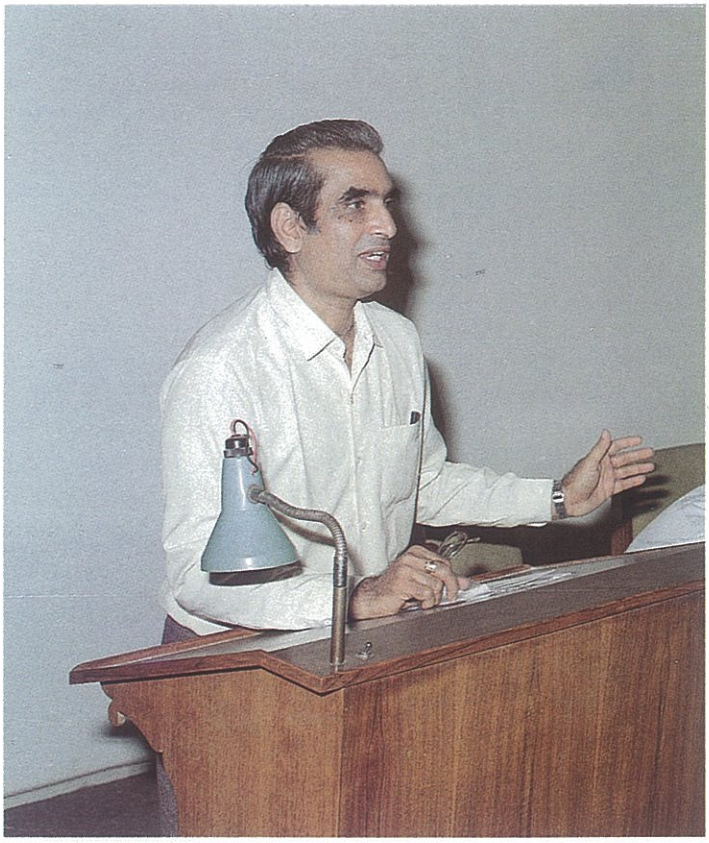
Eleven Chemical Engineers—five from M/s Bharat Petroleum Corporation Ltd. and three each from M/s Bongaigaon Refinery & Petrochemicals Ltd. and M/s Cochin Refineries Ltd.—attended this course comprising 55 lectures including six by technocrats from M/s Indian Oil Corporation Ltd. and five from M/s Engineers India Ltd. Prof. K. Vasudeva, Department of Mechanical Engineering, IIT, New Delhi, in his valedictory address, stressed the need for such programmes for upgradation of skills.

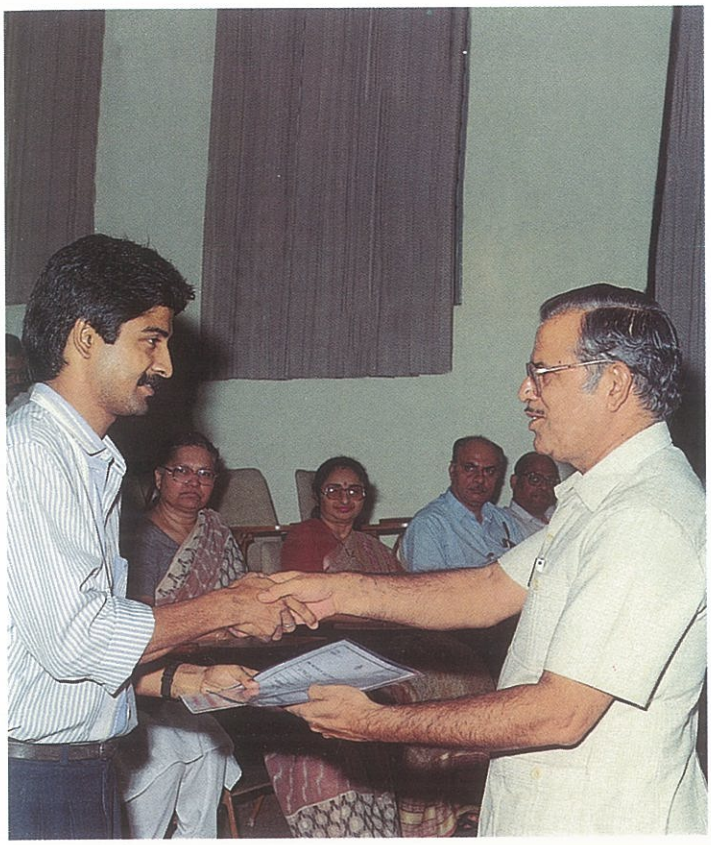
Petroleum Refining Technology for Chemical Engineers of Indian Oil Corporation: February 21-March 4, 1994

Sixteen engineers sponsored by the Refineries and Pipelines Division of IOC working at its five refineries at Guwahati, Haldia, Barauni, Mathura and Gujarat attended this course in which few lectures were delivered also by the experts from M/s Engineers India Ltd. and Dr. G.C. Joshi, Emeritus Scientist, IIP. Dr. Tamas Karacsony, Counselor (Science), Embassy of Hungary, New Delhi addressed the participants during the valedictory function.

Advanced Programme on 'Engine Fuels—Quality Requirements and Emissions': March 29-31, 1994

Fourteen Engineers representing 10 leading-automobile industries and the Vehicles Research & Development Establishment, Government of India, Ahmednagar and three Engineers of IIP participated in this programme.





Formulation and Testing of Engine Oil Additives

A four-month specialized-training course on above subject was formulated and conducted for Mr. Fayez Kassoumeh, Scientist, Scientific Studies Research Centre, Syria, beginning February 7, 1994.

HRD-Courses organised for IIP Personnels

- Stress Management-Managing Insult Situations: April 12, 1993.
- Spiritual Concept in Practical Research: January 19-21, 1994.
  Dr. Rakesh Chopra, Century Health Pvt. Ltd., New Delhi conducted above courses.
- Personality Plus and Effective Communication.
- Motivation Skills.
  The above two courses were conducted by Shrimati Renu Matto, Corporate Arms, Jamshedpur during October 18-22, 1993.
- Managing the Future: March 21-25, 1994.
  Shri A. Venkateshwar Rao, former Chairman, Allwyn Ltd., and Chief Engineer, Andhra Pradesh State Electricity Board, Hyderabad conducted this course in two batches attended by about 50 scientists.

Conferences & Workshops

Brain Storming Session on Petroleum Biotechnology: May 31-June 1, 1993

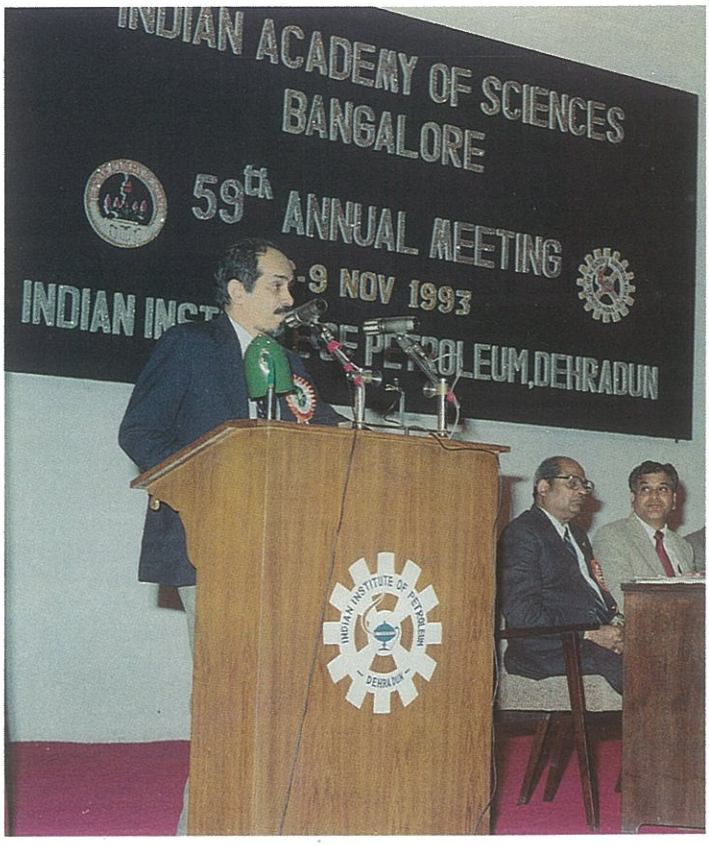
A brain-storming session on two research projects namely, 'Microbial Enhanced Oil Recovery' and 'Oil Spill Degradation and Pollution Control' funded by the Department of Biotechnology (DBT) was organised at IIP. This was attended by various Institutions involved in these multi-institution collaborative R&D programmes and select user-agencies. The session was chaired by Dr. (Mrs) Manju Sharma, Adviser, DBT.

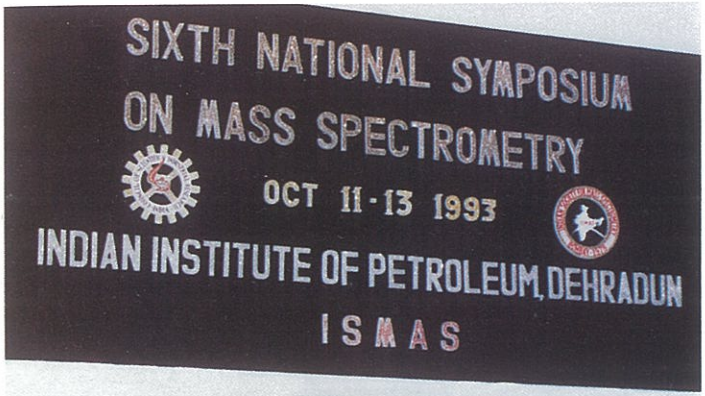
IIP - Licensees Meet: May 25, 1993

A Meet was held between Scientists & Engineers of Industrial & Domestic Combustion Area of IIP and the Licensees of domestic and industrial combustion appliances developed by IIP, to review the problems, if any, faced by the licensees and to suggest remedial measures for the same.

IIP R&D Annual Review Meet : June 7-11, 1993

This meet was organised to bring all scientific and technical staff on one platform so that they could know and discuss the work being carried out in different laboratories in the Institute, and to review the 'delta progress' made during the year 1992-93 and plans for the future. There were 102 technical presentations during the Meet by 85 speakers.





Seminar on Frontiers of Chemistry: July 29, 1993

The seminar was organised to felicitate Dr G.C. Joshi, Scientist—F and Area Coordinator, Chemical Sciences Division on attaining his super-annuation on July 31, 1993. Several Speakers gave thought-proving talks on wide ranging topics in chemistry, viz. 'Random Walk in Field of Organometallics', 'Additive Chemistry for Lubricants and Fuels' and, 'Synthetic Excursions in Functional Chemicals'.

Sixth National Symposium on Mass Spectrometery: October 11-13, 1993

This symposium was organised by IIP under the auspices of Indian Society of Mass Spectrometery (ISMAS).

Professor E.S. Raja Gopal, President, ISMAS, and Director, National Physical Laboratory, New Delhi, was the Chief Guest.

Over 250 delegates from various Indian research institutes, universities and industries and 25 delegates from foreign countries participated.

Technical presentations included 23 invited lectures and 127 poster papers in areas of petroleum exploration and processing, inorganic, organic and nuclear chemistry, planetary and earth sciences, and instrumentation.

Seminar on Fuel & Lubricants - Indian Developments for Engine Applications: December 8, 1993

IIP was specifically invited by AIAM, ACMA and CII to hold this seminar during the Auto Expo' 93 (December 7-15, 1993) at Pragati Maidan, New Delhi. During this Seminar IIP Engineers made five presentations on 'trends in fuel quality', 'alternative fuels & transport sector', 'analytical modelling & engine process research', 'engine development', and 'automotive lubrication and tribology'.

Seminar-cum-Workshop on 'Interpretation of Data in Chemical Reaction Engineering': Feb 7-18, 1994

Dr. R.S. Mann, currently the Emeritus Professor, Faculty of Engineering, University of Ottawa, Canada conducted this workshop attended by 15 persons from IOC (R&D Centre), EIL (R&D Centre) and Punjab University besides the IIP Scientists working in relevant areas.

Star Marks

AWARDS

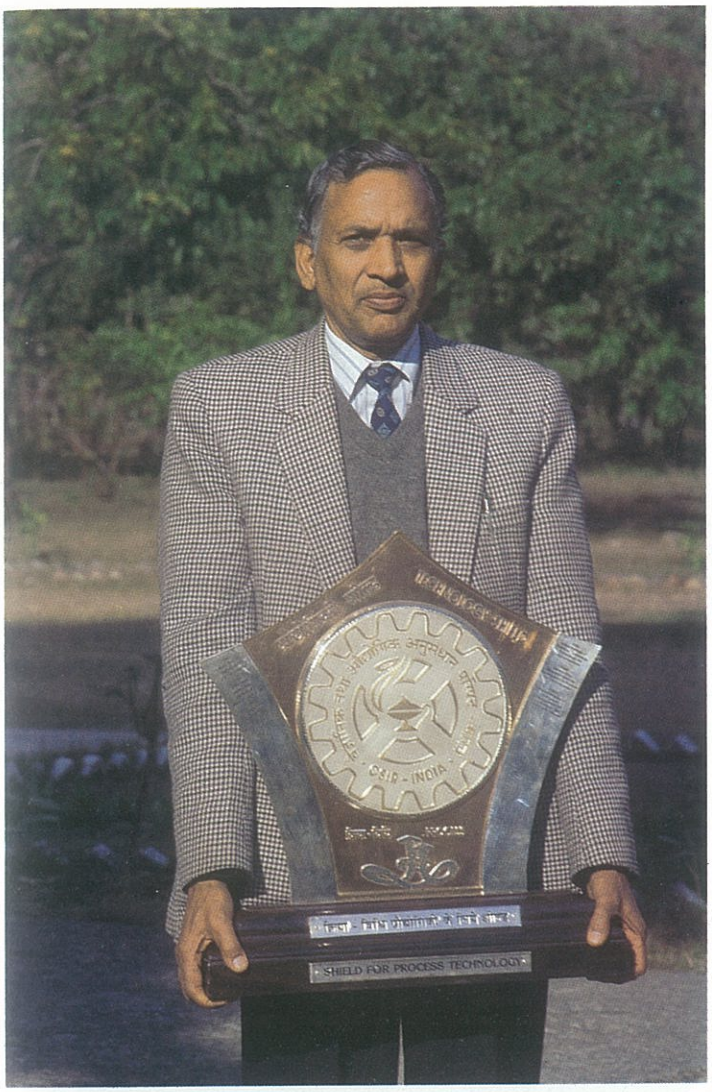
* FICCI AWARD

Dr. T.S.R. Prasada Rao, Director, was awarded the prestigious FICCI Award for the Year 1992-93 for his contributions in the discipline of Physical Sciences, on September 28, 1993 at New Delhi, by Hon'ble Prime Minister Shri P.V. Narsimha Rao. Dr. Prasada Rao has been accorded this distinction for his notable contributions to the area of catalysis.

* CSIR YOUNG SCIENTIST AWARD

Mr. A.K. Gondal received this prestigious award for the year 1993 on September 26, 1993 in the field of Engineering Sciences, for his outstanding research on understanding of engine-component wear and effects of methanol and its blend in gasoline on the tribological behaviour of IC engines.

The award was given by Hon'ble Vice President of CSIR, Shri P.R. Kumaramangalam.



* CSIR TECHNOLOGY SHIELD

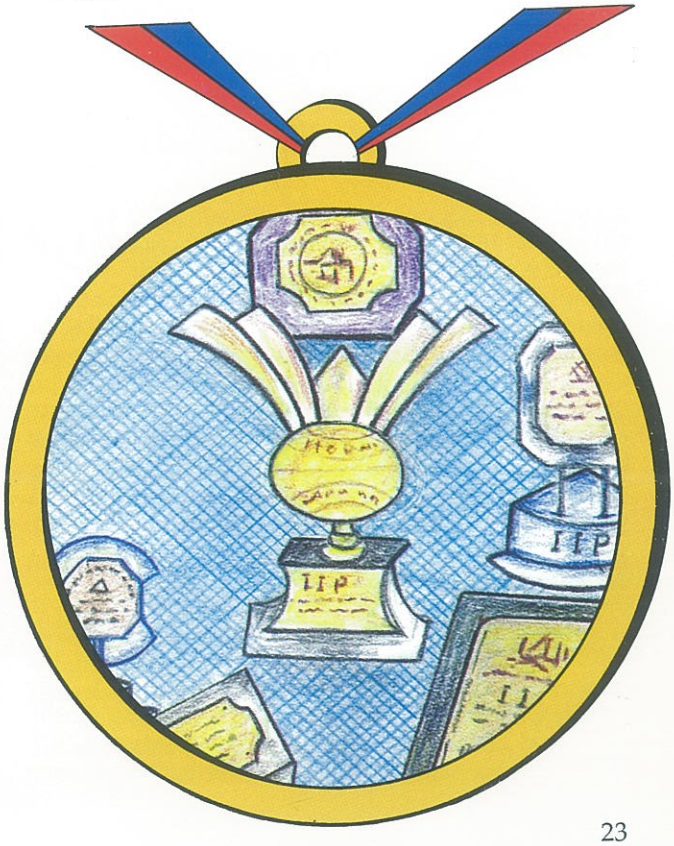
IIP received the CSIR Technology Shield for the year 1993 on December 10, 1993 for developing technology for the production of food-grade hexane using sulfolane as the solvent for extraction. This technology monopolized by only a few companies around the world, enables commercial production of food-grade hexane with the benzene content as low as 0.5 percent.

The award was received on behalf of the Institute by Dr. B.S. Rawat, Area Leader, Separation Processes, from Hon'ble Minister-of-State for Science & Technology, Shri Bhuvenesh Chaturvedi.

RECOGNITIONS

* The Indian Academy of Sciences, Bangalore elected Dr. T.S.R. Prasada Rao, Director, IIP as a FELLOW of the Academy in recognition for his outstanding contributions in research and development in his area of expertise 'CATALYSIS'.

* The Catalysis Society of India also elected Dr. T.S.R. Prasada Rao—an eminent scientist in catalysis area—as its new president in April 1993.



Around us

COMMUNITY & CULTURE

World Environment Day: June 5, 1993

The World Environment Day was organised with active participation of the Dehradun District administration. The Advisor to the Governor of Uttar Pradesh, Shri B.K. Goswami was the Chief Guest while Shri S.K. Das, Commissioner, Garhwal Division presided over the function.

Presentations were made by eminent environmentalists of the region including Shri Sunder Lal Bahuguna of the Chipko Movement fame, Dr. Vandana Shiva, Shri Avdesh Kaushal, Dr. Sunil Tandon, and others.

Oil Conservation Week: January 3-9, 1994

The week was celebrated, as part of the country-wide 'Oil Conservation Week' programme to create awareness among the masses on the importance of conservation in their daily life.

National Science Day: February 28, 1994

The National Science Day was celebrated to commemorate the day of the announcement of discovery of the Raman Effect by Dr. C.V. Raman, which won him Nobel Prize in Physics, by organising visits of students from several schools in the city to expose them to modern research facilities in science and engineering and R&D activities of the Institute.

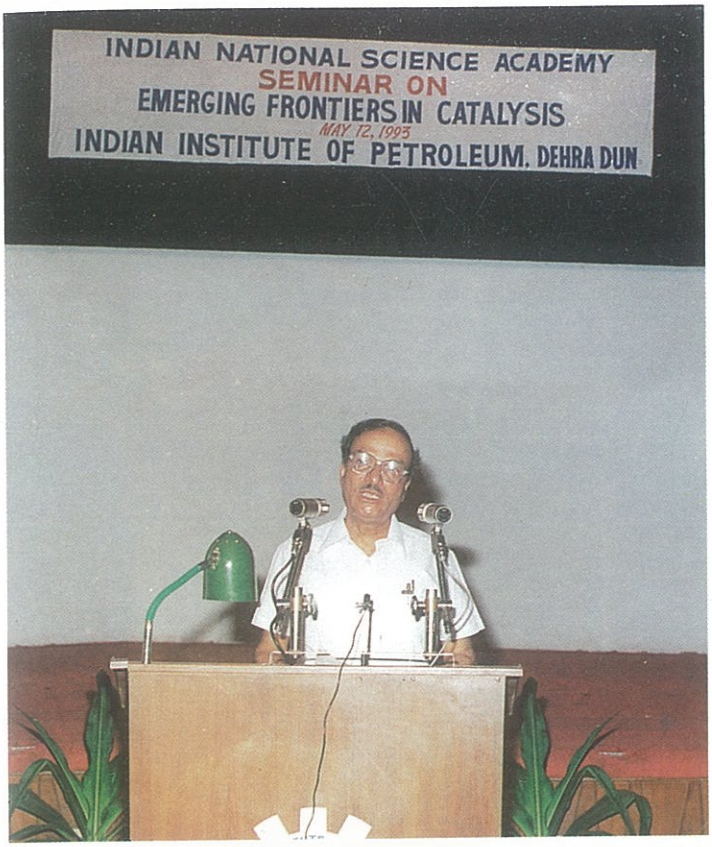
MEMORABLE EVENTS

IIP Foundation Day Celebrations: April 13-15, 1993

IIP celebrates every year April 14 as its Foundation Day, as it was on this day the Institute shifted its temporary laboratories at Central Road Research Institute, New Delhi to the present Campus in Dehradun. Dr. Shankar Dayal Singh, a noted Litterateur and Member of Rajya Sabha, delivered a thought provoking talk on 'Implementation of the Official Language Policy in R&D Organisations' on April 13, 1994. A cultural programme was organised on April 14, followed by a lecture-cum-demonstration on 'SCIENTOONS' (cartoons based on science) by Dr. Pradeep K. Srivastava, Scientist, CDRI, Lucknow on April 15.

INSA Annual Council Meeting and Seminar: May 12-13, 1993

The Institute hosted the Seminar on 'EMERGING FRONTIERS IN CATALYSIS' organised by the Indian National Science Academy (INSA). The Seminar was inaugurated by Dr. S.K. Joshi, President of the INSA and Director General, CSIR. An overview of the present status and future



challenges in industrial catalysis with particular reference to India's achievements were highlighted.

FICCI-CSIR Conference: May 15, 1993

The Institute organised a one-day conference on 'Role of Public Funded R&D in the New Economic Environment' co-sponsored by the Federation of Indian Chambers of Commerce and Industry (FICCI) and the Council of Scientific & Industrial Research (CSIR) Dr. D.N. Tiwari, Director General, Indian Council for Forestry Research & Education inaugurated the Conference.

CSIR Foundation Day Celebration: September 26, 1993

The Day was celebrated by organising various essay & inter-school competitions and presenting mementoes to the IIP employees who completed thirty years' service in CSIR and also to those who retired during last one year.

Mr. S.K. Manglik, Chairman, Oil and Natural Gas Commission, Dehradun was the Chief Guest.

59th Annual Meeting of the Indian Academy of Sciences: November 6-9, 1993

Indian Academy of Sciences held it Annual meeting at IIP, at the initiative of Dr. T.S.R. Prasada Rao.

Professor R. Narsimha, President of the Academy, inaugurated the meeting. Public lectures were delivered by eminent scientists—Dr. A.P.J. Abdul Kalam, Scientific Advisor to the Defence Minister, Professor Santimay Chatterjee, Professor G. Padmanabhan and Professor K.S. Valdeya.

Dr. Shanti Swarup Bhatnagar's Birth Centenary Celebration: November 19, 1993

The Birth Day of the Founder Director of CSIR was celebrated in the Institute by organising a stage play in Hindi entitled 'In the Matter of J. Robert Oppen-Heimer'.

NOST Symposium: March 13-17, 1994

A national symposium, under the auspices of National Organic Science Trust (NOST), dedicated to Professor K. Venkataraman, was held at the Institute. About 50 highly reputed organic chemists of the country and from outside participated.

Dr. S.K. JOSHI, DG, CSIR visits IIP: March 10, 1993

Dr. S.K. Joshi, Director General, CSIR visited various laboratories of the Institute and addressed the senior scientists on the importance of protecting intellectual properties by way of patents, need of effective marketing of technologies and developing greater credibility with the user industry. He made his observations at the impressive performance of IIP and also remarked that IIP was one of the top ranking CSIR laboratories.

Rajbhasha

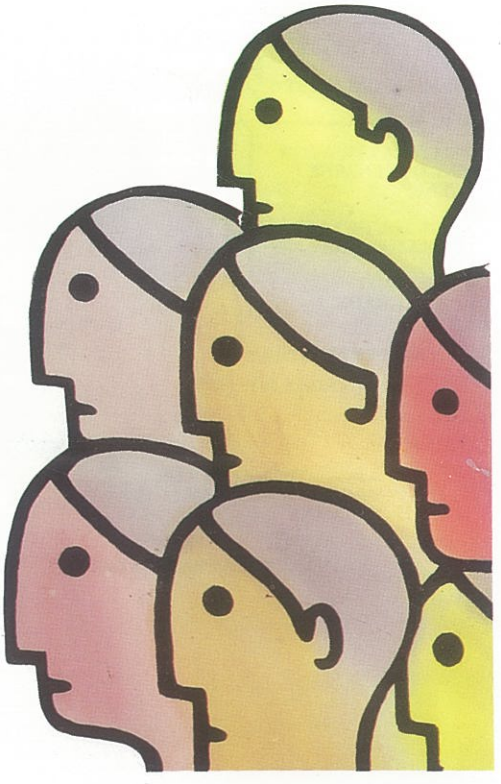
The Rajbhasha Unit of the Institute has been engaged in the implementation of the Official Language policy which includes training and teaching of employees in Hindi, Hindi typing, Hindi shorthand; ensuring bilingual or diglot (Hindi-English) preparation of office orders/ memoranda, signboards, nameplates, stationery, annual and other reports and other documents (involving translation work), and initiating some novel and innovative activities, throughout the year.

(i) Hon'ble Dr. Shankar Dayal Singh, M.P. (Rajya Sabha) Lectures on Rajbhasha: April 13, 1993

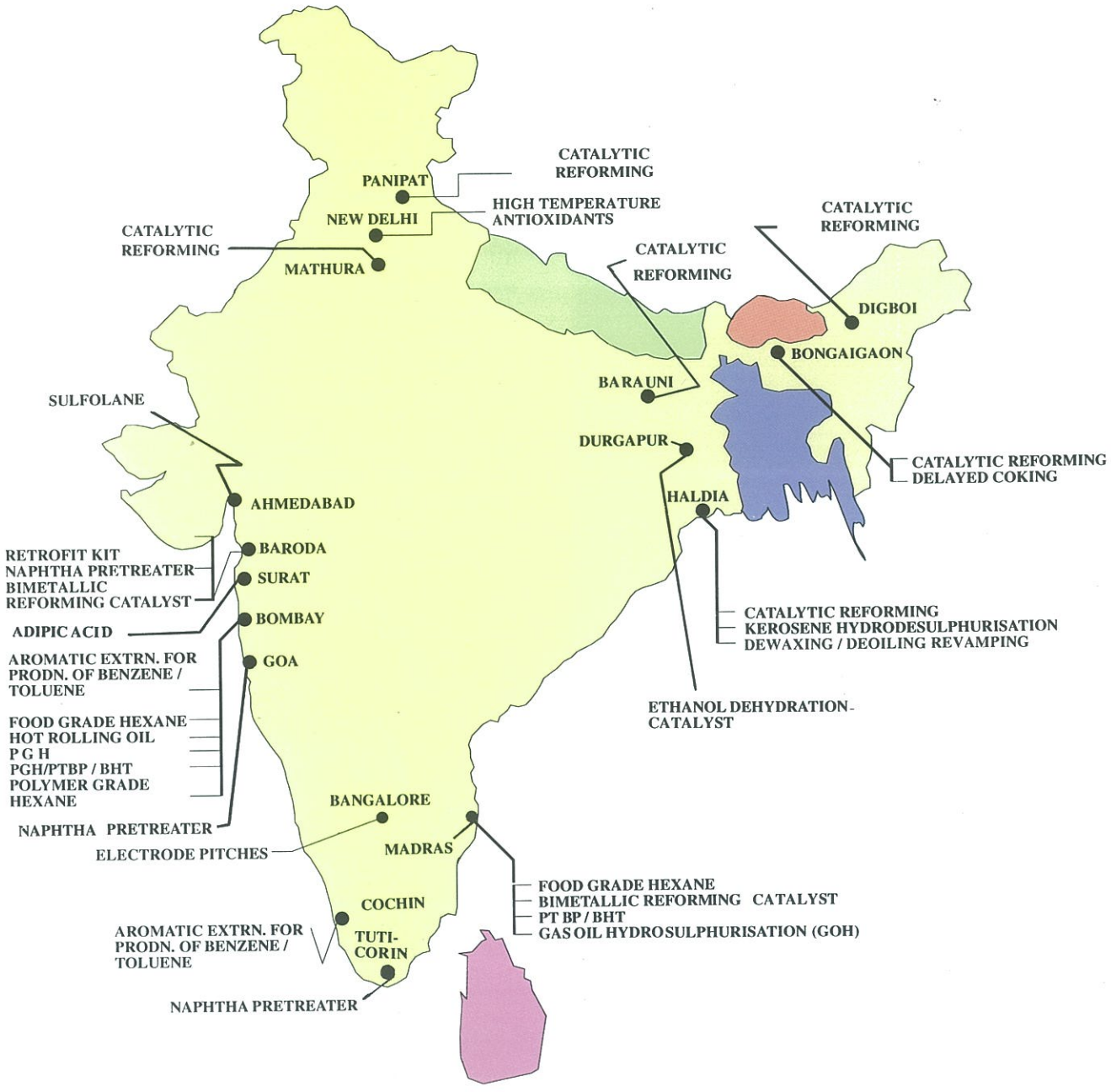
As the Chief Guest on the occasion of IIP Foundation Day celebrations, Dr. Singh, a famous Litterateur and an active Statesman attached to the Committee of Parliament on Official Language, said that giving the rank of 'Official Language' to Hindi—the language of the people of India and also of our freedom struggle—was really a revolution in that the common man's language became the Official Language, but that landed it into an unfortunate dispute. He advocated simplicity in usage of this language.

(ii) Historical Workshop of CSIR Hindi Officers: December 2-3, 1993

It was a historical occasion when the Rajbhasha Unit of the Institute organized the Workshop of Hindi Officers (working in the National Institutes/ Laboratories) of the CSIR during December 2-3, 1993, the first of its Kind in the History of CSIR. It aimed at bringing together those engaged in the implementation of the Official Language policy, and to provide them a platform to speak out their problems and aspirations. Twenty three representatives from 20 laboratories/institution of the CSIR (out of a total of 41 institutes/laboratories) participated in it. An 'Inter-Council Official Language Implementation Co-ordination and Advisory Committee' (ICOLICAC) was set up.



MAJOR I.I.P. TECHNOLOGIES LICENSED IN THE COUNTRY



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