

Dr. T.S.R. Prasada Rao
FASc, FNAE, FIChE
60th Birthday Felicitation Volume



20 January 1999

Indian Institute of Petroleum

(An ISO-9001 R&D Institute)

Dehra Dun - 248005



Dr T S R Prasada Rao FASc, FNAE, FIChE

Felicitatation Function

January 20, 1999

FELICITATION VOLUME

Edited by

Dr G Murali Dhar

On behalf of Organizing Committee

International Symposium on

“Frontiers in Catalysis in the 21st Century”

(In honour of Dr T S R Prasada Rao)

Indian Institute of Petroleum

Dehradun – 248 005

INDIA

PREFACE

Dr. Turaga Sundara Rama Prasada Rao, FASc, FNAE, FIChE will complete sixty years on 20th January 1999. This is a milestone event in any ones life. He is well known as an erudite scholar, an inspiring scientist, a visionary and an able administrator. He made outstanding contributions to Catalytic Science and Technology in a career spanned over 32 years while working at Fertilizer Corporation of India (Now PDIL) Sindri, Indian Petrochemical Corporation Limited, Baroda and Indian Institute of Petroleum, Dehradun. His contributions through publications and patents and development of various catalysts and processes and their commercialization are well recognized. The spontaneous recognition, nationally and internationally, speaks volumes about the quality and quantity of his work. He received many prestigious awards like FICCI Award, Kamal Kumari Memorial, Om Prakash Bashin Award, K G Naik Gold Medal, Bhartiya Sanskriti Pursakar, Doon Ratna Award, Professor S K Bhattacharyya Memorial Eminent Scientist Award etc. He is a fellow of Indian Academy of Engineering, Indian Academy of Sciences, Andhra Pradesh Academy of Sciences etc. He was the first Indian to be invited to be on the editorial board of Applied Catalysis journal published by Elsevier, Netherlands.

He was one of the founder members of the Catalysis Society of India and served as the president of Catalysis Society of India 1992-94 and Secretary, Catalysis Society of India for two terms 1984-1987 and 1988-1989. He represented India on council of International Congress on Catalysis. More than any thing, he has been a source of inspiration and strength to almost all the activities of the Catalysis Society of India.

In addition to his contributions as a scientist, Technologist, and Administrator, he has contributed to the cause of Science in his capacity as a member of a number of policy making agencies like OADB, Governing body of CSIR, Scientific Advisory Committee, Ministry of Petroleum and Natural Gas etc., to name a few.

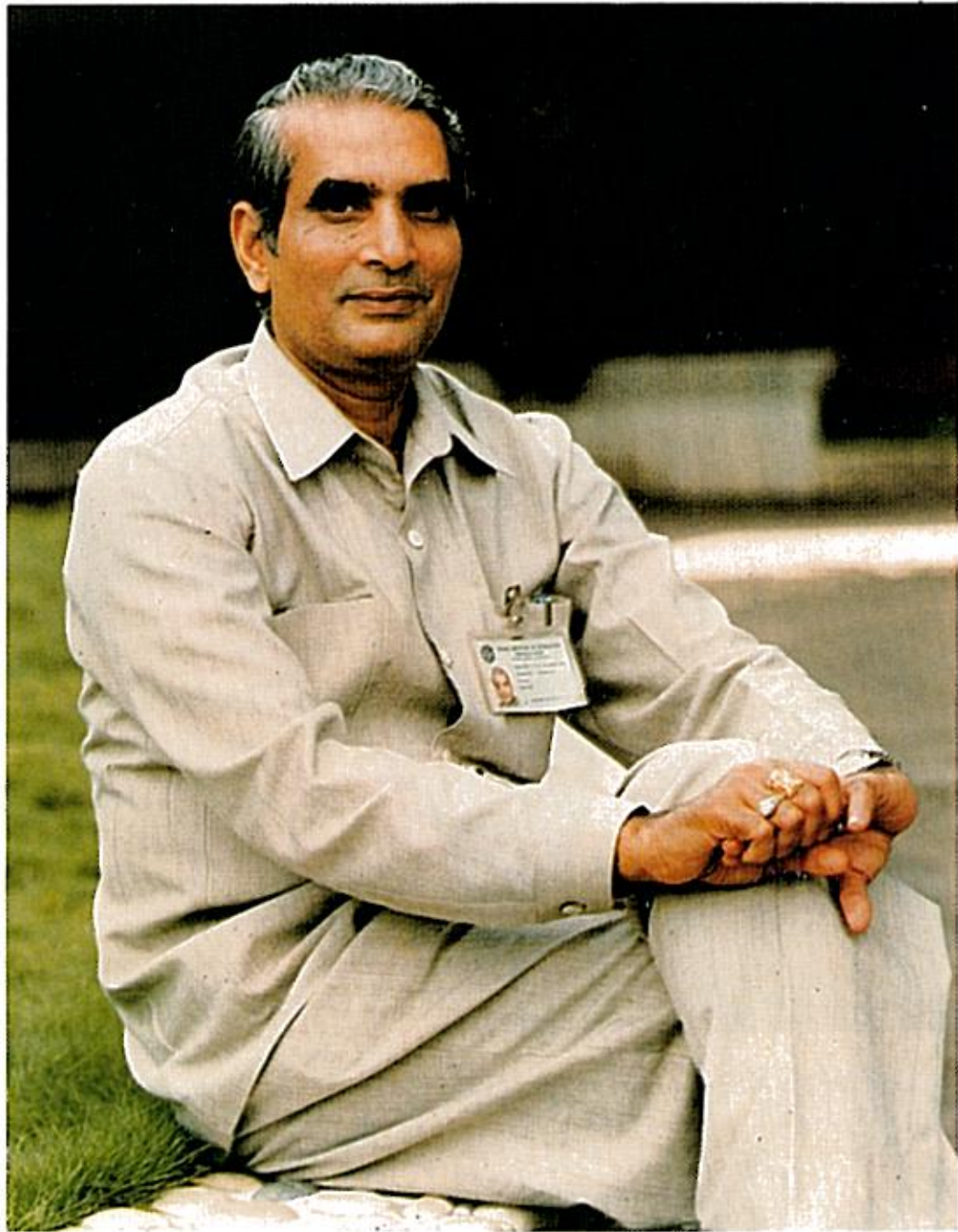
A large number of admirers, friends and well wishers desired to felicitate Dr. Prasada Rao in a befitting manner by organizing an International Symposium with Professor M. M. Sharma as Chairman, Mr. V. K. Kapoor as Convener and Dr. K. Narsimha as Co-Convener. The felicitation committee is formed with me as the convener and the editing of felicitation volume is entrusted to Dr. G. Murali Dhar.

I express my sincere thanks to Dr. G. Murali Dhar, for an article on Dr. Prasada Rao and also for editing felicitation volume, and thanks are also due to Mr. Vikram Singh Rawat, Dr. N. Viswanadham, Dr. T. Venkateshwar Rao, Mr. B. N. Srinivas, Dr. Prashant Kumar, Mr. M. S. Rana, Miss. Anjali Sinha, Mrs. Seema Sharma and Mr. Jassu Kumar for their valuable contributions in bringing out this volume.

I feel greatly honored and privileged to be associated with the felicitation function and felicitation committee. The volume, attempts to highlight the great achievements of multifaceted personality of Dr. T. S. R. Prasada Rao, a dynamic Scientist and Technologist, an able Administrator, Philanthropist, a Philosopher and a Visionary. I sincerely believe his life and works will inspire young scientists, technologists for many years to come.

20th January 1999
Dehradun

Dr. M. O. Garg
Convener
Felicitation Committee



Dr Turaga Sundara Rama Prasada Rao, FASc, FNAE, FIChE



Dr T S R Prasada Rao & Wife Mrs Sujatha Venkateswari Prasada Rao

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DOWN THE MEMORY LANE

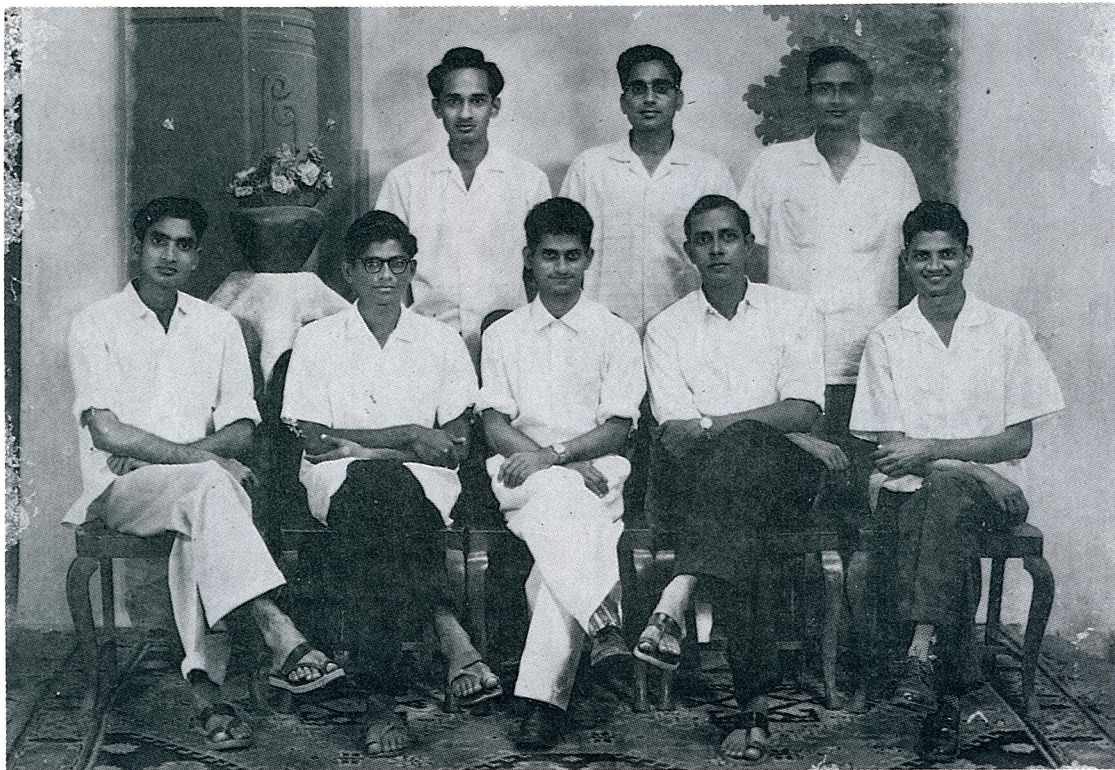
Early Days and Family Life



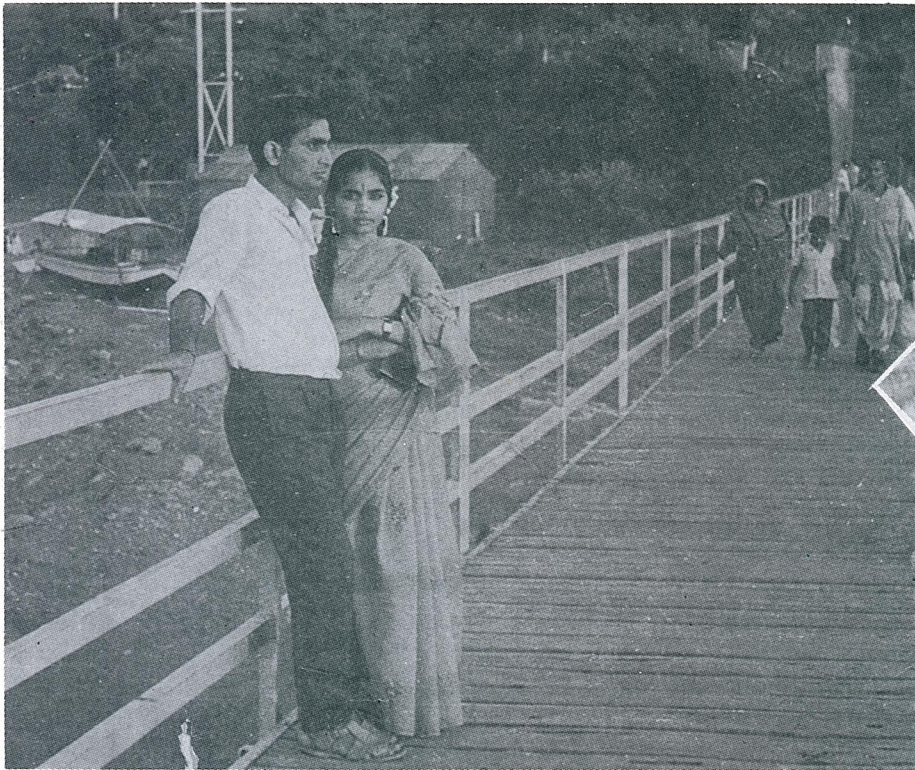
*Beloved parents Shri Turaga-Venkata Lakshmi
Rama Rao and Smt. Adisaraswati*



Young Prasada Rao



Dr Rao with his friends (B.Sc. hons) at Andhra University



Dr T S R Prasada Rao with his wife on a pleasure trip



*Proud father with Uday
on his lap*



In a picnic at Sindri



Couple on a trip with Uday and Haritha



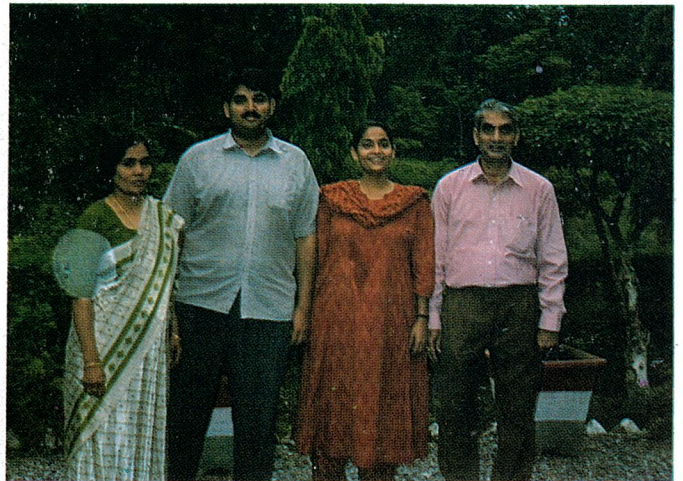
*Trying a hand
on cooking* ➤



A snap on the 25th marriage anniversary



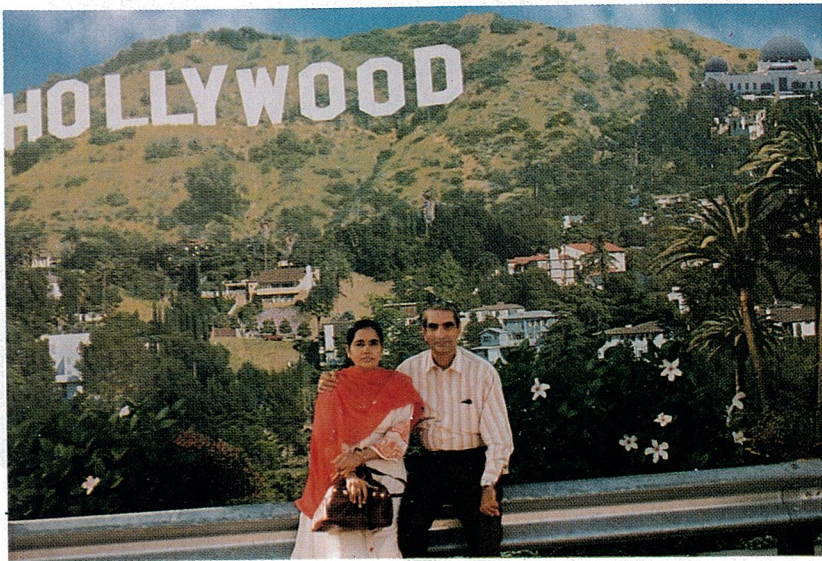
Enjoying the nature



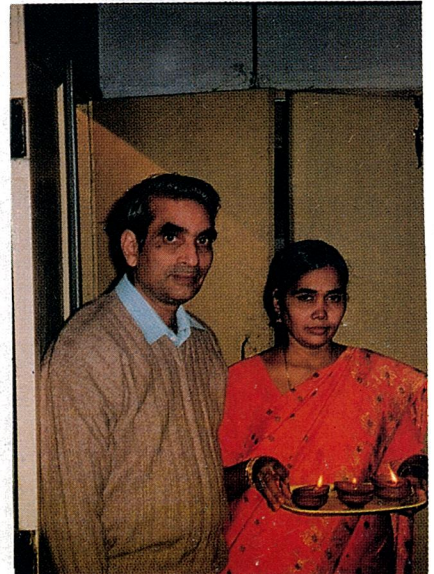
Family at his bangalow



Giving away a prize to Uday



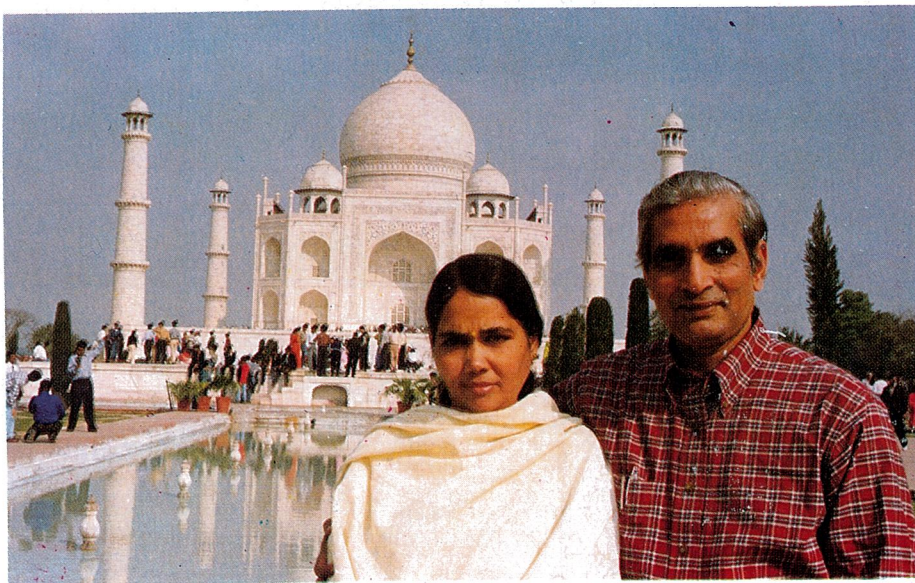
Facing camera at Hollywood



Celebrating Dewali



Visiting the Wax Museum at London



A visit to Tajmahal

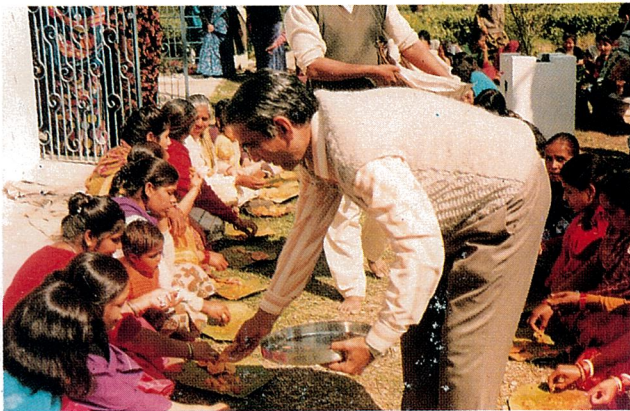


Dr & Mrs Rao in traditional chinese dress

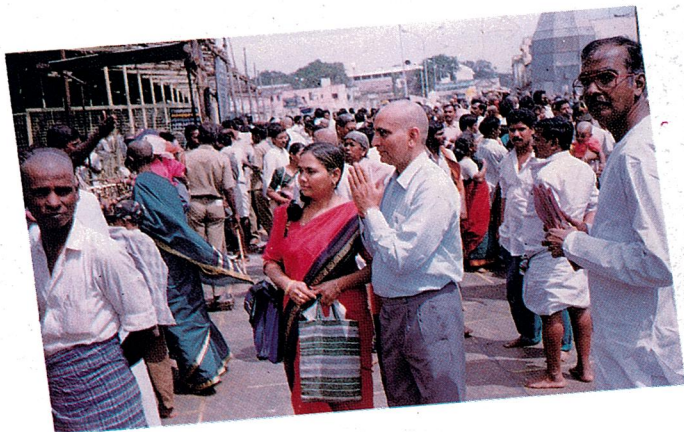
Social & Cultural Life



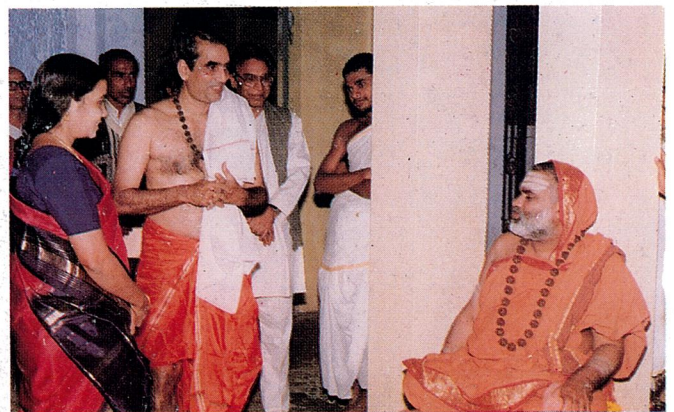
Celebrating Holi



Participating in bhandara at spiritual centre IIP



*Couple taking blessings from
Lord Balaji, Tirupathi*



*Couple taking blessings
from Kanchi acharya*



Young Prasada Rao in a drama troupe



*Encouraging a child artist in
a Republic day function*



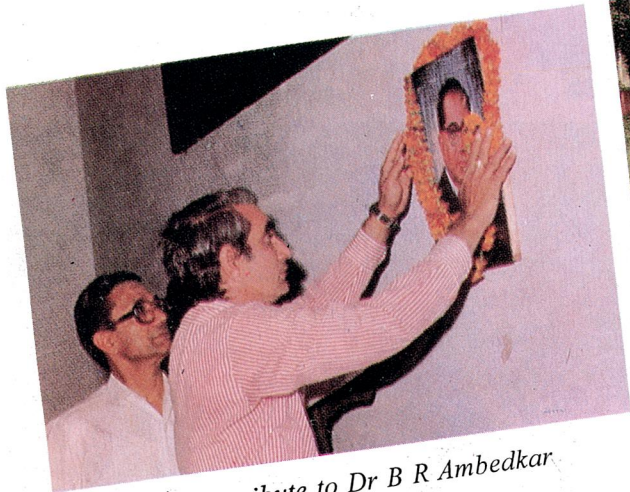
*In Egyptian dress near
pyramids in Egypt*



With Smt. Sonal Man Singh (A classical dancer)



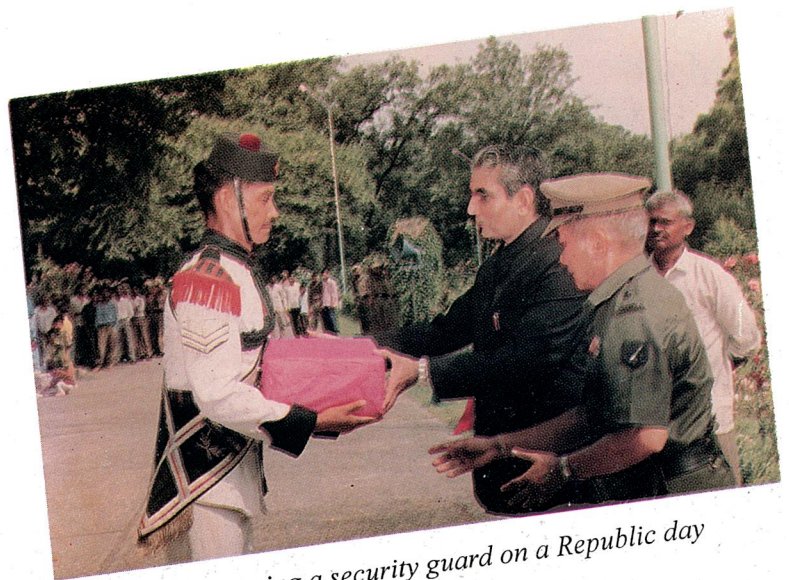
Educating about oil conservation



Paying tribute to Dr B R Ambedkar



Towards making green surroundings



Honouring a security guard on a Republic day

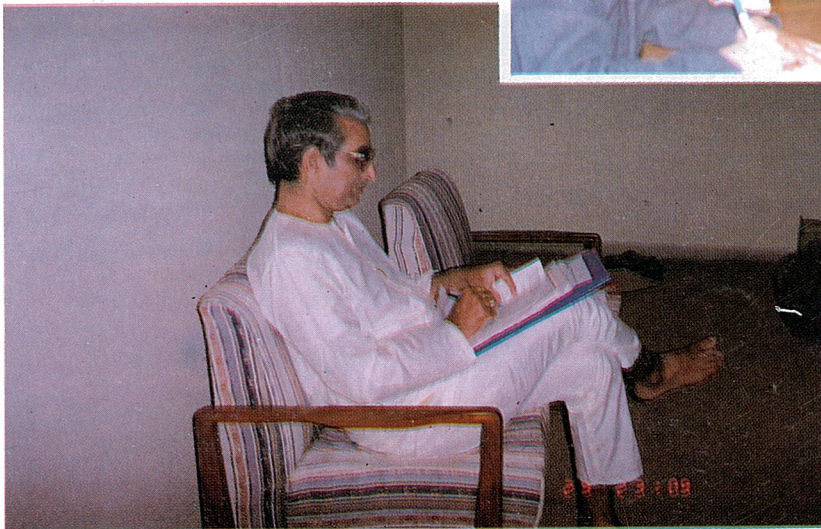
Honoring Padmasri
Dr Shaym Singh (Shasi) ➤



◀ Dr Rao in his office



Explaining science to school children



◀ Working at home

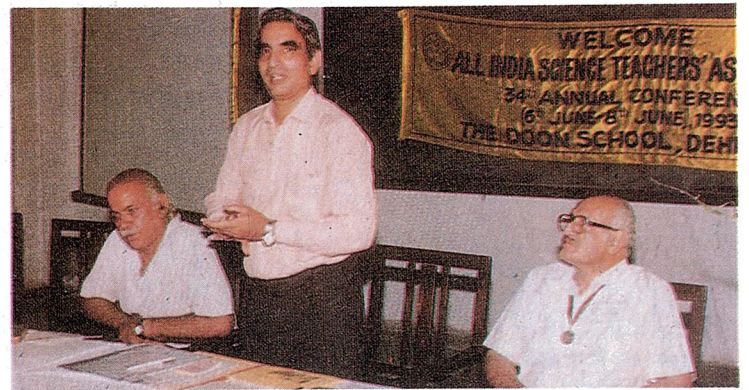
Feathers in the Cap



Receiving FICCI award from then Prime Minister of India Shri P V Narasimha Rao



◀ Inauguration of workshop by
Dr G S Sidhu former DG CSIR



Addressing the National Science Teachers Association at Doon School ▶



◀ With Prof. S K Joshi and
Shri Ramalingam, Chairman,
MRL in IIP Industry Meet at Chennai

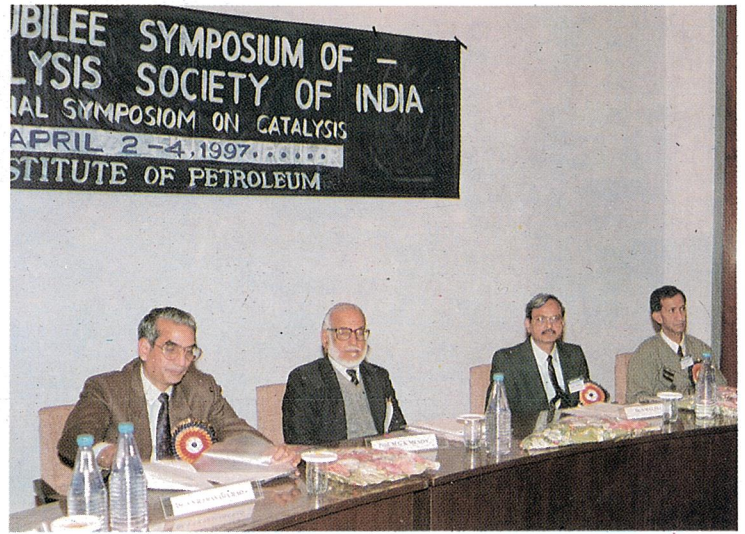


With IIP colleagues in IIP industry meet at Chennai ▶



◀ In Mini Refinery conference

In Silver Jubilee Symposium of CSI at IIP with Prof. M G K Menon, Dr N M Gupta and Dr Paul Ratnasamy ➤



In the inaugural function of 14th National Symposium on Catalysis at Chennai



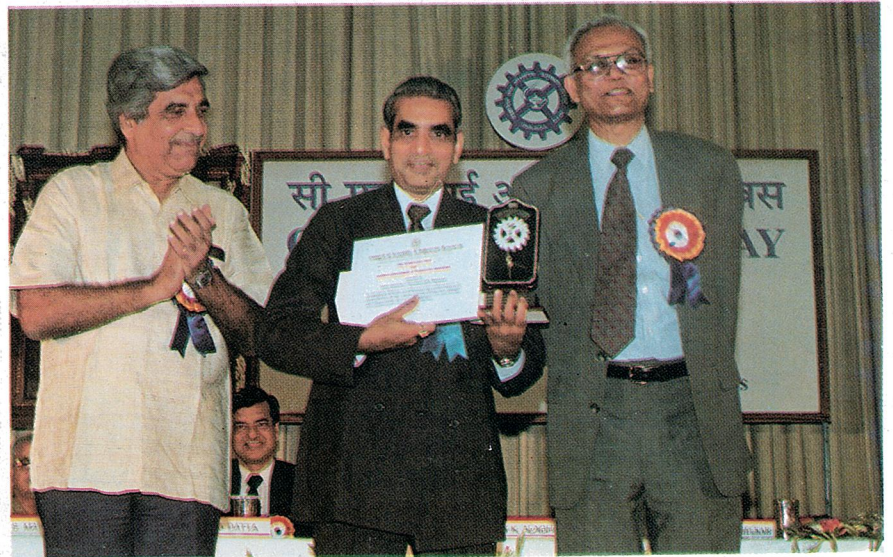
▲
With Padmasri R M Vasagam, V C, Anna Univ., Mr T S VijayaRaghavan, Secretary, Ministry of Petroleum and Natural Gas, at 14th National Symposium on Catalysis held at Chennai



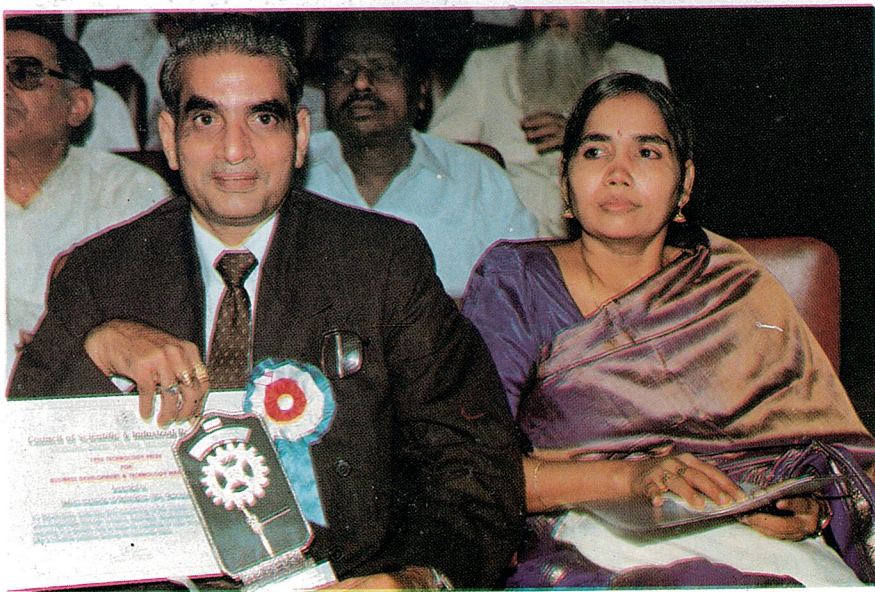
◀
Dr Rao and Kelkar in an NRI Meet at Washington DC with Mr Krishna Murthy and family



Receiving "Bharatiya Sanskriti Puraskar" from honorable HRD Minister Shri Arjun Singh



After receiving the CSIR technology award, with Y K Alagh, Union Minister for Power & Science and Technology, and Dr R A Mashelkar, FRS, DG, CSIR

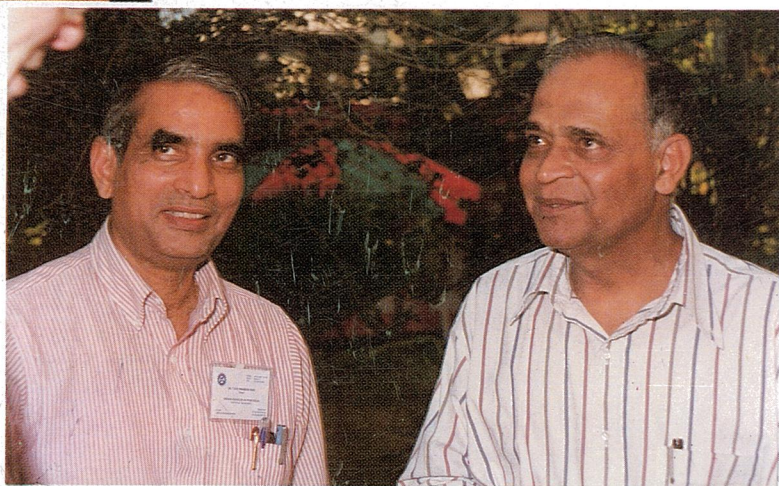


With his wife in CSIR technology award function

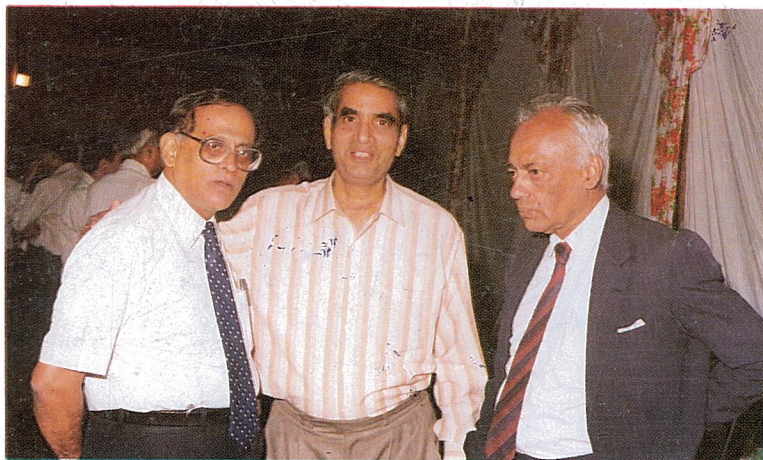
With Prominent Personalities



← Dr Rao honoring his well wisher
Late Shri Lovraj Kumar



With his mentor →
Prof. M.M.Sharma, FRS



← With Dr S Varada Rajan
former DG, CSIR and Dr Ghosh,
Director, RRL, Jorhat



With Dr R A Mashelker FRS, →
DG., CSIR



Honouring Dr Abid Hussain on the occasion of IIP foundation day



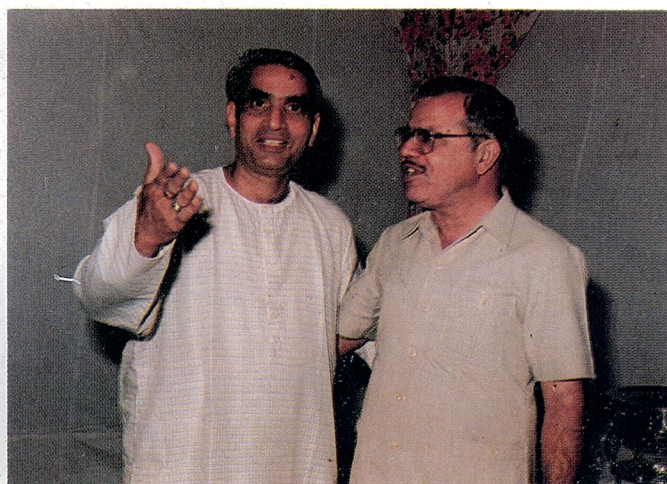
With Bharat Ratna Dr Abdul Kalam



With Dr S Varada Rajan and Prof. R Kumar



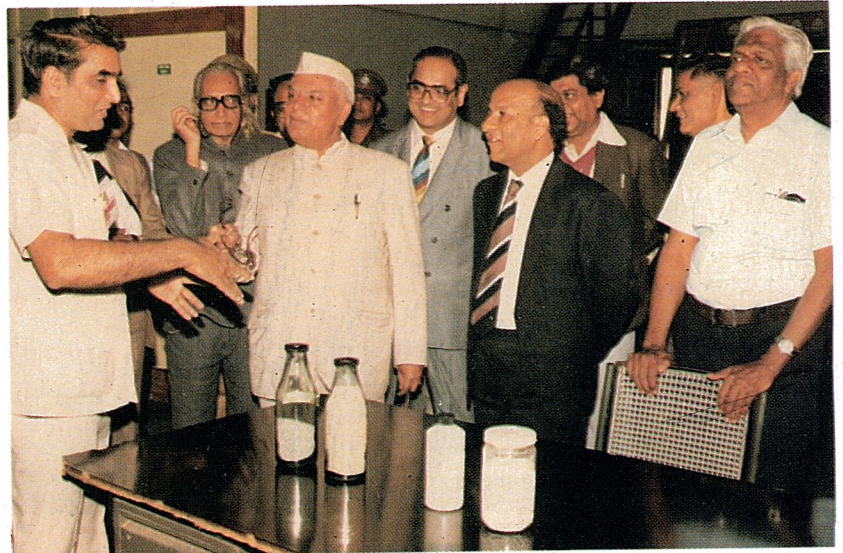
Honouring Prof. D Bala Subramanian, former Director, CCMB



With Prof.-K Vasudeva, RC member



◀ With late Dr K R Chakravarthy
at PDIL, Sindri



Explaining catalysis to then
honourable Union Minister of
Industry Shri N D Tiwari, ➤
Dr S Ganguly, CMD, and
Mr Sethuraman, MD, IPCL
are also seen



With Prof. G C Bond and IPCL colleagues



Parliamentary delegation at IIP

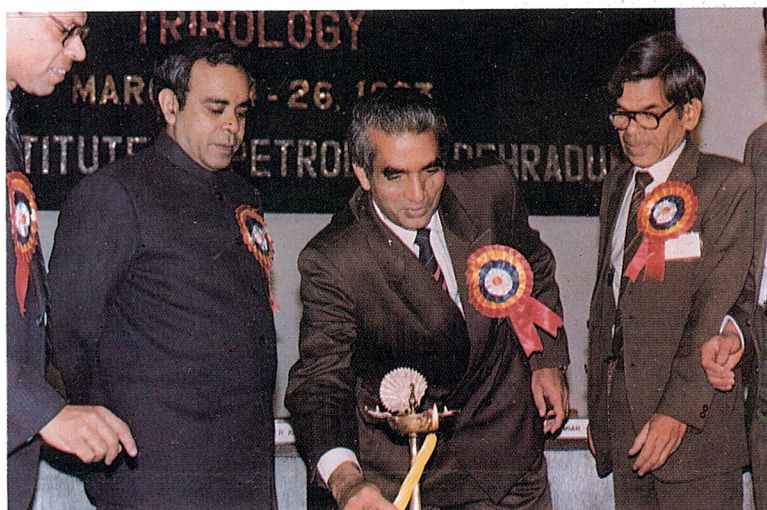


With his research students at IIP



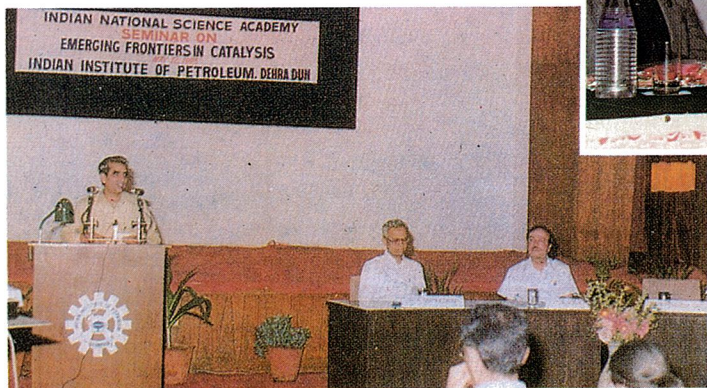
◀ *Having a ride on test vehicle run by CNG with Dr R A Mashelkar*

With Shri Krishna Kumar, honorable Minister of Petroleum and Natural Gas in the Inauguration of IC Engines conference



In the Inauguration of Tribology conference with honourable Minister Shri Kumaramangalam and Prof. A Sethuramiah

With Prof. G L Haller and Prof. S Szostak in Indo-US workshop



Addressing the Indian National Science Academy seminar on catalysis



With Dr Greene on the occasion of MOU signing with MOBIL



With Captain Satish Sharma, honourable Minister of Petroleum and Natural Gas

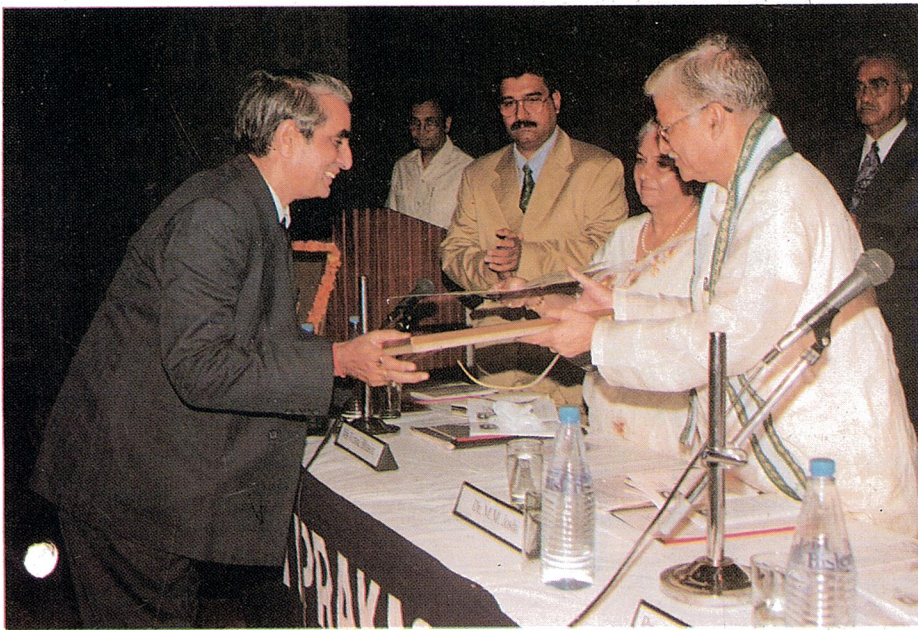
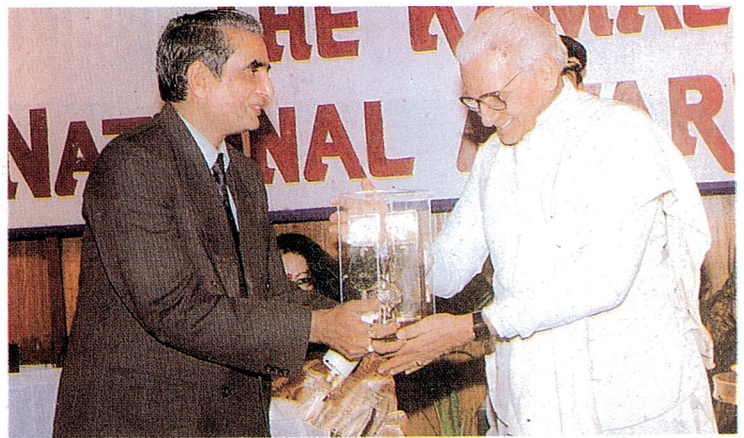


In IIP-IFP meet



With Scientific Advisory Committee ➤

Receiving Kamal Kumari award
from Honorable Governor of Assam
Shri Loknath Mishra



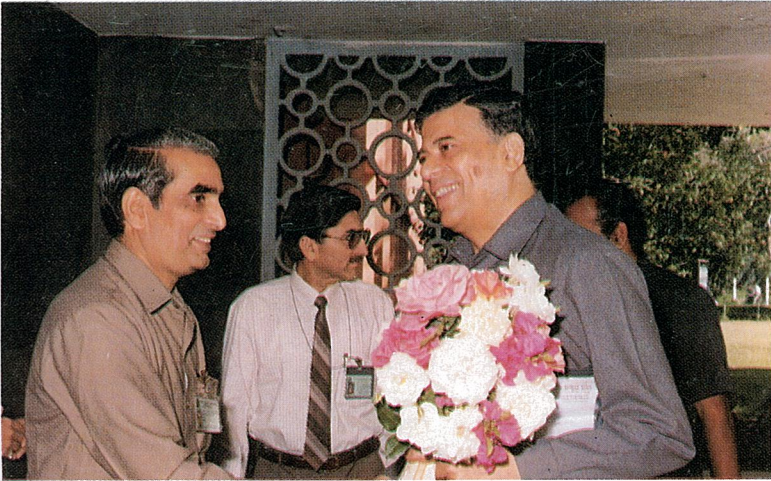
Receiving Om Prakash
Bhasin award from
Honorable Minister of
Science and Technology
Prof. Murali Manohar
Joshi

Being Honoured by Delhi Telugu
Academy with Eminent Scientist Award



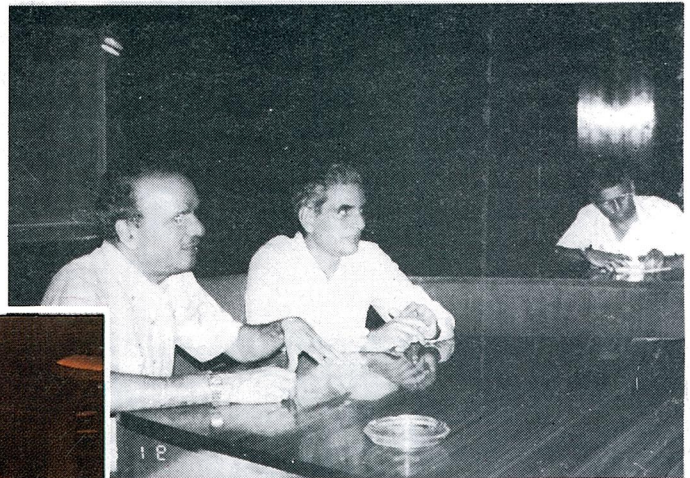


Having discussion with
Shri G V Ramakrishna, then RC Chairman, IIP



Falicitating Dr Vijay Kelkar, Secretary
of Ministry of Finance and
R C Chairman of IIP

With Prof. S K Joshi former DG, CSIR ➤



◀ With Shri C.R.Prasad, GAIL Chairman



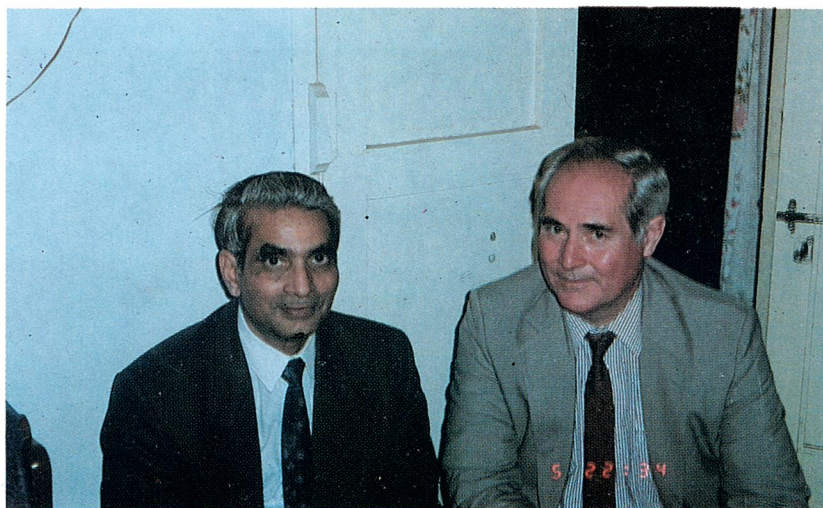
➤
*With Prof. W M H Sachtler,
North Western University,
USA*



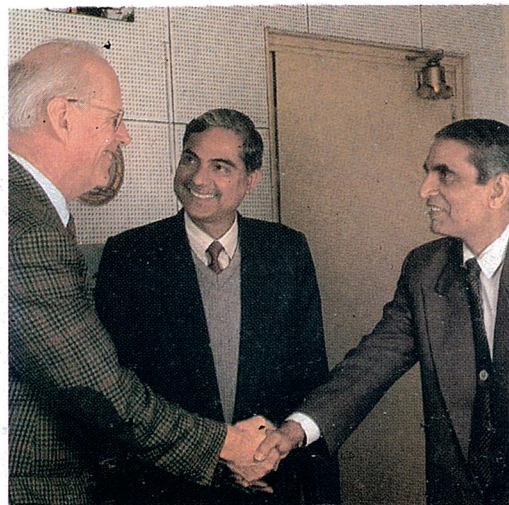
With Prof. M Boudart, Stanford University, USA



With academician Marchuck



Prof. E Kiss, University of Navisad, Yugoslavia



*With Prof. Herman J Lowink AKZO
Nobel Catalysts, The Netherlands*



With Prof.P G Menon, Dr J Prasad and Dr Krishna Murthy



With Prof. Iwasawa and family



With Prof. Kaliaguine and Prof. Iwasawa in Japan

**WHAT FRIENDS AND ADMIRERS
LIKE TO SAY**

Dr T S R Prasada Rao is known for making friends and keeping them. In spite of his multifarious activities always cared for professional friends. He has students, junior colleagues whom he groomed, professional colleagues and friends and admirers from different walks of life from all over the world. A kaleidoscopic view of various facets of Dr Rao's personality is reflected through their crystallized thoughts.

Dr Abdulhadi S Al-Otaibi
Director General
Kuwait Institute for Scientific Research
Kuwait

I wish Dr T S R Prasada Rao every success in all his endeavors.

Mukesh D Ambani
Vice-Chairman & Managing Director
Reliance Industries Limited
Mumbai

I am pleased to note that the International Symposium on Frontiers in Catalysis in the 21st Century is being held in honour of Dr T S R Prasada Rao.

Dr Prasada Rao, as I have known him, has been instrumental in pioneering research on developing catalysts for organic chemical processes in India. His work has benefited development of indigenous catalysts for the petrochemical and petroleum industries in India and have placed them at par with contemporary developments elsewhere in the world.

I take this opportunity to wish Dr Prasada Rao continued success, both as a research scientist as well as a leader in the scientific community in India.

M G Banerjee
Chairman & Managing Director
Lubrizol India Limited
Mumbai

Dr T S R Prasada Rao a Market Executive moulded into the Scientific Environment. My initiation of Dr Prasada Rao dates back to less than a decade, but the propagation started after I joined Lubrizol India Limited (LIL) in my present capacity the catalytic

effect has been immense in that Dr Prasada Rao has been a dominant figure in the Petroleum & Petrochemicals Industry for the last two decades. His intellect combined with the special talent to match seemingly unrelated information with a problem on hand has more than often resulted in a solution. His missionary zeal for enhancing the role R&D laboratory particularly IIP in the Indian and international industrial environment has played a key role in his becoming a doyen of Indian R&D. His relationship with Industry and regular contact to academia has enabled to open up a new facet of Technological Development.

The result of his marketing abilities have been two fold. Not only did he bring fresh perspective from economic engineering science but his vigor and enthusiasm, which could turn into at times sharp appraisal in his presentation, served to give the strength and impetus of education and culture. The central theme of Dr Prasada Rao contribution towards science and technology is a subject on which all modern petroleum refineries and petrochemical industries are lynched. With his pivotal role through his pioneering contribution catalysis will from the centre piece of industrial development in the country – so great has been the impact of his work. This will lead to a clear understanding of the subject and a peep into the variety of contours which still need to be understood. Dr Prasada Rao has started a cult of bringing projects to IIP, completing the projects and marketing the technology attained and in turn bring finances to this institution. Through this, Dr Rao has become an unbelievable phenomena having a clear mission, depth of knowledge, pleasure of working long hours, the dignity of simplicity, the wisdom of economics, influence of setting examples and joy of enjoying everything. Technology development is crucial and difficult to share as it always is a closely graded secret. After liberalization India's role as a major competitor become more perceived, technologies will become more denied to the country. It is this contribution and the role played by Dr Prasada Rao which will be long cherished and I on my behalf personally and of all my colleagues in Lubrizol India wish him atleast another sixty years when his presence will have a more catalytic effect for completion of the reaction he has initiated. People like Dr Prasada Rao will not rest but will be embedded in this continuous innovation.

Jean-Claude Barbier
Executive Vice President
Institut Francais de Petrole
France

The International Symposium on "*Frontiers in Catalysis in the 21st Century*" is an excellent opportunity to make an assessment on the activity of catalyst development. For IFP, it is a gratifying experience to witness an institution such as IIP, for which IFP has been associated since its inception, flourish and perform very well in its charter of duties. As one of the active players at IFP involved in IIP activities, I feel greatly privileged to have been associated with IIP. I am happy to note that IIP has made remarkable progress enabling it to become a pre-eminent research institute in India.

We feel that the credit for this rapid progress has been due to the untiring spirit of Dr Prasada Rao, the main architect behind this success. I congratulate Dr Prasada Rao on this occasion and express our sincere regards and well wishes to the contribution he has rendered to the petroleum refining industry and IIP.

Dr Y S Bhat
SABIC Industrial Complex
Kingdom of Saudi Arabia

DR T S R PRASADA RAO : AN ACTIVE CATALYST FOR PETROCHEMICALS INDUSTRY IN INDIA

I have the privilege to be associated with Dr T S R Prasada Rao in IPCL, Baroda over a period of four years during 1987-90. Those days he was heading the catalyst group and almost at the end of this period he assumed the charge of head R&D.

I have seen Dr Prasada Rao from very close angle catalysing several technology developments in IPCL. In a truest sense he is like a good catalyst which yields the maximum desired product against an environment of highest severity. He always cared for his coworkers, motivated and activated them regularly. More than that he reflected their efforts in a most appropriate manner at the top level. He is a very broad-minded person, interacted with people of all patterns and oriented them in the right direction. He believed more in team work rather than excelling individually. That did not deter him from not recognising the efforts put in by the individual. He cared for living environment of coworkers. In fact it was his first task in the morning to meet them and enquire about the well being of their family members. He liked group discussions and took note of important points suggested by individuals irrespective of their levels.

The respect that Dr Prasada Rao enjoys today among scientific people in India is based on more than his remarkable achievements. His involvement in developing several successful technologies and their impact on petrochemicals industry in India speaks for itself. More than a very good science manager, he is a perfect gentleman, considerate, patient and delightful person.

Dr Prasada Rao is highly energetic and dynamic person. Even at this age he does not show any signs of slowing down. He is more active than ever. I wish him very active and fruitful years ahead.

Dr A K Bhatnagar
Director (R&D)
Indian Oil Corporation Limited
Faridabad

DR T S R PRASADA RAO - A MULTIFACETED PERSONALITY

Writing or speaking about a multifaceted personality is as alluring as it is daunting. Alluring because he is a combination of so many desirable qualities of mind and heart that make an immediate and pleasantly lingering impression which tempt you to take up the pen and paper. At the same time, one feels diffident in attempting to describe a complex personality because of the fear of not fully succeeding in the effort and I am faced with this dilemma when a special occasion has arisen to write about Dr. T.S.R. Prasada Rao, an outstanding scientist and an equally great human being. It is really difficult to decide whether Prasada Rao the scientist or Prasada Rao, the individual is more appealing but a safe assessment may be that both complement each other to make a harmonious and well rounded whole. In the long years of my professional association and friendship with him, I have often marvelled at this rare combination.

Dr Prasada Rao is a scientist of eminence and is widely known among the scientific fraternity in India and abroad. His expertise and rich contributions in the area of catalysis are well recognised and he is credited with the development of various catalysis and catalytic processes for the fertilizer and petrochemical industries. Among an impressive and long list of his achievements, Xylene Isomerization and Encelite catalyst commercialisation, commercialisation of mono and bimetallic catalysts for catalytic reforming, commercialisation of Pt/Al₂O₃ Paraffin dehydrogenation catalyst and alumina catalyst for dehydration of ethanol and commercialisation of adsorbents like 3A, 4A molecular sieves, are particularly noteworthy. He is a recipient of various prestigious awards and has authored a book on 'Advanced Catalysis Science and Technology' and over 100 other publications.

As Director of Indian Institute of Petroleum since 1990 he has not only developed and commercialised a number of process technologies for the petroleum and other chemical industries but also established an enduring and fruitful interface between IIP and various user industries. The strong linkages he created between research on the one hand and industry on the other has dispelled the wrong but a widely prevalent notion that research in governmental institutions is largely an ivory tower exercise. His success in globalisation of IIP is perhaps the highest tribute to his acumen as a technology marketer in the competitive world market.

Dr Prasada Rao has a wide circle of friends and admirers in the research, academic, industrial, social and cultural fields and it is very easy to understand the secret of his popularity among such a large cross-section of people. His spontaneity and uninhibited mannerism can put any interlocutor at ease in minutes and his easy amiability and body language exude a sincerity which is infectious. All these and more make Dr Prasada Rao a very special and an immensely likeable person.

I have known Dr Prasada Rao for more than fifteen years and our mutual bond of friendship and camaraderie have grown from strength to strength over all these years. During his tenure as Director, IIP, Indian Oil R&D Centre and IIP were able to undertake a number of collaborative projects which were not only mutually beneficial but also further cemented the friendly ties between the country's two premier petroleum R&D institutions. He played a sterling role in shaping the recommendations of the Scientific Advisory Committee in such an effective and practical manner as to provide a new momentum to research and development activities. As a member of the Ganguli Committee, he had also been instrumental in identifying gap areas in downstream petroleum sector and making wide ranging recommendations to bridge such gaps through indigenous R&D efforts.

Indian Oil Corporation as a whole also had the benefit to his expert advice and valuable suggestions for enhancing corporate operations provided in his capacity as Member of various technical and safety committees. His support for Indian Oil was also manifest in various other ways. For instance, he showed no reservations in accepting invitations, at times at very short notice, to be the key speaker or serve as a panellist at conferences and seminars organised by the Corporation. In this context I would like to gratefully acknowledge his valuable contributions at for a like the Indian Society of Analytical Scientists, National Conference on Industrial Tribology, International Seminar on Fuels & Lubricants etc.

While felicitating Dr. Prasada Rao for a lifetime of outstanding achievements in scientific research and management I wish him many more years of productive and constrictive role in further extending the frontiers of science and technology in India.

CSIR's younger generation has a lot to learn from Dr Rao's way to working. Personally, I am deeply touched by his help and guidance I received from him from time to time while functioning as a colleague Director in the CSIR family – an organisation which has no parallel in India.

I wish Dr Rao a fruitful post 60 years service to the nation and CSIR in particular.

P K Biswas
Executive Director
Mathura Refinery

The initiative of the Catalysis Society of India and the Indian Institute of Petroleum to organize the International Symposium on 'Frontiers in Catalysis in the 21st Century' at IIP, Dehradun in honour of Dr T S R Prasada Rao on his 60th birthday is indeed, the most befitting honour that one most eminent Catalysis Scientists of India so richly deserves. It is heartening and I feel proud to be associated in the programme. In my opinion, Dr Prasada Rao, Director, IIP during his tenure has taken this 'National Institute' to greater height in the International Scientific domain. It is Shri Rao who did not leave nay stone unturned to commercialise the technologies developed by the scientists of IIP and thereby brought fame to the Institute and name to the Scientists . I personally came to know Dr Rao only after he took over the helms of this premier Institute and then had many occasions of seeing him deliberating in Scientific Technology Forums, where he had gone out of way to project the image of the Institute and its Scientists. It is Dr Rao who has taken this prestigious institution to its glorious peak in the scientific world and brought the culture of team work amongst the Scientists/Technologists of IIP.

Dr Prasada Rao, a Catalysis Scientist himself has contributed immensely to indigenise business of catalysis in this country. His emphasis on technology development and commercialisation has provided a major fillip to globalisation and marketing of Indian technology and paved the way in establishing technology alliance with the world renowned technology establishments like IFP, UOP, SWEC, Mobil etc. This will go a long way in projecting the Indian technologies abroad.

His efforts in commercialisation of reforming catalyst, xylene isomerisation catalyst, NMP extraction process are few of the innumerable examples of his contribution in the field in the country. He took personal interest and saw that the commercialised technology succeeded in Indian Industries.

I take this opportunity to felicitate him and wish him all the best of life on his 60th birthday. I shall be looking forward to many more contribution from him for the development of science and technology for this nation in the days to come.

Dr S J Chopra
Director (Technical)
Engineers India Limited
New Delhi

It is a privilege for me to commemorate the magnificent achievements of Dr T S R Prasada Rao on the occasion of his 60th Birthday. I am very happy that IIP is

organising International Symposium on "Frontiers in Catalysis in the 21st Century" in honour of Dr Prasada Rao.

Dr Prasada Rao is a very kind, gentle and open person. He initially worked with PDIL and IPCL-R&D Centre before taking over IIP when it was going through a difficult phase. His boundless energy, optimism and dynamism contributed immensely in propelling IIP to look into newer alliances at both national and international level. His endeavour to introduce contemporary concepts & remove obsolescence is highly appreciable.

He has significantly contributed towards reforming, hydroprocessing, oxychlorination and dehydrogenation catalysis. He also has special interest in environment-friendly catalysts and processes etc. Dr Prasada Rao has also contributed towards catalysts by way of publications in many journals, a number of Indian/Foreign patents besides being editor of 3 books. He has also represented India at the International Association of Catalysis Societies for the last several years.

Dr Prasada Rao has been bestowed with many prestigious awards such as FICCI, Om Prakash Bhasin, K G Naik Gold Medal etc. which speaks volumes of his professional excellence. The spontaneity of his national and international recognition, speaks of his extensive contribution to the scientific and technological progress of catalysis in fertilizer, petrochemical and petroleum refining industries.

I wish Dr Prasada Rao & his family health, happiness and all round prosperity.

Professor C T O'Connor
Dean of Engineering
Faculty of Engineering
University of Cape Town
Republic of South Africa

I would like to record my sincere congratulations to Dr T S R Prasada Rao for his seminal contribution to the outstanding catalysis research being carried out by members of the Catalysis Society of India and the Indian Institute of Petroleum.

Asis Datta
Ph.D., D.Sc., FNA, FASc, FNASc.
Vice-Chancellor, Delhi University
New Delhi

Please convey my personal regards and felicitations to Dr Prasada Rao, on this occasion. We all look forward to his well being and significant contribution in this area.

Professor Bernard DELMON
Universite Catholique de Louvain
Belgium

The members of the Laboratory "Catalysis et Chimie des Materiaux Divises" wish to forward their warmest congratulations and best wishes to Dr T S R Prasada Rao at the

occasion of his 60th birthday. We wish to express our high esteem to him for his outstanding scientific and technical activity. He enjoys a considerable reputation in the world for his achievements in petroleum refining and petrochemistry, and for his very successful career in India. This innovative technology development he realized at IPCL in Baroda, and his action at the head of IIP in Dehradun contributed decisively to the remarkable evolution of the Fertilizer, Petroleum Refining and Petrochemicals industries in India, but also made him a well known and highly regarded scientist in the world. His very broad activity encompassed an astonishingly large area: production of molecular sieves, naphtha reforming, paraffin dehydrogenation and FCC processes, several steps in synthesis gas production, conversion of naphtha to gasoline, a particularly elegant process for oxidation of cyclohexane to adipic acid, and several other original petrochemical processes.

The scientific contribution of Dr T S R Prasada Rao is very impressive, demonstrating his keen interest besides his successful activity as technical director, business manager, deputy general manager at IPCL, and general director of the world-famous Indian Institute of Petroleum.

We are certain that Dr T S R Prasada Rao will enjoy a harmonious continuation of his career and pursue his fruitful activity well beyond the age of 60 and we wish to join our wishes to all those who celebrate his birthday.

Dr E Desa
Director
National Institute of Oceanography
Goa

Dr T S R Prasada Rao, one of the most dynamic Directors of the Council of Scientific & Industrial Research and head of the Indian Institute of Petroleum, has through his vision and leadership in R&D for technology development, brought laurels and global recognition to his Institute, IIP. His tireless efforts had reshaped IIP as a nucleus of research for the petroleum and petrochemical technology in India. Dr Prasada Rao has through his refocussing of the R&D activities brought IIP to prominence in the national arena, and technological ties in the international scene with some of the best industries globally.

I have known Dr Prasada Rao for several years, and his unfailing generosity and large-heartedness in all areas that touched our mutual interactions, remains for me an example to admire and a goal to strive for.

I take this opportunity to wish him a supremely active retired life, because technology and its pursuit for the advantage of the country has always been his driving force. IIP as well as CSIR Scientific Community will always look forward for Dr Prasada Rao's valuable suggestion and advice in the pursuit of scientific research, in this way he moves not away from us but merely to a new operating field.

Professor Bharat B Dhar
Emeritus Scientist-CSIR
Department of Mining Engineering
Institute of Technology
Banaras Hindu University
Varanasi

Dr T S R Prasada Rao, Director, Indian Institute of Petroleum (CSIR), Dehradun, has been one of most valuable colleagues at CSIR during my tenure as Director, CMRI (1991-97) Dhanbad. During my association with Dr Rao at CSIR I have seen him as a model modern corporate-type Director who was running his lab like real enterprise. We had several things common, namely remoteness and approach to laboratories, the wide through of our activities nationally and internationally.

Dr Rao has not been only a path setter in the modern CSIR philosophy but has given a true direction to the development of oil industry in general and the frontiers of catalysis in particular – a branch of science for which he was known as an expert since his PDIL days at Dhanbad.

Professor V K Gaur
Distinguished Professor
Indian Institute of Astrophysics
Bangalore

My first meeting with Turga Sundra Ram Prasada Rao, about a decade ago, left me with a deep impression, and as time has proved, an abiding one, of a highly affable person-warm, discerning and responsive-driven by boundless energy and a high sense of purpose. These innate attributes, Prasada Rao, indefatigably forged over the years to lead IIP from strength to strength winning laurels all the way. His perspicacious management of the innovative potential of IIP scientists has been exemplary, at once energising them into a creative resource for the nation and contributing handsomely to the CSIR's bank of new knowledge products. These are extraordinary achievements and constitute a rich legacy which would undoubtedly sustain a high quality of scientific endeavour at Indian Institute of Petroleum, Dehradun, and, I fondly hope, evolve even stronger sinews, perennially invigorating our industrial environment through a self perpetuating culture of continual innovation.

Prasada Rao's many faceted contributions to the development of heterogeneous catalysis and surface science embodied in his numerous publications, new catalysts and processes, many of them now currently incorporated into industrial operations, bear eloquent testimony to a lifetime of productive and as his ever smiling face would witness, highly rewarding endeavours. He has been one of the star Directors of the CSIR family, loved and esteemed by many who, like me, rejoiced in these achievements as enhancing our collaborative endowments.

At this new threshold of his life and work, which I am sure, can not but be one of renewal and fresh adventure, I heartily wish Prasada Rao and his wife a perennially fulfilling world full of even greater joys and surprising catalysts.

Dr Sobhan Ghosh
Executive Director
Indian Oil Corporation
Faridabad

Dr T S R Prasada Rao is one of the tallest figures today in the arena of catalysis research in the country. Indian Industries namely, Petroleum, Petrochemicals and Chemicals have been immensely benefited by the interaction, suggestions and guidance by Dr Rao in the last 3 decades of his active research life. Dr Rao has himself played the role of Catalyst in forging a meaningful alliance between the CSIR Laboratories, Universities and Industry. Many of his works have resulted in commercialization of several technologies. We, at Indian Oil R&D Centre have a long and memorable association with Dr Rao, where several projects in the areas of Refining, Catalysis development, Pollution control etc. are successfully conducted jointly with IIP. During the span of 32 years Dr Rao has created a legacy of his own be it in PDIL, Sindhri, IPCL, Baroda or IIP-Dehradun. He was instrumental in the creation and working of the Catalysis Society of India which is today one of the growing professional society in the country. Catalyst community will always remember the significant professional achievements and draw inspiration from him.

Above all the professional excellence achieved by him, is the warmth he never fails to show to his colleagues & friends. It was always very pleasant to deal with Dr Rao I believe, most of us characterise him as an extremely dynamic person but action by very casual in his personal appearance. Indeed this is a very rare quality. I wish Dr T S R Prasada Rao a very exciting and fruitful years ahead. In whatever capacity he functions or whatever responsibility he accepts, I am sure, Dr Rao will be successful in his missions. I wish him & his family excellent health, happiness and a very fruitful future life.

Professor Laszlo Guczi
Department of Surface Chemistry and Catalysis,
Institute of Isotope and Surface Chemistry
Chemical Research Center,
Hungarian Academy of Sciences
P. O. Box 77, Budapest, H-1525, Hungary

I met first time Dr T. S. R. Prasada Rao in 1985 when he invited me to give a lecture on the 7th National Symposium held in Baroda on February 6-8, 1985 on behalf of Indian Petroleum Company Limited, as the host of the Meeting. Once I received the invitation, I inquired about geographical location of city Baroda, but nobody was able to tell me, until Air India Office clarified that it should be Vadodara.

IPCL made a splendid and unforgettable arrangement in Delhi lavishly organized by Dr. Rao. After two day stays in Delhi we arrived in Baroda and some of us were invited for dinner at the hotel restaurant in the same evening just before commencing of the Symposium. During dinner Dr Rao politely asked me whether I have, or not any objection to present the first plenary lecture after the keynote address. He made it at such a kind and persuading way that I could not resist and during the rest of the night I had to organize the lecture which was different from that I had prepared at home.

So, this is how it started our meeting and I am very grateful to him to made me acquainted with India, Indian culture, the scientific life in India and since that time I am always very happy to come to this great country. In 1998 I celebrated my tenth visit

making a great deal of Indian friends who visited me in Hungary including postdoctoral fellows, graduate students. For the last ten years we have had an intergovernmental collaboration, many scientific papers, etc.

During the period between 1985 -1998 I visited many times IPCL giving lectures, consulting scientific programs, etc. and I remember how proud Dr. Rao was about the development of "Encilite", a new catalyst, which made xylene isomerization in a more efficient way than that developed at Mobil.

I was surprised when he moved to Dehradun. However, I understood it when I attended the Silver Jubilee Conference of the Indian Catalysis Society. The Institute what was taken over by Dr. Rao, became one of the main centers of catalysis research in India with a very modern, strongly project oriented program. Dehradun is now is frequently visited place for many Indian and foreign scientists.

60th birthday is a milestone in the life of a human being. One may turn back to make an inventory about the achievements, about good and bad things what occurred during the first 60 years. But, one is young enough to direct the somewhat the wheel to desired direction. During the last 14 years since we have known each other I could not observe any movements which should be corrected.

Wish a happy birthday to Dr. Rao and a successful and fruitful continuation in his scientific work to remain active member of the world catalysis community for a long time.

Dr I B Gulati
Ex. Director
Indian Institute of Petroleum
Dehradun

Dr Prasada Rao is an eminent Catalysis scientist whose contributions to the science and application of catalysis are well recognized. The fillip he has given to the country's effort in this field can well be gauged from several industrially successful processes developed at IPCL and IIP by his teams. At the Indian Institute of Petroleum, Dr Prasada Rao has been singularly successful in taking to commercial scale several technologies and processes developed at the lab and pilot plant scale over the years. These efforts have been well recognized by CSIR giving the 'Technology Awards' to the IIP scientists year after year.

I am sure Dr Rao has a still more active role to play in the growth of the petroleum and chemical industry of the country. I wish him all success in these endeavours.

Please convey him my regards and best wishes.

Dr N M Gupta
Head, Catalysis Section
Bhabha Atomic Research Centre
Bombay

A DEDICATED SCIENTIST, MANAGER PAR-EXCELLENCE AND AN ADMIRABLE HOST

It gives me great pleasure to write this about Dr T S R Prasada Rao, Director, Indian Institute of Petroleum, Dehradun, for a souvenir which is being brought out on the occasion of his 60th birthday on 20th January 1999. I first met Dr Prasada Rao in 1985 during a symposium on "Advances in Catalysis Science and Technology" organised at Indian Petrochemicals Corporation Limited, Baroda. He was the convener of the symposium and was then working as Sr. Research Manager (R&D). Dr Prasada Rao subsequently moved to IIP as its Director and since then I had several occasions to meet him; mostly during symposia, seminars and meetings held from time to time on the catalysis related subjects. We also had opportunities to work together for the Catalysis Society of India in various capacities. The organisation of two memorable events namely the 12th National CSI Symposium on Catalysis at BARC during December 1994 and the 13th National Symposium on Catalysis held at IIP during April 1997 was the result of this collaboration. I have known Dr Prasada Rao as a rare genre of an outstanding scientist, science manager par-excellence and an extraordinary host. His multifaceted contributions as a scientist and as director are reflected in a large number of his publications in international journals of repute and in various progress reports from IIP, Dehradun. The achievements of Dr Rao are the blend of industrial research pertaining to catalysts development and fundamental research in the areas of Catalysis and Surface Science. Some of the catalyst development programmes which go to the credit of Dr. Prasada Rao include the development of a bimetallic Pt-Re reforming catalyst, a new generation FCC catalyst, xylene isomerisation catalyst, catalysts for oxidation and ammoxidation of olefins and for dehydrogenation of paraffins etc. It is well known that during the directorship of Dr. Prasada Rao, IIP has reached new heights and has shown exemplary results in terms of quantum jump in its business and income from private and public sectors as well as Government organisations.

In addition to his achievements as a scientist and chief of IIP, Dr Prasada Rao has remarkable personal qualities of making friends and influencing people. He is a man of very simple habits and is a highly devout person. I have heard his colleagues at IIP, saying "Anyone who went to Dr. Prasada Rao with personal problem has never returned disappointed; people will cry when he leaves the institute after retirement". This reflects on Dr. Rao's humane nature.

I take this opportunity to convey my personal greetings and best wishes on behalf of the members of the Catalysis Society (Mumbai Chapter) to Dr Prasada Rao on his 60th birthday. I pray the Almighty gives him a long active life, peace, good health and happiness.

Poonam Gupta
Scientist
Indian Institute of Petroleum
Dehradun

I consider myself very lucky to be given an opportunity to give my felicitation to Dr T S R Prasada Rao, on his sixtieth Birthday. IIP has risen to great heights and prospered under the dynamic leadership of Dr T S R Prasada Rao.

His genuine concern for each employee is tremendous. He has won the trust of all the employees during his tenure at IIP by being easily accessible to each employee. His constant endeavors has placed IIP on the global map. Today IIP's technologies are not only commercialized in the various part of India but in the various parts of the world too. He inducted lot of young JRF from all over India to come and join IIP to carry out 'Basic Research' because he always believed that any institute can prosper and be strong if 'Basic Research' group is strong. Every employee of IIP whichever status he / she may be at, gets an opportunity to update and improve their technical skills and behavioral aspects through regular management courses and technical courses conducted both at IIP and outside.

In spite of his busy schedule he could devote enough time for research work in the field of catalysis. He was recognized as an outstanding scientist by getting various awards from the various institutions which again added to IIP's pride.

He has put in great efforts to improve the infrastructure by getting many state of the art instruments installed at IIP. Scientists were appropriately trained to operate their new instruments. Maximum exposure is given to the employees at IIP than in any other CSIR lab. He is a "GUIDE" for some "MENTOR" for some and even "MESSIAH" for some.

I wish him and his family a very happy and prosperous life ahead on the occasion of his 60th birthday.

Dr A B Halgeri
Sr. Manager (R&D) &
Head, Catalysis Group
Indian Petrochemicals Corporation Limited
Baroda

The Catalysis Group of IPCL was established way back in 1972 under the leadership of wellknown catalyst scientist Dr P G Menon. He structured catalysts research activities at IPCL, keeping in view, the future developments of petrochemical catalysts in India. Dr Menon indentified the following thrust areas in catalysts division namely, platinum based catalysts, oxidation / ammoxieqation catalysts, zeolite catalysis, homogeneous catalysis.

Dr T S R Prasada Rao , one of the pioneers to join IPCL R&D Centre in those days and carried the torch lit by Dr Menon in to productive developments, commercialization of petrochemicals catalysis in India. Dr Prasada Rao was associated with our R&D Centre almost at the inception stage carved the catalyst group to one of the most foremost leading active group in India. In the early days, he was responsible for setting up of the laboratories, creating bench scale and pilot scale facilities, procurement of sophisticated interments for catalyst characterization and evaluation. Recruiting research personnel and training them to applied research during the early stage of R&D Centre. Among various research projects, he identified aromatic catalysts technology development as on eof the thrust areas. Ultimately, he succeeded in commercializing both zeolite based xylene isomerisation catalyst and bimetallic catalyst for catalytic reforming. He strongly believed in collaborative research efforts where strengths are available in Indian laboratories. IPCL collaborated with NCL, ACC to commercialize first petrochemical catalyst, for example, xylene isomerization at Gujarat Aromatics Plant on 23rd June, 1985. I had the fortune of closely associating with Dr Prasada Rao in this project right from the inception stage and it was tremendous and memorable experience for me to

work with him and to commercialize the catalyst. The catalyst performance was excellent and surpassed all the records at IPCL. It was a collaborative effort of IPCL scientists; NCL, ACC, as well as IPCL's technical services and operations group. Dr Prasada Rao provided scientific leadership during the commercialization of xylene isomerization catalyst. Soon after xylene isomerization catalyst create facility for catalyst manufacturing activity at Baroda Complex. Through his foresightedness and vision, he tried to acquire ACC's CATAD plant for future development and also IPCL to get into molecular sieves and catalysts business. He skillfully negotiated and coordinated between IPCL and ACC's top management to acquire CATAD business. With the acquisition of CATAD, IPCL strength in catalysts business enormously increased, both monometallic catalyst and bimetallic catalyst were developed in association with IIP, Dehradun and were commercialized at IPCL for xylene production. At the same time, he persuaded Centre for High Technology (CHT), Delhi to try one indigenous bimetallic catalyst at MRL for the production of gasoline. In May, 1990 the first bimetallic catalyst was successfully commercialized at MRL for gasoline production. Both, IIP and IPCL scientists worked together and demonstrated the overall capabilities in commercialization of bimetallic reforming catalysts at IPCL and MRL.

Dr Prasada Rao put to lot of efforts in indiginizing various molecular sieves as import substitutes in petroleum refining, petrochemical, fertilizer and other chemical industries. Many new types of modified adsorbents were manufactured in CATAD and were supplied to various users.

One of the major thrust and vision, Dr Prasada Rao demonstrated was for the development of paraffin dehydrogenation catalyst. He wanted from the beginning, IPCL should develop on its own strength paraffin dehydrogenation catalyst and commercialize at IPCL. He created a task force by middle of 1980's and was monitoring the bench scale and pilot scale experiments till he moved to IIP in 1991. As a result of his vision, IPCL could commercialize paraffin dehydrogenation catalyst in 1994 and has emerged as one of the intentional competitors in this area. Dr Prasada Rao set up a path and nourished these areas right from the beginning and encouraged to see that IPCL commercializes variety of catalysts.

In additions to several petrochemical catalyst development and commercialization activities, Dr Prasada Rao encouraged to carry out fundamental work in the area of oxidation of ethylene to ethylene oxide and extensive work on propylene ammoxidation to acrylonitrile. He has published number of papers and reviews of international repute in association with coworkers. He has also published number of papers on zeolite catalysis. All his dedicated and committed efforts and also vision have brought good recognition to IPCL R&D Centre by way of wining the following National Awards.

Development of Zeolite Catalyst for Xylene Isomerization Process.

ICMA Award in 1985

Development and Commercialization of Mono and Bimetallic Reforming Catalyst for Petroleum and Petrochemical Industries.

DSIR Award in 1993

FGMI Award for excellence in Research and Technology in 1993

Development and Commercialization of Paraffin Dehydrogenation Catalyst

DSIR Award 1998

He also conducted as Organizing Secretary for 7th National Symposium on Catalysis in 1985, which was the most memorable event in the history of the Catalysis Society of

India. He was also inducted on the Editorial Board in Applied Catalysis and other leading scientific journals. Dr Prasada Rao inspired lot of young scientist at IPCL and also coordinated successfully with technology and operations groups at IPCL. He also believed in a team work and carried people enthusiastically all along. He is a source of inspiration to the entire scientific community involved in catalysis research. We at IPCL will continue the task which he has left and plan to do many more commercialization activity in coming years. We can conclude the overall impression as a man he has put India on the world map of petrochemical.

We wish him all the best of his health and hope that Dr Prasada Rao will continue to guide and serve the scientific community be and large in coming years.

Dr S B Halligudi
Scientist
National Chemical Laboratory
Pune

MY IMPRESSIONS ABOUT DR T S R PRASADA RAO

It is great pleasure to record my feelings about Dr T S R Prasada Rao who is laying down office as a Director of a prestigious Indian Institute of Petroleum, Dehradun. Dr Prasada Rao is a man of many qualities and I had an occasion to be a member of Indian delegation to participate in the Indo-French Seminar on Catalysis in May 1992 and he was our leader to take us to places like Caen, Strasbourg, Paris and Lyon, etc. I was very much impressed by his simplicity, being a Director, he mingled freely and entertained us during travel with his marvelous humor and kept us fresh throughout our journey. I always used to admire him saying that he looks like a famous hero Shri Nageshwar Rao of Telugu cinema. He was felt happy over my comparison with an actor or caliber and told me that I should not tell this in presence of his wife (Mrs. Rao), with a smile on his face. In fact, it is true that running the administration smoothly and in a progressive manner of National Laboratory requires the qualities of an actor.

Regarding his professional qualities, I am happy to express my feelings with reference to the meetings of ILTP-Indo-Russia Collaboration in the area of Catalysis, since, I attended many of the meetings as a participating scientist in the above programme from CSMCRI, Bhavnagar. Attending Meetings, where Dr Prasada Rao used to be a Chairman was a great pleasure, he used to conduct the meetings so nicely and all the participants used to feel why the meetings was over. Meetings, if held at Dehradun, hospitality of himself and his colleagues were exceptionally good and unforgettable. The catalysis community in India is surely missing an active role of Dr Prasada Rao, who worked so hard for the progress of catalysis science and engineering and transferring the same to the industrial sector of our country. I am sure that his contributions to catalysis science and engineering will be remembered in the context of global competition for newer technologies for chemicals. It is a great pleasure to wish him and his family a very happy and an active retired life.

Professor Yasuhiro Iwasawa
Department of Chemistry
The University of Tokyo
School of Science
Tokyo, JAPAN

First of all, I wish to express great congratulations for the achievement of Felicitation Issue of the Bulletin of the Catalysis Society of India in honor of Dr T S R Prasada Rao.

As everybody knows, Dr Prasada Rao is the Fellow of the Indian Academy of Sciences and the Indian National Academy of Engineering, and nowadays his name is well known in the world due to his technologically and scientifically significant achievements.

Dr Prasada Rao has made pioneering contributions to the field of Applied Catalysis in India with special emphasis and remarkable success in catalysis-based technology development and commercialization. His contributions to catalysis have profoundly influenced technologies of petroleum refining, fertilizers and the petrochemicals industries in India and has helped these industries to achieve self-reliance and competitive expertise in their areas.

As far as I know, his most significant acclaimed commercialized work has been on the zeolite-based xylene isomerization catalyst (marketed world-wide presently by IPCL under the brand name "ENCILITE") which was a major breakthrough in the petrochemical industry due to the superiority of the process. Indian Chemical Manufacture Association recognized this achievement through its Forward Technology Development Award to IPCL in 1985. Dr. Prasada Rao improved FCC catalysts for the fertilizer industry. He developed a Pt-Re bimetallic catalyst for naphtha reforming in collaboration with the Indian Institute of Petroleum (IIP), which is now operating successfully for the past seven years in several commercial reformers for aromatics production. Dr. Prasada Rao has also developed and commercialized at IPCL a Pt/Al₂O₃ catalyst for dehydrogenation of heavy C₁₁-C₁₄ paraffins. He also invented a novel single step oxidation of cyclohexane to adipic acid using a cobalt-based catalyst replacing environmentally hazardous nitric acid. This is expected to radically change Nylon production routes in the world. Dr. Prasada Rao has also made a great contribution to the naphtha to gasoline and gas (NTGG) process using pentasil zeolite catalysts, which is tremendous possible potential in India.

Dr Prasada Rao has also made seminal contributions to the business of managing science and technological institutions in India. Under his Directorship of the Indian Institute of Petroleum, Dehradun in the last 7 years has achieved tremendous progress, excellence and world-wide recognition.

Dr Prasada Rao has won several awards for his distinguished achievements. The most prestigious ones being the FICCI Award in 1993, the Kamal Kumari National Science and Technology Award in 1995, and the Catalysis Society of India's Eminent Scientist Award in 1996.

Dr Prasada Rao is also a member of the Council of the International Association of Catalysis Societies. He has been continually advising and formulating national policy in the areas of petroleum, natural gas, petrochemicals, chemicals and science technology. He has also been consulting to various organizations including the academia.

His achievements are surprising and incredible in meaning of extremely large volume and high quality of performance which include many innovative frontiers of science and

technology. I do hope that Dr. Prasada Rao would continue to give impication and dream towards the 21st Century in the field.

Finally, I, as a sincere friend, wish to praise his honor and productive achievements, and I also wish to send my congratulations to Mrs. Prasada Rao and his family.

Professor R N Iyenger
Director
Central Building Research Institute
Roorkee

I am happy to learn that Indian Institute of Petroleum, one of the constituent laboratories of CSIR, is organising an International Symposium on "Frontiers in Catalysis in the 21st Century". It is very apt that this Symposium is being organised in honour of Dr T S R Prasada Rao who has contributed significantly to the area of Catalysis. The participation of eminent national and international personalities from R&D Labs, Universities and Industry will surely add to the value of the Symposium. It is very appropriate that a Souvenir and Festschrift are being brought out to commemorate the occasion.

Dr Rao has been associated with Central Building Research Institute, first as Officiating Director during 1993-94 and later as RC member during 1994-97. All the staff of CBRI and myself are extremely glad to note that Dr Rao is being felicitated during this occasion. Wishing all success to the function.

Dr R V Jasra
Deputy Director
Central Salt Marine Chemicals Research Institute
Bhavnagar

My association with Dr Prasada Rao dates back to November 1982 when I started my professional career in the field of adsorption and catalysis at R&D Centre of Indian Petrochemicals Corporation Limited, Vadodara. Dr Rao's commitment to R&D, particularly in the field of catalysis has been total and is amply demonstrated in his achievements in development of catalyst(s) in the field of petrochemicals and petroleum refining. He has ability not only to think big but also to think beyond limitations, which largely arises from his belief in him and associates' abilities. Highly inspiring leader, a humane and warm-hearted person, Dr Prasada Rao always leaves an impression on you. I have learnt a lot from him and he has left a deep impression on me both at personal and professional level. I shall always cherish my association with Dr Rao.

S K Joshi
Chairman
Defense Research & Development Organisation
Recruitment & Assessment Centre
Lucknow

I would like to join all his associates and admirers on this very special occasion of his sixtieth birthday and emphasize how obliged CSIR is to Dr Prasada Rao for his enlightened leadership of the Indian Institute of Petroleum (IIP), Dehradun.

Dr Prasada Rao joined the Indian Institute of Petroleum in 1990 as its Director. I had the benefit of knowing Dr Prasada Rao first as a Director of a sister laboratory and later when I move to CSIR headquarters. I came to know Dr Prasada Rao very intimately. He helped me along with other colleagues to face the challenges posed by liberalization and altered expectations of the government and industry from CSIR and its laboratories.

Dr Prasada Rao has unusual and matchless understanding of the behaviour of people. Because of his humane qualities and unique management methods he lifted IIP from a state of turmoil to a state of strong cohesiveness in its working. He brought IIP to a level that today it is counted as one of the best Petroleum Research Institutes in the world. He strengthened the ties of IIP with Petroleum Industry and initiated several new measures to win the confidence of the Petroleum Industry.

Dr Prasada Rao encouraged all the workers of his laboratory to approach him whenever they had any problem. IIP was infected with union problem when he joined it, and today it is free of any such problems. The scientists at IIP today are deeply conscious of their duties and responsibilities because Dr Prasada Rao succeeded in generating in them a sense of belonging. I also requested Dr Prasada Rao to look after Central Building Research Laboratory as its Director for about a year. Dr Prasada Rao fulfilled that responsibility extremely well. I used to consult Dr Prasada Rao on a number of important issues connected with CSIR. He was member of many committees like Mashelkar Committee For Strengthening the Marketing and Commercial Efforts in CSIR Laboratories.

I am very happy to convey my felicitations and greetings to Dr Prasada Rao on this occasion and wish him the many fruitful years of an active career in service of our country.

Dr P Kanta Rao
Scientist G (Retd.)
& Former Head of Catalysis and Physical Chemistry Division
Indian Institute of Chemical Technology
Hyderabad-500 007

My association with Dr Prasada Rao is four decades strong first as Alumni of the Andhra University, Visakhapatnam. While we have joined different institutions after our Ph.D. in Chemistry from Andhra University, we kept contact with each other. However, it is after I joined IICT (the then RRL), Hyderabad that our contacts became stronger and resulted in a collaborative project with IPCL (R&D), where Dr Prasada Rao has been leading R&D in catalysis. I would like to put on record that it is mainly because of Dr Prasada Rao's efforts the collaborative project on oxychlorination became a reality. I must say here that this is one of the projects which gave spurt in contract

research at IICT in the area of catalysis. Four of my Ph.D. students got their degrees in catalysis from the initial financial support for their fellowships. The collaboration with Dr Prasada Rao flourished and continued even after he joined as Director IIP, Dehradun. His outstanding contributions to the basic and applied aspects of catalysis area are well known. He is one of the luminaries in the area of catalysis in India. He has received several awards and rewards in recognition of his contributions.

Dr Prasada Rao I know is a very dynamic and humane person. If you approach him for anything, he always says yes. Similarly it is very difficult for anybody to his request. That is his personality. One thing I found in him is that he never forget his friends whether they are his Alumni or former colleagues. He makes it a point to create an opportunity to meet them at one time or the other.

It is a fitting tribute to Dr Prasada Rao for organizing "International Symposium on Frontiers in catalysis" in his honour on his 60th Birth day. I take this opportunity to wish Dr Prasada Rao and his family all the Best in the decades to come.

Avdhash Kaushal
Chairperson
Rural Litigation & Entitlement Kendra
Dehradun

While introducing Dr Prasada Rao, a scientist of emergence, an institution builder par excellence, an erudite scholar and a humanist of exceptional mobility, I am simply overwhelmed by the surge of pleasant and soul warming memories of my decade long fruitful interaction with him. Infact, while touching upon the unique qualities and varied achievements of Dr Prasada Rao, I fell like one of those blind men who could hardly describe what an elephant is like. He combines in him all that is best and nobles in India's cultural heritage and western scientific milieu. Cast in the mould of scientific genius of Einstein, he is endowed with a humanitarian vision and spiritual insight that is rarely equalled and never excelled. He is the peak and pinnacle of human excellence in all its manifestations. He is a Karma yogi of the highest order.

In him, I have found an admirable fusion of an ideal scientist and a warm, human radiating cheer and joy all around. His is the heart that vibrates in tune with the dreams and aspirations of the underprivileged and deprived millions of the country. He is one of those rare intellectual giants whose hands science has become the tool for the weak and well being of the humanity. That the benevolent destiny nudged me to be in constant touch with Dr Prasada Rao is by far the most fortunate facet of my life.

A veritable "gem of purest ray serene", Dr Prasada Rao always had a soft heart and deep concern for the plight of the marginalised communities. By generously and readily making available all the facilities under his command for the functions and programmes of RLEK, Dr Prasada Rao has played a key role in placing RLEK on a firm footing. Even in the midst of his break neck schedules, he could manage to snatch time to share his thoughts with the underprivileged.

Humble and gentle to the core, he is simple in his greatness and great in simplicity. For us at RLEK he is veritable Triveni Sangam triple stream of hope, humility and humanity. His resplendent life is a saga of truth grace and beauty-Satyam, Shivam Sundaram. Let the tribe of Dr Prasada Rao increase and flourish.

Chepuri (Kris) Krishnamurthy
President & CEO
KLASM International Inc.
Technology & Management Consulting
12612 Block Saddle Lane
Germantown, MD 20874

“HE IS A PEOPLE’S MAN”

An NRI's impressions of Dr T S R Prasada Rao a world renowned scientist.

On this happy occasion of Dr Prasada Rao's Sashtiabdhapoothi I deem it an honour and a privilege to felicitate him and pen my reflections about his qualities as a scientific pundit.

In my short association of less than a year with Dr Prasada Rao I have experienced on more than one occasion his sterling qualities of head and heart that are sheet anchors to his successful career. His character, positive attitude, cheerful disposition and style of working are unique and unparalleled. His religious background and implicit faith in the supreme commander of the universe give him the functions and frame of mind to handle multi functions cheerfully and achieve successful results. His contributions to the field of science and technology as a technocrat and a benevolent a manager have won him a place in the hearts of a large community in India and abroad.

Dr Prasada Rao is a typical jetsetter both in India and on his trips abroad. He has excellent communication skills and networking relations and he makes a lasting impressions on the people he comes in contact with. It is such great pleasure to work with him. My self, my wife Leela and my children sincerely wish Dr Prasada Rao many happy returns on his sixtieth birthday. We pray lord Venkateswra to give him the strength of mind and body to continue his zealous contribution to humanity and achieve many more laurels. Our best wishes to Mrs. Prasada Rao, Uday and Harita for the best life can offer in future.

Manoj Kumar
Catalysis Division
Indian Institute of Petroleum
Dehradun

It gives me great pleasure to express my feelings about Dr T S R Prasada Rao, Director Indian Institute of Petroleum, Dehradun. Dr Prasada Rao possesses a dynamic personality. The credit of development of several indigenous technologies in the country in the field of petroleum goes to him. He is known as a best science manager in India. He always encourages the young staff to achieve higher goals in life. It is his motivation and dynamic leadership that IIP has bagged CSIR science and technology award several times during his tenure. His efforts for the welfare of IIP employees have set land marks in the history of IIP. He has created new facilities in IIP campus like central school, LPG gas godown etc. for the welfare of the employees. Due to his great foresightedness and scientific and managerial capabilities, he brought IIP to the top position among all of the CSIR laboratories. Credit goes to Dr T S R Prasada Rao in modernizing IIP laboratory by creating huge infrastructure and providing UPS electric system. Only during his tenure IIP has become well equipped with sophisticated instruments. He tremendously improved the quality of research by providing excellent training to IIP staff both in India and abroad.

Dr Rao being the Director and Area Co-ordinator of catalysis group, I could interact with him at several occasions. He encouraged me for going for higher studies at HNB Grahwal University Srinagar for improving my academic qualification and also advised me to register for Ph.D. Being such a busy person, he takes care of every employees. One event I will remember forever. When I got married and joined my duties after availing few days leave. He called me and congratulated personally with great love and affection.

I extend my heart felt felicitations to him on his 60th birthday, and wish him and his family a very healthy and prosperous life.

Dr Prashant Kumar
Indian Institute of Petroleum
Dehradun

A PHENOMENON

It is indeed a great pleasure writing a few lines about my teacher Dr T S R Prasada Rao. I came in touch with him when I joined IIP as JRF and started working for my Ph.D. under his guidance. And being his student I had many a occasion to interact with him and observe him closely. He inspired me immensely with his approach and thinking. His enthusiasm and love for catalysis is infectious and always motivate us to strive for more. His liveliness, the subtle charm and charisma endeared him to one and all without exception. I found him a rare person. A great visionary, a profound scholar, a prolific reader, a discerning scientist, a lucid writer, an eloquent speaker and a science manager par excellence. All these have made him a unique amalgam of intellect and gentleness. His emphasis on the overall development of the personality and being cool in the tight situations are one of the many lessons I learnt from him. The initiation he has taken in the function of Research Scholar Club has been exemplary. His camaraderie with his student is legendary. He is very forthright in his opinion and makes everybody at ease in his company. Also, his candid presentation and convincing persuasiveness always won over the opposite side. Dr Prasada Rao has proved to be a phenomenon in IIP with his style of management and made IIP one of the best places to work with. I wish him and pray to God for many more fruitful years ahead and hope that his commitment to science and technology will motivate countless youngsters like us to carry forward his mission in the years to come.

Sushil Kumar
Director
Central Institute of Medicinal and Aromatic Plants (CIMAP)
National Botanical Research Institute (NBRI)
Lucknow

Thank you very much for asking me to write about Dr T S R Prasada Rao. I have known Dr Prasada Rao since he became the Director of Indian Institute of Petroleum, Dehradun. I have met him on many occasions in meetings at CSIR, DST and other scientific institutions. Dr Prasada Rao is always smiling and makes the environment happy wherever he is present. His considered views on subjects of interest to him are valued by all concerned. We have learnt about his extraordinary talent in taking along with him the entire community of scientists, technical officers and other staff members of his institute in making most valuable contributions for the benefit of Indian

Petroleum Industry. The collective work of the IIP performed in last few years has brought commendation both to IIP and CSIR as a whole. His outstanding contributions have been recognised by several bodies in last few years. We are all proud of him and his endeavour. On this occasion CIMAP's and NBRI's staff and I wish Dr Prasada Rao and his family a very happy and productive time ahead.

Dr Mahendra Pal
Indian Institute of Petroleum
Dehradun

It has been about eight years since Dr T S R Prasada Rao joined this institute as Director on September 20, 1990. I still recall the charge taking over ceremony in the auditorium of the institute which was followed by a high tea in the quadrangle of the main building. That was the day when every employee of the institute was looking at the future image of the institute in him. When all were busy in sipping the tea from their cup, Dr Rao was meeting his employees and shaking hands with them. He forgot all the escorting VIPs amongst the crowd, and, went to almost every employee present to say hello. This was his way of meeting his employees by which, he could win the heart of all in the institute.

In his early days, Dr Rao made a detailed study of the functioning of the institute and devoted his maximum time to understand the CSIR way of working, as he came from a big industrial company IPCL. He felt the need to change the way of working, and, so motivated all his employees to work in the areas which lead to develop the indigenous technology for the present need of the country. With the result the institute delivered a number of technologies to Indian hydrocarbon industry, and won several prestigious awards. It is a matter of great pride to all of us, that we won seven out of nine technology awards instituted by CSIR under his dynamic leadership. He stressed on generating funds from private and public sector companies and, advocated to CSIR for the share of employees in externally brought money. His mission was to make the institute self financing, in which he has succeeded significantly.

In his desire to make the institute from **local to global**, Dr Rao has put untiring efforts. The institute is now fully equipped with most modern facilities and has collaboration worldwide. Once unknown in Dehradun, **Mohkampur** is now on the international map. The staff of the institute has received wide exposure of international laboratories by his eight years efforts. We are really proud of this achievement under his able leadership.

Dr Rao is a great human being. He always thinks of the welfare of his employees, and, has a great love for the children in the campus. He has contributed significantly towards beautification of the campus, and arranged to provide several facilities for better living in the campus. He has always contributed for the betterment of his employees, and never expected anything in return. He has always shared the moments of sorrow and happiness of all his employees. He has commanded respect from all the employees owing to his very fine behaviour.

I on behalf of my family, and myself express heartiest congratulations to Dr Prasada Rao on his sixtieth birthday, and wish him a very long and happy life.

Dr Samir Kumar Maity
Catalysis Division
Indian Institute of Petroleum

A MAN OF POSITIVE THINKING

It is a great pleasure to me to write few lines about my guru, Dr T S R Prasada Rao. I have come in contact with him when I joined at IIP as a JRF in Catalysis Division under his guidance in 1992. At the beginning of my carrier as a research scholar, what immensely impressed me was his eloquence and eye-catching personality. Truly speaking, he is a man who motivated me to hard work and he moulded me into a catalyst man. During my stay in IIP, I found him a man of high character. His enthusiastic speech and inspiration, his dynamism and cool nature are really exceptional. He is a man of positive thinking. I never heard "no, not possible" from his mouth. He always leads us to a positive direction. His attractive nature is an exemplary. He has all capabilities to make everybody happy. I have never seen him in angry mood. He can manage any odd situation coolly and nicely.

I love, respect, admire and adore him.

Professor R C Mehrotra
Professor Emeritus and Coordinator
Department of Chemistry
University of Rajasthan
Jaipur

Dr T S R Prasada Rao is certainly one of our best known catalysis professionals and science administrators in the country and has established the highest international reputation by his outstanding contributions, which are so closely related to our specific national interests also.

The age of 60 years is certainly too early for the retirement of a person with the intellectual calibre of Dr Rao. I have, therefore, no doubts that Dr. Rao will continue in his inimitable efforts in the service of Science & Technology in general and our national development in particular for many decades to come.

Wishing a long and happy life dedicated to the nation for Dr Rao and with best wishes for the success of the Symposium.

R P Mehrotra
Director (R&D)
United Catalysts India Limited
New Delhi

It gives me a great pleasure to felicitate you for your contribution in the area of catalysis and your successful leadership for managing the premier institute - IIP. Though I knew you for the last three decades but I have enjoyed your association in IIP from 1991 to 1996 and benefitted in the planning and Research & Development and commercialization of catalysts and catalytic processes.

During my long and close association, I find you very humane and helpful, not only in professional areas but also at family front. In addition to your valuable achievements in the area of catalysis, you have done an excellent job by improving the earning of extra budgetary resources (EBR) from about 100 lakhs in 1990-91 to 700 laksh in 1996-97. It is a fantastic achievement.

Your devotion and contributions in catalysis have already brought you several distinguished honour and awards and I wish you many more successes in all your future endeavours.

Goverdhan Mehta, FNA, FASc
Director
Indian Institute of Science
Bangalore

I have pleasure in writing this message concerning Dr. T S R Pasada Rao for the souvenir, which you are bringing out at the time of the International Symposium on Catalysis in January 1999, arranged on the occasion of his sixtieth birthday. Dr Prasada Rao is a leading expert in Catalysis. He is very enthusiastic and with his dedication and involvement, helped the Indian Institute of Petroleum grow to greater heights. I take this opportunity to wish him all the best and good health.

S K Mukherjee
Director - In-charge (Project)
IPCL (Retd.)
Director (Personnel)
Calcutta

I am delighted to note that an International Symposium on Frontiers in Catalyses in the 21st Century" is being organised by the Catalysis society of India (Northern Chapter) in association with the Indian Institute of Petroleum, a leading Scientific Institute of the country headed by an able 'Director' of your standing and eminence since 1990. Holding of the International Symposium coinciding with your sixtieth birthday is a befitting recognition of your unalloyed devotion, untiring efforts and note-worthy vision in directing the institute's plans and programmes. Besides your excellence in Science, your humane approach played a key factor bringing laurels to you and the IIP.

I wish all success to the symposium bringing together the 'Scientists of Eminence' drawn from within and outside the country and sincerely hope that the two days' deliberations bring out some distinctive features in their observations. Let the contributions made by them serve the cause of humanity through he harmonious blending of technology and environment.

Praying for many happy returns of similarly occasions and with kind regards.

Professor V Muralidhara Rao
Head, Department of Physical and Nuclear Chemistry
and Chemical Oceanography
Andhra University
Visakhapatnam

I am happy to note that you are bringing out a souvenir in honour of Dr T S R Prasada Rao and a commemorative issue of the bulletin of the catalysis society of India on the occasion of International Symposium on "frontiers in Catalysis in the 21st Century" to be held during January 19-21, 1999. I know Dr T S R Prasada Rao for over three decades as a senior colleague in Andhra University and as an internationally reputed scientist. He studied M.Sc. Chemistry with Inorganic Chemistry as specialisation during early sixties in Andhra University. Immediately he joined Professor M N Sastri's Research School for carrying out research work leading to Ph.D. I happened to be a product of the the same school, I have personal contact with Dr T S R Prasada Rao since 1964. He worked in the area of solvent extraction of blue peroxychromic acid and its derivatives and obtained Ph.D. Degree in the year 1968. Although he left Andhra University subsequently, I continued to be in touch with him and was benefited by his advice in my field of research. He made significant contribution to the field of Analytical Chemistry and Inorganic Chemistry while working in Andhra University.

His versatility is reflected in the fact that he could switch over to the field of catalysis with such an ease and spontaneity. He made outstanding contributions in this field and developed novel catalysts which have been pressed into use in the Industry. It is a matter of great satisfaction that the catalysts developed by him contributed to the boost of petrochemicals industry to a large extent.

During my association, I found very great qualities in him. He is very friendly and open hearted. His dynamism and resourcefulness are to be emulated by every body. I pray God to shower his blessings on him and wish him and his family many more years of purposeful, fruitful healthy life and prosperity.

I wish the symposium a grand success.

Professor G S Murthy
Department of Physical and Nuclear Chemistry
and Chemical Oceanography
Director, School of Chemistry
Andhra University
Visakhapatnam

It is a pleasure for me to give my impressions about Dr Rao with whom I was associated since early 60's. After completing his B.Sc. (Hons) Chemistry, Dr Rao specialised in Inorganic Chemistry and later joined Professor M N Sastry's school for research to which I also belong. Dr Rao was always a center of activity both in the laboratory and outside. His dynamism used to attract several student friend belonging to various faculties and several of them sued to get the advantage of his association and wise counseling. He was always known for his good organizing capacities which, I am sure, helped him in building a successful career in his life.

I am happy to know that the Indian Institute of Petroleum, Dehradun entered into new realms of research and collaborative programs and secured considerable profits under his stewardship. I wish Dr Rao and his family members happy and prosperous times ahead.

V V S N Murty
Dy. Superintending Engineer
Vamsadhra Project Circle,
Srikakulam

Dr Prasada Rao, and myself hail from the same village "AVIDI" situated in East Godavari District, Andhra Pradesh. You all, I am sure, may not have heard of this small village but due to Dr. Prasada Rao's remarkable achievements, our native village finds a place in the country, nay, on the globe. For the first time when Dr. Prasada Rao was endowed with the FICCI award the press brought this small village to light..

I feel it is my proud privilege and fortune to participate in the symposium and grace the function.

Dr Prasada Rao has proved that **"MAN IS THE ARCHITECT OF HIMSELF"** Dr. Prasada Rao is a self-made man. I must say here that **"GOD HELPS THOSE WHO HELP THEMSELVES"**. He never forgets his native village, people and he believes that **"JANANI JANMA BHOOMISCHA SWARGADAPI GARIYASI"**.

Really it is an immemorable vent in one's life to be endowed with such sort of bounty of affection and love as meted to Dr. Prasada Rao, by the generous hearts of IIP Dehradun, National and International scientists.

I know not what to wish which D. Prasada Rao has not, and yet I pray to almighty to grant him good health, cheer, long life and all that conducive to his happiness.

I once again congratulate the steering committee and I wish that the International Symposium on "Frontiers in Catalysis in the 21st Century" a grand success.

A Muthukrishnan
Controller of Administration
Indian Institute of Petroleum
Dehradun

IMPRESSIONS

MY ASSOCIATION WITH Dr T S R PRASADA RAO

Though my association with Dr. Prasada Rao is brief but it created deep impact on me. The moment I was transferred from CECRI, Karaikudi, I was staying at NPL Guest House and Dr. Prasada Rao was also incidentally staying in Science Centre, New Delhi, who happened to know about my stay, sent Mr. S.K. Jain, Scientist-F (Liaison) of IIP Delhi Office and Mr. A.P. Bhatia, A.O. to convey his welcome message to a new entrant to IIP and promptly he blessed me before I assumed charge of COA. On my first meeting in Dehradun I found Dr. Prasada Rao in his office and he gave me a bouquet and also put 'Tilak', blessings and 'Prasads' from temple. Promptly I touched at his feet and invoked his blessings. After few days, there was a function organised by Staff Club wherein I was asked to present a memento to Dr. Prasada Rao who was Chief Guest of the function. At that time in the auditorium Dr. Prasada Rao introduced me to the audience gathered there and spoke good words about me. I was moved by his remarks and before presenting a memento, I in all my humility, touched his feet and gave a memento. (Though this created some murmurs amongst some disgruntled employees. Later I explained them that I am not higher in stature than Dr. Prasada Rao to present a memento to him in public).

During my transactions I always found him amicable and very employee-friendly though it created interruptions in official transactions of work when every employee or the worker is freely having access to Director at any time without appointment. Dr. Prasada Rao is always available to employees for any help whether official, social and even financial also.

I conclude this message that Dr. Prasada Rao gave away his personal money to a distinct relative of a retired employee who was suffering from some serious illness. In short, Dr. Prasada Rao personality is fully defined by the sloka, "Deva, Manusa Roopa", i.e. 'God comes in the form of human being'.

Govind Singh Panwar
Indian Institute of Petroleum
Dehradun

Dr T S R Prasada Rao

It is a great pleasure for me to express my feelings about our respected Director Dr T S R Prasada Rao.

He is a renowned dedicated scientist and above all a great boss, friend, humanitarian. In my view Dr T S R Prasada Rao is one of the shining star in the galaxy of science and technology. Dr T S R Prasada Rao is a well known figure not only in our country but also in abroad too. He will always be remembered for his significant achievement in science and technology. A number of people have been benefited from his inspiration interaction indeed, a dynamic leader by his excellent interaction and presentation he has put IIP in the world map in the field of petroleum technology.

It is rare to find such a nice person in scientific community who has given such liberty and opportunity to the employees to visit abroad which they would have never imagined in their life time.

When ever he happens to meet even in the corridors of the institute he greets us warmly and shakes hand with a smile and always encourages us. His positive attitude always influences me to a great extent. Being in the Institute he works as a Director, walks as a gentleman, talks and behaves as a friend. I wish him a healthy and happy sixtieth birthday.

I salute such a nice and great personality of the country.

M A Pathan
Chairman
Indian Oil Corporation Limited
New Delhi

I am very happy to know that Indian Institute of Petroleum and Catalysis Society of India jointly plan to bring out a Felicitation Souvenir in honour of Dr T.S.R. Prasada Rao for release at the International Symposium on Frontiers in Catalysis in the 21st Century to be held at Dehradun during January 19-20, 1999.

Dr Prasada Rao is a catalysis scientist of international eminence and a leading light in the development and propagation of this branch of science in India in contemporary

times. He is credited with the development and commercialisation of various catalytic processes and catalysts for Petro-chemicals and fertilisers.

Catalysis is the most critical factor in most of the industrial processes, more particularly in chemical industries including petroleum, petrochemicals, fertilisers, drugs and a host of others. The role of catalysts in chemical processing will become more and more critical in future not only to achieve higher product quality levels to meet customer expectations but also to conform to increasingly stringent environmental norms likely to come into effect.

The petroleum refining industry in India with an installed capacity of over 67 million tonnes per year is a large consumer of catalysts for fluid catalytic cracking process which are now being imported at a heavy cost. With expansion programmes in various refineries and new refineries planned, the existing capacity is slated to reach 129 million tonnes in the next few years with catalyst requirements also going up proportionately. Therefore, it is high time for India to develop and manufacture indigenous catalysts to make our refining operations more competitive than at present. Hydrocracking process is yet another new addition to catalytic processes requiring focused attention of the scientists.

In his capacity as Director, Indian Institute of Petroleum and as Member of various technical committees, Dr Prasada Rao has made very significant contributions to the growth, operational efficiency and safety in the oil industry. Indian Oil Corporation had the benefit of his advice on a number of technical and R&D related issues and I have very happy memories of constructive and stimulating interactions with him. I wish him more crowning achievements and the best of everything else in life.

Professor C N Pillai
Emeritus Scientist (CSIR)
Formerly HOD, Chemistry Department
Indian Institute of Technology (Madras)
CECRI Chennai Unit, Chennai

My first contacts with Dr T S R Prasada Rao were in the '70's as regular co-participants at the meetings of the Catalysis Society of India, and in the subsequent years, more closely both professionally and personally. I and my student have benefited greatly from this association. His contributions to the science and technology of catalysis are enormous and need no reiteration before the catalysis community. While felicitating Dr Prasada Rao on his 60th birthday, I, along with the catalysis family, look forward to many more years of productivity and achievements from him.

S Portion
Indian Institute of Petroleum
Dehradun

A TRIBUTE TO DR T S R PRASADA RAO

For the first time in the history of IIP, we have a director with human face who can go to any length to help IIP employees. Dr T S R Prasada Rao during his tenure, tried his level best to help IIP employees to the maximum, even in their personal matters. The facilities that Dr T S R Prasada Rao so kindly extended for the treatment of IIP

employees and their families in some of the best medical centers of the country, will always be remembered with gratitude.

During his tenure at IIP not only bagged several CSIR Technology awards, but linked up with several renowned Indian Companies & many prestigious International Companies like UOP, Ammoco & Mobil. Due to his effort IIP could get OADB Grant, World Bank Loan, which helped IIP to stand as one of the premier institute in Petroleum & Hydrocarbons field. Besides equipping IIP with best instruments, it is his endeavour that persons even at JTA level could be sent abroad for training. In his tenure he made it possible to have a full fledged HRD Cell which is doing so nice work to expose IIP personals to develop their skills in various fields.

I find myself wanting for words to explain his human face, but to me he appears so human that it is very difficult to find a suitable word.

Dr T S Prahlad
Director
National Aerospace Laboratories
Bangalore

Please accept my very warm greetings. I do trust CSIR will continue to benefit from your inspiring leadership in this important area.

Dr V Prakash
Director
Central Food Technological Research Institute
Mysore

Dr Prasada Rao, as we know, has really climbed up from lot of his experience earlier to a stage where today he has occupied a very important position of leading his dynamic laboratory IIP into the next century and next millenium. Knowing Dr Prasada Rao very well, I am positive that he is a person who would not sit quiet and I think his overflowing knowledge would certainly push itself into avenues where his contributions would be highly needed and highly demanded. Therefore, both on behalf of myself and my colleagues at CFTRI we would simply say the following words :

“May the heaven’s choicest blessings be there on Dr Prasada Rao and his family for a very active, healthy and very warm and happy life ahead of him after his superannuation where the CSIR family would always remember his contribution both as a scientist and as a human being.”

Surjit & Ravi Randhava
Unitel Technologies, Inc.
Mt. Prospect, Illinois
USA

DOCTOR SAHIB

Scientist...visionary...leader...energetic...friend...just five of the many words that come to mind when we think about this remarkable individual. We are of course talking about Dr T S R Prasada Rao, the eminent Director of the Indian Institute of Petroleum (IIP), also affectionately known as "Doctor Sahib" to many of his friends around the world.

It is most appropriate that the forthcoming International Symposium on Frontiers in Catalysis in the 21st Century is being held in honor of the good doctor. After all, catalysis is a subject that has always been near and dear to his heart. However, we are not going to use this occasion to talk about Dr. Sahib the scientist – many of our more distinguished colleagues are better qualified to comment on this aspect of his life. Instead, we prefer to tell you a bit about the other side of this man, facets that you might not otherwise be privy to.

Doctor Sahib's energy level is astounding. He rarely goes to bed before one in the morning, and rumor has it that he is wide awake before five. An intensely religious Brahmin, he always starts his day with prayers. The fact that he only sleeps four hours a day makes it very easy for those of us in the United States to keep our lines of communication open. Generally speaking, the window of opportunity for phone calls between India and the United States is about four hours per day. Doctor Sahib's schedule gives us a daily total of almost 10 hours, with no loss of sleep at our end. What a friend!!

Unlike most of us mortal beings, this man is not bothered by jet lag. He can fly 20 hours from New Delhi, land in Chicago at 5:30PM, and be ready to work for another six hours. After all that, he wants to start next morning at 7:00AM and will carry on without a yawn till 9:00PM. The only people who are likely to get stressed out with all this are his hosts.

Many years ago, Dr. Sahib was one of the first senior officials of the Government of India to recognize that, as we get ready to enter the 21st century, India can very well become the research and development (R&D) platform for the rest of the world. With the blessings and support of the powers in New Delhi, he has been busy translating this vision into action. A variety of initiatives are already in place – contract R&D volume has been greatly expanded, co-development opportunities are being aggressively pursued, and cross-licensing of technologies is being explored. Most importantly, a program to market and commercialize the portfolio of IIP's technologies has been implemented. We sincerely believe that all of this is just a beginning, and that a lot more will follow.

As a leader, Doctor Sahib is second to none. That's because he always prefers to use persuasion rather than power. But superimposed on his mission-oriented management style is his legendary human touch. Every person that he deals with, regardless of rank or role, is a unique individual in his eyes. Kindness, concern, fairness, and morale are keywords in his lexicon.

As a native of Andhra Pradesh, Doctor Sahib has always boasted about his capacity for consuming hot food, i.e., hot with chillies. "Our Andhra chillies can bring the world

down to its knees," he proclaimed. That's where we were able to prove him wrong. He may be a great scientist, he may be able to conquer jet lag, he may need only four hours of sleep a day, but until recently, he had never tasted Dave's Insanity Sauce, a concoction made from pure extracts and essential oils of habanero peppers. One drop of this sauce was all it took. "Aray Baba! This thing should be banned," he complained with tears in his eyes. But, he did finally admit that, when it comes to "heat", we had a winner.

Doctor Sahib, keep up the good work! Our best wishes to you and your family. May you enjoy good health, and a long and prosperous life. Finally, we pray that your professional career continues on its path of success.

M.S. Rana
Research Scholar
Indian Institute of Petroleum
Dehradun

It gives me a great pleasure to write about my beloved guru Dr T S R Prasada Rao. Dr Prasada Rao is a very popular and renowned personality whose scientific contribution in the area of catalysis has been universally acknowledged. I consider myself fortunate to be associated with him as his student since last five years. Even though the motivation was there, he was the person who impressed me upon to work for my Ph.D. All along he has been taking keen interest in my work and would always find time for discussion, critical evaluation and assessment of my work. He always has words of encouragement for my fellow research scholars and me: words like How are you?, Do hard work!,.....God bless you! Constantly keep on ringing in my ears. His in-depth knowledge continued with his humble and kindness has been a motivating factor for me and has also helped me to develop my personality. As a student on his 60th B' day I pray to my great guru with these lines:

*Teach me how to learn wisely and well.
Help me to master the subject I need to study.
Help me to remember how fortunate I am,
to be able to study, to grow in knowledge.
Give me wisdom, that I may treasure knowledge,
and never forget how little I know.
Teach me to give each task its rightful place,
and use my talents to the best of my ability.*

Professor (Dr) T C Rao
Director
Regional Research Laboratory
Bhopal

Dr T S R Prasada Rao is a personality effervescent with enthusiasm and unbounding intellectual energy. His leadership of IIP Dehradun must be a golden leaf into CSIR annals of performance. In fact, IIP was one of the few institutes who were able to respond to transitions by articulating a business orientation and reaching out to markets and customers in global petroleum industry. Dr Rao's technical contributions aptly deserve highest accolades. It is nice to know that many luminaries from leading companies are participating in the International Symposium being held in his honour.

Dr Rao has distinguished himself in R&D Management and has given immense strength to CSIR systems.

Personally, a very handsome personality, cheerful friend and great supporter. I wish him ALL THE BEST !

Dr Paul Ratnasamy
Director
National Chemical Laboratory
Pune

It is pleasure for me to write these words about my dynamic colleague, Dr T S R Prasada Rao, with whom I have had a long and fruitful association of more than two decades. My early collaboration with Dr Rao was in the development and commercialization of an indigenous catalyst for xylene isomerization. I can confidently say that it was the dynamism and the untiring efforts of Dr. Rao which led to the commercialization of the catalysis which happens to be the first indigenous catalyst used in petrochemicals production.

Dr Prasada Rao took over as the Director of IIP during its difficult times in 1990 and today it is one of the best laboratories of CSIR. He has managed to inject the institute with funds and the staff with his infectious dynamism. This has resulted in the development of many new technologies such as LPG from NGL and adipic acid from cyclohexane. Dr Rao ranks today as one of the best managers of scientific staff in India.

As a scientist, he has worked in many areas of catalysis such as isomerization, reforming, ammoxidation, oxychlorination and dehydrogenation and has left his mark in all the areas either through commercialization of catalysis or through publications. His eminence in catalysis arises from the different types of catalysts commercialized and the wide variety of subjects investigated by him. His contributions to catalysis science and technology in India will always be remembered.

I greatly cherish and value my long association and friendship with Dr Prasada Rao, whom I wholeheartedly wish many many years of productive and happy life.

Dr B S Rawat, FNAE
Emeritus Scientist & Consultant
Indian Institute of Petroleum
Dehradun

I am very happy that IIP and Catalysis Society of India is organising an International Symposium on the "Frontiers in Catalysis in 21st Century" in honour of Dr T S R Prasada Rao, who will complete his 60 years of age in January 1999. This area occupies a pivotal position in chemical and petroleum industry.

The Symposium on Catalysis is appropriate in honour of Dr Prasada Rao who has always championed the development of catalysts and catalyst based technologies in the institute. With his optimism, positive attitude and expertise in public relations, he has succeeded in rallying people behind him and leading the institute to new heights.

His human relations and qualities have owned every body's heart not only in the institute but outside the institute as well. I have always enjoyed working with him and I am sure fellow colleagues in IIP will always remember him for his qualities.

I wish Dr Prasada Rao and his family a very happy, healthy and active life.

Jens Rostrup-Nielsen
Haldor Topsoe A/S
Denmark

It is a great pleasure for me to be member of the Steering Committee of International Symposium on "frontiers in Catalysis in the 21st Century". I had heard a lot about your efforts before I visited your institute in Dehradun in 1997. At this occasion, I had my impression confirmed and I learned how you have been able to organize complex scientific projects and how you are able to motivate your scientists. This has given you a strong basis to create focus on catalysis and to place the institute in a central role in India's Energy Policy. Your scientific results have created great respect internationally.

Congratulations with your 60th Birthday.

Professor Wolfgang M H Sachtler
V N Ipatieff Professor Emeritus
Center for Catalysis and Surface Science
North Western University

IN THE HONOUR OF DR T S R PRASADA RAO

I want to congratulate Dr T S R Prasada Rao on his 60th birthday. At the same time, I congratulate the scientific community of India, in particular, the Indian Institute of Petroleum in Dehradun for having in their midst this eminent leader in catalytic technology. Dr Prasada Rao and his colleagues have enriched the industry of India with novel findings and important processes. The work on zeolite based catalysts has been spectacularly fruitful. Dr Prasada Rao showed how silylation of gallosilicates improved the para-selectivity in the alkylation of benzene. This line of research led to his most significant invention, the process of xylene isomerization, which is based on a novel zeolite catalyst. The work is comprehensive; Dr Prasada Rao studied new synthesis routes for MFI zeolites, avoiding costly templates and developed the catalysts to achieve high isomerization selectivity. It is encouraging to see that in India this invention was followed by a process design and that the process is now applied at an industrial scale. Every industrial researcher knows how tedious and difficult the path can be which leads from the inception of a new catalytic route in the lab to the development of a pilot plant process and from there to an upscaled industrial plant. Only a person who combines scientific skills and inventiveness with powerful perseverance and strong leadership abilities can achieve such a task. Dr Prasada Rao is such a person. While being interested in all technical details he never fell into the trap of becoming a narrow specialist. The areas of heterogeneous catalysis on which the impact of Dr Prasada Rao is visible, cover a wide spectrum. They include bimetallic catalysts, such as Platinum-Rhenium, oxidation, such as the single step oxidation of cyclohexane to adipic acid and the ammoxidation of propylene, the dehydration of alcohols and paraffin dehydrogenation.

As director of the Indian Institute of Petroleum, Dr Rao has inspired young scientists and created an atmosphere of distinct competitiveness. My best wishes for his health and long life, therefore, include the hope that his enlightening spirit will continue to radiate through a new generation of catalytic scientists and engineers.

Dr P Samuel
Deputy Director
Central Fuel Research Institute
Dhanbad

It is indeed gratifying to learn that the friends and colleagues of Dr T S R Prasada Rao are going to felicitate him on his 60th Birthday. I have been acquainted with him for more than three decades dating back to my student days in Andhra University. Dr Prasada Rao who had just then joined as a research scholar had been a source of encouragement to most of us. I particularly recall his few words of encouragement at the time of my leaving the department to join Professor Yeddanapalli's group in the field of catalysis. He has continued the same spirit of encouragement even today although at a different levels of service. He has been an extrovert right through student days and any amount of additional managerial responsibilities did not hamper his personality, rather he improved upon it at every opportunity as his success in research & management demonstrated throughout his career.

Being an excellent research administrator he has had a great vision the fruit of which is seen in every assignment he has accomplished or is continuing. Recollecting the past, I still admire him for the able manner in which he has managed two national laboratories at the time of crisis as Director, that too one of these totally out of his discipline. The main reason for his success as I noticed during my long acquaintance with him is the 'human touch' he never gave up in spite of his elevation in profession. I am sure, for a person of Dr Prasada Rao's capabilities and vision, he has still lots to accomplish and I wish him the best of health and opportunities to discharge further his services to the Scientific Community. I extend my hearty birthday greetings wishing him many returns of the day, and also congratulate his family for their contribution to his success. May God bless him with a long life and active service to society.

Professor M N Sastri, FNASc
9-42-2, Ramalaxmi
Andhra University (Post)
Visakhapatnam

I am extremely delighted to learn that the Catalysis Society of India and the Indian Institute of Petroleum are organising an International Symposium on Catalysis in honour of Dr T S R Prasada Rao. This is a very fitting tribute to his leadership qualities and achievements in basic science research and technology development.

Dr Prasada Rao was closely associated with me during his postgraduate studies and doctoral research programme at the Andhra University. He combined in himself the qualities of a dedicated researcher and a friend always ready to extend a helping hand to his colleagues. I and the members of my family cherish the delightful company he gave us during this period.

It is a matter of personal pride and fulfillment for me that Dr Prasada Rao has blossomed into a scientist of international repute and an inspiring leader, winning numerous awards.

I and the members of my family wish Dr Prasada Rao all prosperity and many more distinctions in his professional activities.

K Satyanarayan
Chairman & Managing Director
Engineers India Limited
New Delhi

I feel privileged to pay my personal tributes to Dr T S R Prasada Rao on the occasion of International Symposium on "Frontiers in Catalysis in the 21st Century" Dr Prasada Rao possesses a truly illustrious career as an outstanding scientist, researcher and administrator.

His enthusiasm & encyclopedic memory are admirable. He is man of strong will and strict principles. His interactive personality, his drive for excellence and above all this truly human values have brought many laurels to IIP. Needless to say, that under his leadership IIP has gone from strength of strength. His readiness to help his colleagues and friends quietly on technical, personal and social matters has led to an altogether different environment in IIP.

Dr Prsada Rao's contribution towards development of catalysts and his breadth and depth of knowledge in the area of exploratory catalysis is well known.

I wish and pray to the Almighty for good health, all joy and happiness for Dr Prasada Rao and his family.

Professor D Satyanarayana
Professor of Marine Chemistry (Rtd.)
Andhra University
Visakhapatnam

My association with Dr T S R Prasada Rao goes back to 1958 when we are students and contemporaries in the department of Chemistry, Andhra University, Visakhapatnam. We are closely and intimately associated with each other both as Postgraduate and research students upto 1965. Dr. Prasada Rao, after obtaining Ph.D. degree, left Andhra University and joined Fertilizer Corporation of India at Sindri. Since then onwards he moved to Petrochemical Research Institute, Baroda and then to IIP, Dehradun. During our student days Dr Rao is very active and helpful to all his Colleagues. He is an embodiment of the saying "A friend in need is a friend in deed". Dr Rao though born in an ordinary family and brought up from a rural atmosphere, he rose to the position of the Director IIP, purely through his merit and hard work. His simplicity, co-operation and helping nature perhaps may be the main factors of his success in his endeavours.

I, on behalf of my family, and members of Chemistry faculty of Andhra University, warmly congratulate Dr Rao, for his achievements in his career and wish him further success in the years to come. I pray God Almighty to Bestow His Grace and shower His Blessings on Dr Rao and his family members.

**Research Scholars Club
IIP, Dehradun**

DR T S R PRASADA RAO - AN ARDENT WELL WISHER

Dr Prasada Rao has shown great fondness for us ever since he came to IIP as Director. He motivated us to form the Research Scholars Club as a platform for developing scientific temperament and inculcating an aptitude for research. All along he has taken deep interest in all our activities - scientific as well as recreational. His encouragement and patronage has always been there in all our scientific endeavors, which has helped us develop our personality and outlook. He is a source of inspiration for us. Our any success gives him great happiness. Dr. Prasada Rao is a very kind hearted and generous person but his special kindness and generosity has been reserved for us; which has some times led to a feeling of envy among other staff members.

60th birthday is a milestone in anybody's life. His 60th birthday is a great occasion for us as well and we take this opportunity to express our sincere gratitude and indebtedness to him. He is one of the brightest stars in the galaxy of scientists and we hope that in years to come his brightness will increase immensely.

We wish him a very happy, successful and enjoyable future full with good health.

**S Sethuraman
Consultant
(Retd. Director , IPCL)
B-3"ADHISRI" 32/33, Kothari Road
Nungambakkam,
Chennai -**

I had the pleasure of association with Dr T S R Prasada Rao for almost a Quarter of a Century, ever since Dr. Rao joined IPCL in 1974. Those were the days when everyone in the Petrochemical industry was new to the Industry, the processes etc. and one had to learn the hard way to improve on the efficiencies, to know the finer aspects of performance of catalysts etc. There used to be very interactive meetings between the Operation and the R&D personnel and Dr. Rao played a key roll in such meetings. He has maintained this in his later assignments as well as is evident on his achievements in IIP with the Industry. He is a scientist, a practical manager and above all a very good Human being, very kind and compassionate and a man attaching weightage to values and virtues in Life.

On the occasion of his sixtieth birthday, I offer my felicitation to him and look forward to his involvement in the countrys future scientific programme and wish him all the best in the days to come.

**Professor M M Sharma
Former Professor of Chemical Engineering & Director
University Department of Chemical technology
Mumbai**

I have known Dr Rao for more than 25 years. The creation of Research and Development Unit, even before the establishments of plants, in the IPCL Vadodara was a unique event and Dr Rao was from the initial batch of officers recruited for this

assignment. Within this R&D unit, after a lot of efforts, an important Division of Catalysis was carved out and Dr Rao and his team made very valuable contributions. The IPCL could derive economic benefits from the Catalysis Scientists and this is a tribute to Dr Rao and his co-workers. It was uncommon to see publications in learned journals from industrial R&D establishments and Dr Rao succeeded in these endeavours as well. He thus had credentials to take up higher level responsibilities and became director of the IIP nearly nine years ago.

Dr Rao has taken IIP to great heights as is reflected in the publication and the number of sponsored projects from Petroleum Refineries in India, Refineries and Engineering companies overseas etc. He has effectively nurtured team spirit and also shown how collaborative work can be done in a meaningful and useful way with operating units, engineering companies and even universities. IIP has garnered a number of Technology Awards under his leadership and active participation. Thus IIP has even acquired different meaning for the first 'I' in the sense that it can now well be read as International Institute of Petroleum.

Dr Rao is a perfect host and I have enjoyed his hospitality several times.

I wish Dr Rao an active and rewarding life.

Dr Lalitha B Singh
80, Vigyan Lok
New Delhi

Dr Prasada Rao is well known in the Petroleum and Petrochemicals field for his many contributions. His research contributions extend over catalysis and process technology covering fertilizer, petrochemical and petroleum fields. Many of these processes have been successfully commercialized.

During his tenure in PDIL and IPCL, most of his time was spent on knowledge pursuing leading to many of his significant achievements, he has started spending considerable time and efforts on Science & Technology management and Institution building after he has taken over as Director, Indian Institute of Petroleum, Dehradun.

I am personally aware of his untiring efforts and unending energy to make Indian Institute of Petroleum, Dehradun as one of the laboratory which can "stand on its own feet". His continuous efforts of making Indian Institute of Petroleum, Dehradun as premier Research Institution where National and International Organisation look up to, have resulted in many collaboration projects and successes.

I have had the privilege of knowing him for many years through his career as Research Scientist. Science Manager, Leader of Research Institution, award winner and as a very considerate person, protecting his colleagues interests. I wish him many more fruitful years of continuing professional contribution to the petroleum and petrochemical industry.

Dr S Sivasanker
Deputy Director
National Chemical Laboratory
Pune

I deem it a honour to write these words about Dr T S R Prasada Rao with whom I have had a very fruitful association of nearly two decades. My early interaction with Dr Rao was in the development of an indigenous monometallic reforming catalyst which would never have seen the light of the day but for his untiring efforts. Dr Prasada Rao took over IIP when it was in a bad shape in 1990 and "turned it around" to make it into one of CSIR's best institutes. As an ex-IIP scientist, I am very happy and proud of IIP's position today-all thanks to Dr Rao's managerial abilities, his broad-mindedness and dynamism. Dr Prasada Rao is an internationally respected scientist who has worked on a wide variety of catalyst and reaction systems and has contributed to the advancement of catalysis through commercialization of catalysts and through publication. His contributions to catalysis science and technology in India will always be remembered.

Dr Prasada Rao is a rare example of a simple and humble gentlemen who was not affected by his achievements or his position as the director of an important institute. It is a great pleasure for me to wish Dr Prasada Rao very many years of happiness and a scientifically productive life.

Professor Chunshan Song
Director, Applied Catalysis in Energy Laboratory, and
Department of Energy & Geo-Environmental Engineering
The Pennsylvania State University,
209 Academic Projects Building, University Park, PA 16802
USA

It gives me a special pleasure to write this article for the Felicitation Volume in honor of Dr T S R Prasada Rao on the occasion of his 60th birthday. I have had close interactions with Dr. Prasada Rao in the past several years. Personally, I have high respect for Indian catalysis community, and quite a few young researchers from India have worked with me in our laboratory. I first met Dr. Prasada Rao at the International Catalysis Congress in Baltimore in 1996 by the introduction of one of my coworkers, Dr K Madhusudan Reddy who completed his PhD research in National Chemical Laboratory in Pune under Dr S Sivasanker and Dr Paul Ratanasamy. Dr Prasada Rao kindly invited me to present an invited lecture at the Indian Catalysis Society National Meeting in Dehra Dun in 1997. I accepted the invitation, but due to the delay in receiving the invitation and the short time in making the travel arrangements within our busy schedule, we were not able to make the trip although I did contribute a review paper to the proceedings. He called me several times, which deeply moved me, and in a long phone conversation, he made me to promise that I will attend the next meeting in Madras in 1998. Later during his trip to US, he accepted our invitation to visit our laboratory at the Pennsylvania State University in March 1998, and gave an inspiring lecture on the development of catalytic processes. Most recently I visited India by kind invitation from Prof. V Murugesan and Dr Prasada Rao for giving a plenary lecture at the 14th Indian Catalysis Society National Meeting in Anna University in Madras during December 16-18, 1998. In this trip I also had opportunities to visit National Chemical Laboratory in Pune (hosted by Dr Paul Ratanasamy and Dr A V Ramaswamy), Indian Institute of Petroleum in Dehra Dun (hosted by Dr T S R Prasada Rao and Dr Murali Dhar), and Research Center of Indian Oil Corporation (hosted by Dr R P Verma and Dr Sobhan Ghosh). I enjoyed the meeting and discussions during the catalysis symposium

and during my visits to the laboratories of the leading researchers at the above-mentioned organizations. Through this trip I developed a deeper appreciation for Dr Prasada Rao's leadership and I am proud to have known Dr Prasada Rao as a professional colleague and a close friend.

A brief discussion is due here on leadership since I characterized him as a highly successful leader. In plain words, leadership determines what are the right things to do, and management skills concern how to do the things right. What distinguishes an effective leader in a research organization from an effective researcher? Having worked in industrial R&D centre and in academia and interacted professional colleagues worldwide for sometime, I would like to share my own perspectives. Many scientists prefer to become an accomplished researcher in terms of quality and productivity of his or her own research or their research group, but this often more or less independent nature of research process could make the effective management of a large organization a little more difficult. In some cases where the mental environments are not so ideal, researchers and workers in different groups may not be very cooperative with each other. This can create a different mind set in people that could jeopardize the whole organization in long run. In my opinion, an effective and dynamic leader in a large research institute should possess first of all the right vision for the future, the clear mission for the organization, good interpersonal skills with sincere respect for the people, the ability to create new initiatives and to delegate responsibilities, the capacity to understand different views and concerns by the people at the working level, the skills to solve problems in a timely manner, the ability to shift the paradigm of thinking by the people in the organization to a cooperative and productive regime, and the capability to interact effectively with key personnel in government agencies, industries, national laboratories, universities and professional organizations. To be effective in understanding the concerns of the scientists and the key challenges in research and development, the leader should have extensive experience and track record as a successful researcher.

Dr Prasada Rao has what it takes to be a highly successful and dynamic leader, and has proved his strong leadership in leading IIP to become a major institution with nation-wide and worldwide recognition. After my recent visit, I have no doubt that most people in Indian Institute of Petroleum would agree with me on this view. I myself have learnt a lot from discussions with him, particularly during our recent trip together from Delhi to Dehra Dun by car. He told me that he cared most about people and explained to me how he evaluated the situations when he first moved to IIP in 1990, how he interacted with people, what he did to change the work environment and to motivate the employees, how he built the cooperative relations with refining industries, and how he and his associates transformed IIP and what is he is continuing to do to make IIP into a global presence. Each of these was very challenging at the time, and he did all this with his associates and apparently he enjoys what he does. It was intellectually enriching to see his leadership, managerial skills, technical and the personal aspects that are all consistent with an underlying philosophy in life. At this point it is appropriate to mention his career development. He was born on January 20, 1939 in Southern India. He completed his educational training (Bachelor, Master and PhD) from the Andhra University in 1967 and then joined Projects and Development India Limited, Sindri, where he worked on temperature-shift fertilizer catalysts. In 1974 Dr. Prasada Rao moved to the Research and Development Center of India's first petrochemical company, the Indian Petrochemical Corporation Limited (IPCL) in Baroda. He worked on catalysis for petrochemical and refining technology at IPCL and was also responsible for the entry of IPCL into the global business of catalyst manufacture. At IPCL Dr. Prasada Rao is best known for developing the xylene isomerization catalyst "Encilite" in collaboration with researchers at the National Chemical Laboratory in

Pune. Additionally, at IPCL, Dr. Prasada Rao was intimately associated with building and managing a first-class research facility in catalysis, adsorbents and polymers. In 1990 the Government of India persuaded Dr. Prasada Rao to move as Director of the Indian Institute of Petroleum (IIP) in Dehra Dun.

Several senior and junior researchers at IIP told me that this institute was not a well-recognized one in India and the Indian refining industries did not have much tie with it in the late 1980s. However, there have been dramatic changes after Dr Prasada Rao was appointed as the Director of IIP in 1990. Since then, Dr Prasada Rao and his associates have transformed IIP into India's premier refining technology center with a global presence. This is reflected by the facts that IIP has forged alliances with almost the entire Indian refining industry as well as Amoco, Mobil, UOP, Stone and Webster, Unitel Technologies, Dorf Ketal, HTI, ABB Lummus, and Praxair. At IIP he has been involved with initiating and monitoring new research and development initiatives at IIP including liquid phase oxidations, zeolite catalysis, separation processes and refining technology. What I was most impressed with was that under his leadership, mostly the same employees have made great strides in the same IIP in the past eight years. He remembers the names of the 600 employees in IIP as well as his family members. In addition to the institute-wide achievements, the notable scientific contributions by Dr Prasada Rao's own research group at IIP include development of a single-step adipic acid synthesis process and the Naphtha to Gas and Gasoline (NTGG) process. I have seen from the display at IIP during my recent visit that IIP has won CSIR Technology Award 7 times under Dr Prasada Rao's leadership with the most recent one awarded in 1998.

During my stay in Madras for the 14th Indian Catalysis Society National Symposium at Anna University, I heard several young researchers, who never worked at IIP nor directly associated with him, expressed their gratitude to Dr Prasada Rao for help bringing financial support for their catalysis research. Later Dr Prasada Rao told me that "all catalysis researchers in India are my friends". When introducing me for my lecture at IIP, he also that "Professor Song is a friend of India" (partly because several young researchers and graduate students from India have worked with me in our laboratory). In my opinion, it takes a great mind to be able to make such statements naturally, and he has certainly devoted his energy and time to his country by his outstanding contributions in enhancing the research and development in Indian catalysis community.

The dedicated efforts and outstanding accomplishments of Dr. Prasada Rao have been recognized by many prestigious awards, such as the Kuloor Memorial Award in 1992; FICCI Award in 1993 by the then Prime Minister of India, Mr P V Narasimha Rao; Kamal Kumari National Science and Technology Award in 1995; KG Naik Gold Medal in 1996; Eminent Scientist Award by Catalysis Society of India in 1997; Om Prakash Bhasin Award in 1996; CHEMTECH Academic Award in 1998; and Fellowship of Science and Engineering Academies in India. As such, it should come as no surprise that Dr Prasada Rao as a resource has been widely tapped by the government of India on India's highest bodies governing oil policy (Oil Industry Development Board), science policy (Society of the Council of Scientific and Industrial Research), education, and industry. In addition to his tireless efforts in leading IIP to become a global R&D organization, Dr Prasada Rao has over 100 research papers, 25 patents and 3 books to his credit. He has served on the editorial board of Applied Catalysis journal, has represented India at the International Congress of Catalysis for the past 10 years and has served as President of the Catalysis Society of India.

Integral to Dr Prasada Rao's achievements have been his wife, his son and his daughter. I happen to have had opportunities to know his son and his wife. Dr Prasada

Rao has always had a very busy schedule, traveled so much and worked in the train and in the car, but in the same time he has been a caring and loving father and husband. He cared about his family as well as the institute. I can see that from how his son, Uday Turaga (who currently works with me in our laboratory) admires his father.

Finally, I would like to congratulate Dr Prasada Rao for his monumental achievements in research and development in Indian catalysis community and for his highly successful professional career and personal life, and I wish him continued success. I would also like to thank the Catalysis Society of India for the kind invitation to visit India and for the invitation to contribute this article.

B N Srinivas
Indian Institute of Petroleum
Dehradun

***Guru Brahma, Guru Vishnu, Guru Devo Maheshwara, Guru Sakshath Parabrahma,
Thasmaisri Gurave Namaha***

It was just a personal quest for Science and Research that brought me in to the foot hills of Himalayas of northern Uttar Pradesh. I disembarked at an innocent little country railway station entrapped in a green valley. Soon, I found myself surrounded by a series of hills carpeted by lush green conifers. As I moved on the surface of the road by hiring a car, slowly the continuity of the landscape was broken only by an occasional village off the country road. After a few kilometers, I came upon a well-paved, lighted road either side beautiful trees which is immaculately neat and clean giving a colony look. It led me to a serene, modern community. They call it Bharathiya Petroleum Samsthan or Indian Institute of Petroleum (IIP). The tree lined roads are neatly laid out, the buildings nicely planned, the construction impressive. There is a little bazaar with its own cooperative store, fruit and vegetable stall, a post office and a small branch of the State Bank of India.

One fine morning I walked down from guest house to the office of IIP and met a towering personality, Dr T S R Prasada Rao, Director, IIP. I was so much delighted with his encouragement and moral boost. He immediately sensed that I was destined to do research. By seeing his thought provoking discussions, constant encouragement I thought that it was the ultimate opportunity and supreme challenge for me to carry my doctoral studies. In the due course I joined IIP and registered for my Ph.D. degree under the supervision of Dr.T.S.R.Prasada Rao. Being his student I came across so many experiences which helped me to mould my personality and character. He is man of a humble heart, showing hunger for goodness, kind enough, above all a godfather for his students. His smile is a gently curved line that sets a lot of things straight. His vapourizing genie mesmerizes even his critics. One of the things he had a hard time while in office is saying no. We never heard the word 'no' from him. Whenever he received an honour or award shown on Television or Newspaper, we were the first along with our families used to congratulate each other for our teacher who reached pinnacle of success.

His spectacular oration, spontaneity in speech and the timely similes pastes audience to their seats. He is the maestro of petroleum research and mentor of modern R&D trends who brought laurels to IIP, today which is considered to be one of the best R&D laboratory on globe. Many at times among our students community, had a lot of debate on the issue of his scientific and managerial skills and at last all the time we conclude our Supervisor/ Director as one of the finest Scientists-cum-Administrators in the

country. If we observe his name closely, **T**-stands for Technology, **S**-Science, **R**-Research, **P**-Petroleum, **R**-Refinery. He is the role model for the generations to come and we all are very fortunate to have him as our Ph.D. supervisor which is a life time opportunity. His traits may not set him upon pillars, but they set him aside for greatness. On the occasion of his 60th Birthday, my cardial greetings and warm regards to my beloved teacher Dr T S R Prasada Rao.

With love and affection

Dr M Sriram
Executive Director
Hindustan Organic Chemicals Limited
Distt. Raigad
Maharashtra

I had the great pleasure of meeting Dr Prasada Rao decades ago when he was working in the Catalysis Section of Indian Petrochemical Corporation Limited (IPCL) as a Scientist. He struck me as an able, amicable catalyst scientist with high potential. He has demonstrated that potential by his outstanding work at IPCL in navigating through the Zeolite catalyst application in industrial plant which only those translating R&D laboratory/pilot plant result to commercial plant level will be well conversant with. Later his stewardship at Indian Institute of Petroleum, Dehradun (UP) brought in laurels and positive image to both IIP and the Council of Scientific & Industrial Research.

On a personal level Dr Prasada Rao has been a very pleasant mannered friend who in his own style would bring the other person's follies in a non-offensive manner. Not many are blessed with such characteristic.

I have been very fortunate to have fruitful contacts with an excellent researcher, manager, administrator and friend in Dr Prasada Rao. I wish him many more years of productive, prosperous and pleasant life.

Professor P V Subba Rao
Department of Physical Chemistry
Andhra University
Visakhapatnam

As his classmate ever since intermediate and close friend, I know him as a "**sthithapragya**" never losing his awareness and poise even under conditions not very conducive. His capacity to convert adversity into advantage is responsible for his creativity. This quality in addition to his brilliance made him a great leader in Indian Science.

I pray God to bless Dr Prasada Rao and Mrs. Prasada Rao with all happiness and prosperity.

Dr C S Swamy
Professor of Chemistry (Retd.)
IIT, Madras
Chennai

I have known Dr T S R Prasada Rao for more than two decades and have always admired his ability, enthusiasm, go-getting attitude and single-minded devotion to achieve the goals set by him.

Dr Prasada Rao always believed that the Catalysis Society of India should be a forum to bring academics, professionals from industry and practicing technologists.

Dr Prasada Rao is very informal while talking to professional colleagues be it India or foreign but has a way of conveying his viewpoint or in publicizing the achievements of his research group / organization / India.

I will always cherish Dr Prasada Rao calling me affectionately as "Swamygaru" and on the happy occasion of the symposium organized in his honour, wish him long life and necessary strength to carry on his service to India, his beloved country, for many more years.

Dr Henrik Topsoe
Haldor Topsoe A/S
Denmark

It is a great personal pleasure for me to participate in the symposium in honor of you. I have enjoyed having personal contacts with you for more than twenty years and I have followed your many significant scientific and industrial contributions through your distinguished career at PDIL, IPCL and IIP. You have made important contributions to many fields such as : zeolite catalysis, CO shift catalysts, xylene isomerization, naphtha reforming, dehydrogenation of paraffin and oxidation reaction. You have also been an important ambassador for Indian Science and Technology.

Uday Turaga
Department of Energy and Geo-Environmental Engineering
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THE LESSONS I LEARNT FROM DADDY

It does not matter to me that Daddy, Dr. T. S. R. Prasada Rao, is a great technocrat whose contributions have been recognized by many awards and honors. This is not to say that I am not proud of his science - for sure I am, it is from Daddy that I learnt to be excited about technology, to be passionate about science and to strive for excellence in research. Yet, the most important lessons that I have learnt from Daddy are more mundane, more down-to-earth, and increasingly forgotten in this world of ours.

An affluent childhood and adolescence does not leave as many memories as a deprived and difficult one does. There were many personal crises that struck Daddy and his

pursuit of education during his early years, despite which Daddy, today, nurtures a sunny disposition. It is not that Daddy has forgotten those days, but that he would rather remember the spirit of persistence he displayed during those days. In moments of personal crisis, however small it may be, I draw strength and inspiration from that spirit of Daddy.

Daddy is a terribly disorganized person, so disorganized that I think he has professionalized the art and science of getting and staying disorganized. Seeing his car race to the airport, I have many a times predicted confidently that he would miss his flight. Every time I have been proven wrong and yet, he indeed is disorganized, because Indian Airlines too is equally disorganized! There are many people who straitjacket their lives to appointments and stick to the discipline of staying organized. These are people who are aware that to keep everyone happy is to make oneself unhappy. I am proud to say that Daddy is an honorable exception to this inexorable law. Daddy finds happiness in keeping everyone happy and continuously strives towards this. This of course means that he has to pay the price of being disorganized and cutdown on his private time as everyone else makes use of his time and resources. It is amazing that despite this perennial state of disorganization Daddy has made advances and brought worldwide recognition to IIP, Indian catalysis R&D and himself. Evidently, it is not just ruthless organization that keeps one on the road to success. There are, of course, those who say that keeping everyone happy is possible only by appeasing them or by compromising with principles of merit and value. It is Daddy's belief that one can be effective enough without losing one's temper and without the customary shroud of arrogance. Personally Daddy has epitomized all this and yet made important contributions to institutions he has worked at - the most significant being IIP as it is today. Most possibly this is also Daddy's magnum opus.

Daddy's fund-raising capabilities are legion, and yet I believe that his success at this is not management jargon. It is instead the capability to dream dare I say, daydream and think big. An instance that often springs to my mind is that of Mr. V. S. Saini also a scientist at IIP who visited our home as soon as we moved to Dehra Dun to request Daddy for a few thousands of rupees to support his Biotechnology Division. It has been almost eight years since and yet I remember the exact sequence of events that night. Daddy urged him to think big and promised to get him nothing less than a 10-lakh project. Within weeks, the Department of Biotechnology provided Mr. Saini with 20 lakh rupees for the Enhanced Oil Recovery project. It was much before any of the management gurus articulated this that Daddy taught me to think big - and he taught this to me by example. It is my fond hope that I shall have opportunities to practice this some day.

Finally, what I have been trying to emulate rather unsuccessfully is to avoid book keeping. Many a times has Daddy admonished me that he is not a chartered accountant who will keep a track of all that he did to people and all that they did to him. It is true, I think so, that Daddy may not have been paid back in the same currency and with the same philosophy, but then as Daddy says, he did things not to expect them back. I can only admire his commitment and philosophy here, but sincerely hope that I will be able to practice it some day.

It is impossible to be objective about one's father, and so, many of you might want to take this with a pinch of salt. But then, this is not written for you, this has been written for my personal satisfaction, as my humble tribute to a person who invested in me his time, wisdom, encouragement and affection without expecting anything in return, who believed in me, who was ruthlessly detached in accepting my decisions about my life and who allowed me all the freedom to do what I liked. I know of countless people who believe in what I have just said, who believe in my father, who

admire his commitment, his dedication and his endeavors to make a difference and this is for them, those who believe in Daddy. I have always done so and will do so.

Professor S N Upadhyay
Professor of Chemical Engineering
Department of Chemical Engineering & Technology
Institute of Technology
Banaras Hindu University
Varanasi

I am happy to learn that admirers, friends, and well wishers of Dr T S R Prasada Rao have decided to felicitate him on the occasion of his 60th birthday. I deem it a privilege in joining them with this "Shashthipurti" celebration. At the very outset I would like to wish him a happy, healthy, productive and prosperous "second career" which he will no doubt begin after his superannuating from his present position and also wish that he continues to make contributions to fields of catalysis and petroleum technology with the same vigor for many more years to come.

Dr Rao's achievements in areas of catalysis and petroleum are well known. He has been the recipient of a large number of prestigious awards, honors and prizes. He has been a highly successful science manager.

Although my association with Dr Prasada Rao has not been very long, in the short time I came to know him. I was greatly inspired by the scientist in him. What makes Dr Rao special that all his achievements did not affect his human qualities of modesty, humility, kindness and simplicity. I consider it my privilege to enjoy his association which I value immensely.

Working with him has been always a great pleasure and I look forward to long association with him in future also. As a host at IIP Dehradun, Dr Prasada Rao has been always generous.

I take this opportunity to wish him and his family the very best in life.

Professor K Vasudeva
(Rtd. Professor)
Indian Institute of Technology, Delhi
New Delhi

THE MUCH LOVED Dr. T S R PRASADA RAO

I first met Dr T S R Prasada Rao in the early 70's on the platform of Catalysis Society of India which had just been started and where he showed great amount of enthusiasm, commitment and friendliness. He has continued this till date and has been one of the key figures in the Catalysis Society. We used to meet off and on at IPCL Baroda where he was located, at UDCT, Bombay where I was and in the Catalysis Society meetings and activities wherein he participated with full vigour.

While at IPCL he demonstrated his penchant for team work and inter institutional collaborative work when institutional networking was not buzz word. The tripartite work of IPCL, ACC and NCL with Prasada Rao, Deo and Paul Ratnasamy as the lead

technical team led to successful development and commercialization of xylene isomerization catalysts perhaps the first such example in India which still continues to be talked about.

The frequency of our meetings kept on increasing after 1990 IIT when he moved to Dehradun as Director, IIP while I had in the meantime moved to IIT Delhi, formal meetings in Dehradun as a member of the Research Council of IIP and other associated activities and informal chats mostly in Delhi where his work brought him often. These offered me opportunities to get to know him as a man, as a manager, as a scientist, as an organizer, as a family man and as a friend. The commitment and enthusiasm that he had shown for the Catalysis Society in his younger days and the team work and collaborative efforts with NCL and ACC of earlier years paled into relative insignificance as compared to those he demonstrated since he came to Dehradun. He built up purposeful linkages with all concerned, be they in scientific field, hydrocarbon industry, government, academic institutes and even social fields the underlying desire always being to push the cause of R & D and to put IIP on the world map. He successfully steered the transfer of several technologies developed in the IIP to the Indian industry and succeeded in attracting global leaders of technology to IIP developed technologies. Since his taking over as Director he and other IIP scientists bagged several awards and came to be looked upon by the Hydrocarbon sector as their key resource. Surely, Dr Prasada Rao has reasons to have a great sense of satisfaction for all he has done and for receiving the love of his colleagues for his humane approach and the admiration of his contemporaries by his positive approach. It is no wonder that his colleagues are holding a symposium in his honour and that the global response to it has been so heart warming.

It is hard to believe that the youthful Prasada Rao is soon going to go sixty the usual age of retirement in India. It is hard to imagine that he will retire and I am sure that he will have many more years of continuing successes be it in CSIR or elsewhere. My wife joins me in wishing Prasada Rao and his wonderful family the very best.

K V Venkatasubramanian
Chairman
Gulf Oil India Limited
Mumbai

I have had very long & close working, personal & family relationship with Dr Rao. Of his many scientific achievements, during a long distinguished career, some other well known experts & leaders in the profession will present their observations. I would like to restrict myself to commenting on his exceptional qualities as a human being, as a manager & administrator of the business of R&D and above all, his outstanding qualities as a leader of people in a field & profession not very easy to deal with.

Dr Rao is a warm, humble & modest human being, extremely sensitive to human aspirations & emotions. His whole personality very quickly empathizes with that of his colleagues, friends & relations with equal ease & dignity. Indeed it is this unique personality characteristics, that has enabled Dr Rao to reach highest levels of performance & excellence during his career.

Qualities of leadership is felt & recognized by the community in which one work & interacts. The people who have had working relationships with Dr Rao in different institutions are uniform in their acclaim of his vision, clarity of thought & quick decision making capability and above all, his ability to look at issues with a fresh vigor

& vitality which is at once infectious & enthuses high degree of motivation. The many successful research pursuits of Dr Rao provide clear proof of his leadership qualities.

May we (my family included) take this opportunity to wish Dr Rao & his family our good wishes in his future pursuits. We also wish him best of health for several more decades to come.

Dr T Venkateshwar Rao,
Chemical Sciences Division
Indian Institute of Petroleum, Dehradun

GUIDE, GAURDIAN AND PHILOSOPHER

It is my great pleasure and greatest opportunity to write about my beloved guruji Dr. Turaga Sundara Rama Prasada Rao, FASc, FNAE, FIChE for a felicitation volume on the occasion of his 60th Birthday. Doing justice for writing about such a multifaceted personality, particularly when one is attached emotionally where expression is little compared to feelings will be Herculean task. Even then, I dare to write as I am the fortunate one not only to have special relation with him as first student of him at IIP, but also because he is more than a thesis supervisor for me. He became guide, philosopher and guardian.

I still remember my first meeting with him in 1991, when I came to join IIP for pursuing my doctoral studies. His pleasant smile and warmth in reception made strong impression about him. He came out of his desk and sat on sofa with me and enquired about personal things and research area of work for me. Since then, I had innumerable opportunities to meet him as part of Institute work as well as at personal level. I know that not only me no body can forget once they come in contact with him. He is a great human with excellent mannerism who love people and understands with sensitivity. His humor and warmth make people at ease and meetings lively. His characteristic generosity and out spokenness makes friends spontaneously wherever he goes. He is extreme friendly with all of us and even with his son. Public relations is his unique asset. He has firm belief in God and his colleagues. He is very social and approachable. Many times even nearby villagers used to come and get some help as he does not say NO for good things. He did a lot for welfare of employees even with out their demand.

He is a confident personality with enormous energy, enthusiasm and optimism, and always thinks big. These qualities he inculcates in minutes into persons who meet him. For whatever the work people go inside his chamber come out with light heart. He considers people personal problems also as part of his responsibility. He does help to all who come across without expecting back from them. He has tremendous forgiveness by which he corrects people.

With high goals and ambitions surprisingly he enjoys small things so beautifully. He always looks fresh and enthusiastic even in late nights after long hours of work. He is the impetus and motivation for research scholars. He is majestic in consoling and convincing the people.

He has excellent memory. In institute any body meets him he recalls the matter and initiates the discussion. He handled many crises in the institute and other institutes like CBRI with great care and courage. He has been successful to a great extent in

creating culture of belongingness, team spirit and openness. He supported many training programs in not only scientific related areas but also for personality development. He gives excellent hospitality and he inculcated this in the institute also. He enjoys challenges and believes that opportunities lies in crisis only. He took liberalization of economy which created lot of competition for technology as an opportunity and utilized it to elevate IIP to statuspearic hights. His Pace-setting vision of modernization led to rank IIP as one of the ISO 9001 laboratories among CSIR family. He prepared the institute to enter in the next millenium in a big way. Recent ties with Mobil, AMOCO, UOP, Stone and Webster, ABB Lummus Crust are few examples of the global growth of this institute.

With his interest and intellect in catalysis he contributed lot for the field. His research areas of interest are reforming, isomerization, oxidations and eco-friendly processes. He contributed in developing many processes in petroleum and petrochemical industry through research at PDIL and IPCL. He is excellent scientifically and charismatic Science and Technology leader. He motivates and takes all with him. His wisdom in economics and missionary zeal to do something for the country and vision for science and technology made him instrumental in developing and commercializing many processes from IIP. Professional rewards of these achievements are seven CSIR technology awards out of nine years for the institute. This is a measure of transformation of IIP from one of the CSIR labs to one of the best CSIR laboratories. Many awards like FICCI, Om Prakash Bhasin, Kamal Kumari National Award for Science and Technology, Bharatiya Sanskriti Puraskar stands in testimony.

He is unlike many leaders, shares excitement with people and gives credit to them. He is ever busy and extensively travelled person. He works hard all the time. Yet at times when he was ill he opened his office at home. His wife Mrs. Sujata Venkateswari Prasada Rao is a great support to him and caretaker. She is the one who forces him to take lunch atleast at 3.30 p.m. and a few hours sleep in night. He has very good family atmosphere with son, daughter and wife. I have interacted many times with all of them and found very open and affectionate. Particularly I have good friendship with his son Uday. If I write there will be no end to write all unforgettable experiences with Dr. Rao.

On his 60th birthday, I congratulate him and pray God to bless him and his family with all happiness, success and make use of him for doing many good things. On this occasion I also beg for his blessings.

With love and regards.

V K Verma & Nishan Singh
Engineering Services Division
Indian Institute of Petroleum
Dehradun

DR T S R PRASADA RAO AS WE SEE HIM

Dr T S R Prasad Rao is a charismatic Leader and a man of vision with global linkage and clear-cut goals. He has all the ingredients such as liberty, justice, equality, peace and humanitarianism that make a charismatic leader.

Dr Rao is one and only one who has put not only IIP but also entire CSIR on the World Map single-handed through determination, vision, skill, motivation and resources in the field of R&D with eye on organizational profits.

He is most humble and simpleton human with absolutely no ego. We have seen earlier Directors also but no one can stand upto Dr Rao for his never-ending optimism and endeavor to put IIP on top.

From the day one, September 1990, we have seen him working fourteen to sixteen hours in a day in and out without bothering about his personal life, in fact he has been on job twenty-four hours a day. He has left his everlasting impression on every inch of the Institute.

He is one person who always has something up his sleeves to spring in surprises and has always been the star attraction in any function and takes whole audience with him.

He is scientist with the human face, we have never seen him saying no to any good cause whether it is for the science or social cause.

Dr Rao was instrumental for creating World Class R&D facilities in IIP through funds from World Bank & OADB, for which Institute will always remain indebted to him. It was his commitment to the Institute that saw IIP becoming an ISO-9001 Laboratory.

His first preference has always been the welfare of the staff and their families. He has also been very active socially, specially doing welfare projects in villages around IIP.

During the last eight years Dr Rao has done some of the works out side science and technology which only he could do, like establishing IIP Kendriya Vidyalaya for the children of the staff and near by residence.

With these words we wish Dr Rao and his family all the best and pray to All Mighty Lord to give him enough strength to lead the Institute to yet further heights.

Professor B Viswanathan
Indian Institute of Technology
Chennai

It is a pleasure for me to write a few lines on my friend Dr T S R Prasada Rao. Dr Prasada Rao is not only a friend to me, but I admire him so much that my catalysis activities are to some extent inspired by his vast resourcefulness and enthusiasm. I came to know of Dr Prasada Rao when he was in the R&D Centre of IPCL, Baroda and this friendship has turned me into a devotee of him ever since he joined Indian Institute of Petroleum as Director. I am sure there will be a number of people who will be able to write about his marvellous achievements as the Head of this great institution. My association with Dr Prasada Rao revealed to me that he had great visions for Catalysis Research in this country. The two symposia that he organized on behalf of the Catalysis Society of India, namely at IPCL Baroda and at IIP, Dehradun bear testimony for his unconditional support and moral back up not only to the Catalysis Society of India but to the whole catalysis society in this country.

Dr Prasada Rao is a visionary, administrator, scientist and above all a humane person. It is rare to find a person blended with all these qualities and this combination made him a remarkable person to whom persons like me can look up to. Dr Prasada Rao has contributed significantly to the two laboratories with which he was associated. But what is striking most, he has contributed to almost all laboratories in India dealing with catalysis, petroleum and petrochemicals with his wisdom, with the same enthusiasm

and drive that he showed to the two laboratories in which he held responsible leading positions. I have always found him bubbling with suggestions, comments and imparting them with a sense of humour.

He had an exceptional quality of making people at ease at all occasions. This is a difficult proposition for men occupying high responsible positions. But I have never found Dr Prasada Rao failing to greet people with great affection and attachment.

It is rare to come across a person of Dr Prasada Rao's caliber with multifarious positive aspects and I consider it a gift for me to have known him for nearly 3 decades.

Dr N Viswanadham
Catalysis Division
Indian Institute of Petroleum
Dehra Dun-248005

FROM THE DIARY OF A DISCIPLE

*Little is the knowledge of me and a little is what I know
Very little is What I can write, But he means a lot to us*

"My dear friends, let me tell you, each and every one of you are responsible for the credit and success that our institute achieved today. You are so simple that you do not know about your capabilities. I am a "nimitta matra", as a thread in a garland, just holding all of you. But, you are the flowers, who bring fragrance and beauty to the institute". A voice echoing among the crowds of employees of IIP, attracted me to watch the activity going around. It was neither a politician's nor a cine stars, but the melodious vocal tune emerging out of the auditorium was delivered by a man simple in appearance, glow in face, command in speech is none else, the monumental personality Dr.T.S.R.Prasada Rao, Director, IIP, delivering his first annual speech on his completion of one year as the Director, IIP on Sept. 20th, 1991. As a newly joined research scholar, I surprised to see such a gathering listening to him with all their ears. That is the philosophy of him with humbleness and encouragement made the people around him to feel him as a friend, rather than the Director of the institute. Since then, as one of his research students, I got the opportunity of his long association, which helped me to learn things from him and understanding his nature and personality.

Within a short time I identified myself as a great admirer and follower of Dr.Prasada Rao. The people oriented philosophy he brought from his father, late Shri Rama Rao who fought for the welfare of the poor through out his life. His grand mother nurtured him with religion and humanity. The philosophical seeds of "serving the nation" were sown by his primary school teacher Jayanthi Suryanarayana Murty, resulted in the incarnation of our beloved guru Dr.T.S.R.Prasada Rao. His faith and strong belief in God, the enormous support from Mrs Sujatha Venkateswari Prasada Rao, dedication of his family to the society all that made him a perennial source of energy and activity.

*Knowledge without proud, accepting truth without egoism,
Patience and positive attitude, Forgiveness and love;
all that add flavor to the glamour of his personality.*

Dr Prasada Rao believes that religion is the backbone of humanity and moral values, without which science alone can not serve the society. The religion and science moulded in a proper proportion to make him an able administrator-cum-scientist and,

above all a great human being. His transparent and open mindedness with his great communication skills improved the interpersonal relations. All his abilities were invested for bridging the gap between laboratory and industry. The industry oriented basic research flourished at IIP under his able directions. The fruits of basic research were served at industries. With his inherent nature for doing good things, without expecting fruits, his unselfish acts for the cause of society made him a 'Karma Yogi' of scientific world. His untiring efforts for putting up central school, his initiation, involvement and inspiration for scholars club, initiation of children park and, establishment of religious centre; all those are a few glimpses of his care and love towards children, society, education and religion.

His smile and encouragement is panacea to those who are in their tough times. His doors are always open for all - to listen to them and talk to them. With the pressures and pains he has, with troubles and tough times he face, with targets and time bound acts; he is with smile and make people smile. That make people turn to him, bound to him and, forever with him. Gardeners to group leaders and scientists to servant workers, all are his friends; on to whom he showers the love and kindness and make them enthusiastic towards the job.

For his research students he is a friend, he is a guide, he is an advisor and corrector and a protector and is a teacher. His guidelines changed the life style of many people to improve their lives. I myself, is one of the examples of his virtues, which corrected me from joining a clerk job and supported me to continue the research career, without which I would have been end up regretting of my own decision. "*Guru brahma Guru Vishnu Guru Devo Maheswarah Guru Sakhath Parabrahma Tasmi Sri Guravinamah*" a Sanskrit sloka defines the teacher as a creator and protector of good and corrector of students in driving them through right path. With all the inherent virtues, Dr Prasada Rao proved himself as an ideal teacher.

Deep with his widely varied qualities of patience, dynamism, analytical power, helping nature, there hums a subtle power that guides people in every aspect of their lives. People listen because what he puts forth benefits them in various facets of their lives. They are comfortable with the clear and concise views he provide that inform them, help them and remind them of those eternal values which give them clarity in the times of confusion. They realized that his navigation is helpful in achieving their goals. They believed that his principles are good for all seasons, good for all ages, good for all those who wish to play a role in making their world a better place. And all these factors helped them in achieving success as an individual, and collectively for the success of the institute and CSIR.

He catalyzed the reaction of success by providing the conditions of harmony, positive attitude and hard work, which eventually lead to achieve a number of awards and rewards to IIP and to the CSIR. His capable direction and his ability of channeling energy in to the productivity with his future vision and strategy, made IIP a diamond that shines on the crown of CSIR forever.

If I deserve to describe Dr. Prasada Rao, he is one of the *Mahatmas*, a great soul, that our scientific community needs all the times.

On this auspicious occasion of his *Shastyabdi mahotsav*, the 60th birthday on 20th September 1999, I congratulate him and pray God for the happy active and successful years to come on the way of him and his family, and fulfill their desire of serving the society.

Professor G D Yadav
University Department of Chemical Technology
Mumabi

DR T S R PRASADA RAO : A MAGNETIC AND MAGNIFICENT PERSONALITY

I have been an ardent admirer and friend of Dr Prasada Rao, who by his charm, fantastic leadership and singular devotion has brought laurels to the I.I.P. He pulls friends from all quarters and even his critics would sing a song in his praise, without realising that they were supposed to criticise him in the first place! Such is his magnetic and munificent personality. I came to know him through Professor M.M.Sharma with whom he has had a great rapport and he used to drop in UDCT from time to time. He always encouraged me for doing good research and welcomed me in I.I.P. like a family friend. He was the first one to talk about our research and patent on enhanced oil recovery to ONGC. I find him to be one of the finest scientists-cum- administrators in the country. His radiating smile, and humane and unassuming nature make instant friends and like a good catalyst he converts whosoever comes in his contact into friends with 100% selectivity. When he had taken over as the Director, it was a Herculean task for him to boost the moral of his colleagues, inculcate faith in their own research, attract some of the best scientists to join I.I.P., generate funds and sell their technologies to the refiners and others alike. The large number of awards and kudos he has been bestowed upon are a testimony of his work in and for I.I.P. I personally believe that he has ambassadorial qualities and would fit into such a post, if the CSIR wants to benefit by his rich experience and collection of friends. I wish him and his family a very prosperous and fruitful life.

राम कृष्ण भट्टाचार्य
भारतीय पेट्रोलियम संस्थान, देहरादून

डॉ० टी एस आर प्रसाद राव: एक महान व्यक्तित्व

आपने जब से संस्थान में कार्यभार ग्रहण किया तब से आज तक संस्थान विकास की ओर ही अग्रसर है। संस्थान को आपने अपने व्यक्तित्व के बल पर एक विशिष्ट दिशा दी। उसी का परिणाम है, संस्थान को आइ एस ओ (ISO) प्रमाणपत्र मिलना। संस्थान हमेशा आपसे मार्गदर्शन प्राप्त करता रहेगा।

आपने आज के युग में बेरोजगार कर्मचारियों को रोजगार दिलाया जिनमें से मैं भी एक हूँ। सांस्कृतिक प्रोग्राम हो या पूजा-पाठ हो, आपने सभी कार्यक्रमों में उचित रूप से सहयोग प्रदान किया। आपकी सहायता और सहयोग को मैं जीवन में कभी भी भूल नहीं पाऊंगा।

मैं आपके 60वें जन्मदिन के अवसर पर आपको और आपके परिवार को शुभकामनाएं देता हूँ। इस तरह के व्यक्तित्व को संस्थान कभी नहीं भूल पायेगा।

मोहन लाल शर्मा
भारतीय पेट्रोलियम संस्थान, देहरादून

करीब 8 साल पहले डॉ० प्रसाद राव ने आइ आइ पी में निदेशक का कार्यभार संभाला था। उस समय हमारे संस्थान की स्थिति बहुत अच्छी नहीं थी। डॉ० प्रसाद राव के आने के बाद हमारे संस्थान ने बहुमुखी उन्नति की, इनके कार्यकाल में लगभग सभी कर्मचारियों को पदोन्नतियां मिलीं। मुझे भी सौभाग्यवश दो पदोन्नतियां इनके कार्यकाल में मिलीं जिनके लिए मैं निदेशक महोदय का आभारी हूँ।

मैंने 1963 में आइ आइ पी में नौकरी शुरू की और मुझे पहली पदोन्नति 1972 में 9 साल बाद मिली थी जबकि इनके 8 साल के कार्यकाल में मुझे दो पदोन्नतियां मिलीं। सेवानिवृत्ति के समय निदेशक महोदय ने सभी संबंधित कर्मचारियों के देयों (DUES) के संबंध में अत्यधिक मदद की है जिससे कार्यालय से मिलने वाले सभी लाभ उन्हें समय से व आसानी से प्राप्त हुए। अभी पिछले ही सप्ताह मेरे नाम से निर्गत नॉन कंज्यूमेबल यानी स्थाई प्रकृति की सामग्री, जो अन्य कारणों से खो गई थी, को बटूटे खाते में डालने वाले प्रपत्र पर भी मैंने निदेशक साहब से दस्तखत कराये थे और बड़ी सहजता से आपने दस्तखत कर दिये थे। इनके कार्यकाल में हमारी प्रयोगशाला में कई नये गैस क्रोमैटोग्राफ आये जिससे काम करने में आसानी होगी। मैं अपनी तरफ से और अपने परिवार की तरफ से डॉ० प्रसाद राव और उनके परिवार को इनके 60वें जन्मदिवस पर अपनी हार्दिक शुभकामनाएं देता हूँ और भगवान से इनके लम्बे और स्वस्थ जीवन की कामना करता हूँ।

तुलसी राम

भारतीय पेट्रोलियम संस्थान, देहरादून

मैं संस्थान के निदेशक महोदय डॉ० टी एस आर प्रसाद राव जी के 60वें जन्म दिन पर उन्हें हार्दिक बधाई देता हूँ एवं मंगलमय भविष्य की शुभकामनाएं भेंट करता हूँ। तथा ईश्वर से प्रार्थना करता हूँ कि आप सदैव परिवार सहित खिले कमल की भाँति मुस्कराते रहें।

डॉ० प्रसाद राव सर्वगुण सम्पन्न, नेक एवं विशाल हृदय वाले व्यक्तित्व के धनी हैं। इनके मन में छोटे एवं बड़े का विचार कभी नहीं रहा। आपने कमजोर वर्ग के साथियों को सदैव गले लगाया उनकी समस्याओं को बिना विलंब के तुरंत तय किया। प्रत्येक कर्मचारी की आर्थिक एवं प्रशासनिक सहायता की। मैंने 25 वर्षों में यह अनुभव किया कि डायरेक्टर से पिछले मात्र 8-9 वर्षों से प्रत्येक कर्मचारी का सम्पर्क हुआ तथा हमने अच्छे भविष्य की किरण देखी जब से डॉक्टर साहब ने कार्यभार लिया तब से किसी भी साथी को कोई परेशानी नहीं हुई। प्रमोशन शतप्रतिशत मिला यूनियन के साथ अच्छा सम्बन्ध बनाये रखा। यूनियन की प्रत्येक उचित मांग को पूरा किया। जो संगठन पूरे सी एस आइ आर में नहीं बना उसे डाक्टर साहब ने अपनी बुद्धि विवेक से संजोया। अच्छे प्रशासन को लागू करके सौहार्दपूर्ण वातावरण आइ आइ पी में बनाया। डाक्टर साहब एक अच्छे प्रशासक बने। साइंस में अपने ज्ञान से देश-विदेश में ख्याति अर्जित की। आइ आइ पी के लिये डॉ० प्रसाद राव कुबेर बने। कार्य के क्षेत्र में प्रत्येक काम करने वाले वैज्ञानिक के लिए काम लाये भरपूर काम दिया जिससे प्रत्येक कर्मचारी को लाभ हुआ। आपके आने से पहले हमें यह मालूम नहीं था कि रॉयल्टी का पैसा कैसा होता है आज प्रत्येक कर्मचारी को मालूम है कि रॉयल्टी क्या होती है। साइंस के क्षेत्र में आपके कार्यकाल के दौरान हुई प्रगति के लिए आइ आइ पी आपका ऋणी रहेगा। पूरे संसार के सामने आपने आइ आइ पी को चोटी के पहले नम्बर में खड़ा कर दिया। यह छवि केवल निदेशक महोदय ने अपनी ही नहीं हमारी भी बनाई है। हमें भी गौरव होता है कि हम आइ आइ पी के कर्मचारी हैं।

मैं आपको विश्वास दिलाता हूँ कि आइ आइ पी का प्रत्येक कर्मचारी आपकी देन का महत्व बनाए रखेगा और उस ऊँचाई को बनाये रखेगा जिस पर आपने आइ आइ पी को खड़ा किया है। हम सभी कर्मचारी आपके कार्यों को कभी नहीं भुला पाएंगे तथा हम सभी आपके ऋणी रहेंगे।

मैं अपनी तरफ से, अपने आइ आइ पी परिवार की तरफ से आपके उज्ज्वलमय भविष्य की कामना करता हूँ तथा आपको पुनः एक बार जन्मदिन की बधाई देता हूँ।

DR T S R PRASADA RAO
A DYNAMIC SCIENTIST,
TECHNOLOGIST AND A VISIONARY

It is a distinct pleasure and proud privilege to write about Dr T S R Prasada Rao who is one of the tallest figures in petroleum refining and Petrochemical Industry and a world-renowned catalysis scientist from India. He has been a leading player in Indian catalysis and petroleum and petrochemical industry for about a quarter century during which period he earned a measure of respect from scientific community in these industries of catalysis that few can equal. His contributions to science and technology received acclaim world over and will be remembered by this scientific Community in India for long a time. His rise to national prominence and international recognition as scientist has not been easy for he did not have the advantage of a proverbial silverspoon. He is a man of his own making. His sterling qualities, infectious dynamism, ability to think big, and unparalleled interpersonal and managerial skills and born to win leader in him, are probably some of the attributes that made him one of the highly respected scientific personality, highly successful technologist and an adorable leader.

TURAGA SUNDARA RAMA PRASADA RAO, was born in Gantipedapudi, East Godavari district, Andhra Pradesh on 20th January 1939. He is one of the eight children of Shri Turaga Rama Rao, a village chief (Karanam) and Srimati Adisaraswati, a house wife. An average rural and brahmin family living on agricultural income did not provide the privileges, pleasures and gifts that a rich and affluent background does but taught belief in God and hard work, trained him on culture, life style and values that stood behind him and made him what he is today. This humble economic and culturally rich background created many challenging financial and social situations that demanded hard decisions. Despite all these difficult situations his resolve to continue with higher education prevailed.

He started his primary education at Avidi village, to which he and his family belongs and continued high school education in Z.P.H. School (then Board high school) in Kothapeta. He vividly remembers his school days and his Sanskrit teacher Sri Jayanti Surya Narayana Sastri who influenced him in his formative years and he believes that his Sanskrit education helped to build good moral values. He is also grateful to his headmaster, Sri Mutyala Subba Rayudu, emulating whom his public speaking abilities blossomed as he moved along the path of destiny. He continued his education at Sri Konaseema Bhanaji Ramar's college before moving to Andhra University campus for studying B.Sc. (Hons), where he continued his education to obtain his M.Sc. and Ph.D. degrees in chemistry. During his university days, he was very active in student union and even senate elections, probably that was the beginning of the emergence of a leader in Dr T S R Prasada Rao. He worked for Ph.D. with Professor M N Sastri, who is a highly motivating personality and taught him devotion to scientific work, value of hard work and importance of spending long hours in the laboratory, which he practices to this date. In addition to training in scientific methodologies, Professor Sastri was also a source of right management skills to Dr T S R Prasada Rao. Although Dr Rao completed his formal education in Andhra University his career in catalysis started under the

tutelage of great late Dr K R Chakravarti at PDIL, Sindri who kindled interest in process and catalyst development and commercialization and inculcated an inclination for self reliance and indigenization of catalysts and catalytic processes. Later at IPCL Professor P G Menon guided and encouraged him to flower into a front ranking scientist in the area of applied catalysis. In September 1990 he took over as the Director of Indian Institute of Petroleum, Dehradun and then on what he did is a history.

Recognitions by National & International Professional Organizations

Some of the professional recognitions for his outstanding contributions to Science and Technology are :

Awards

- (i) Chemtech. – CEW “Outstanding Contribution” Award 1998
- (ii) Shri Om Prakash Bhasin Award for Science & Technology, 1997
- (iii) K G Naik Gold Medal, 1997
- (iv) Catalysis Society of India’s Eminent Scientist Award, 1996
- (v) Kamal Kumari National Award for Science and Technology, 1995
- (vi) Shri Khursheed Lal Memorial Science and Technology Award (Doon Ratna), 1995
- (vii) The Federation of Indian Chambers of Commerce and Industry (FICCI) Award for Phys. Sciences, 1993
- (viii) Kuloor Memorial Award of the Indian Institute of Chemical Engineers, 1992
- (ix) Bhartiya Sanskriti Puraskar by the Art & Culture Foundation, 1994
- (x) Delhi Telugu Academy Eminent Scientist Award, 1994

Fellowships of Professional Societies

- (i) *Elected Fellow of the Indian National Academy of Engineering (FNAE)
- (ii) Elected Fellow of the Indian Academy of Sciences (FASc), Bangalore
- (iii) Fellow of the Andhra Pradesh Academy of Sciences
- (iv) Member of the New York Academy of Sciences, USA

Membership of Editorial Board of Journals

- (i) The First Indian Member on the Editorial Board of **Applied Catalysis**, Elsevier, Netherlands, 1990-94
- (ii) Member of Editorial Board “**Petroleum Asia Journal**”
- (iii) Member, Editorial Board, "Indian Journal of Engineering and Material Sciences"
- (iv) Member, Editorial Board, "Indian Journal of Chemical Technology"
- (v) Member, Editorial Board, “Fuel Science and Technology”, Dhanbad
- (vi) Member, Editorial Board, “Hydrocarbon Technology”, India
- (vii) Member, Editorial Board, “Journal of Scientific and Industrial Research”
- (viii) Member, Editorial Board, “Siberian Journal of Scientific and Industrial Research”

Others

- (i) The International Cultural Diploma of Honour by American Biographical Institute, 1995
- (ii) Secretary of the Catalysis Society of India two terms 1984-87 & 1988-99
- (iii) President, Catalysis Society of India, 1992-1994

Contributions as a Scientist and Technologist

Dr Prasada Rao's instinct for applied research is uncanny. His skill and ability in taking knowledge from a dormant source to a profit center is unmatched in the field of catalysis, petroleum refining and petrochemical industry. He could marshal his thoughts in fundamental research, yet he can dove tail the results to practical applications. This combination is reflected in his publications in top journals in the area of catalysis as well as in the number of processes he has developed and commercialized.

It is well known that it is tedious and difficult path to take a laboratory catalytic invention through pilot plant and finally to an upscaled industrial plant. The obstacles and challenges in both scientific and management fronts are daunting. Only a person that combines scientific skills and inventiveness with powerful perseverance and strong leadership abilities can only achieve this task. Dr Prasada Rao belongs to the genre of people with such a combinatorial skills. Being worked for long time in industry he has developed a special talent to match seemingly unrelated information with the problem on hand which often resulted in a solution to industrial hiccups. He always modeled his work based on powerful economic sense and usefulness to solve industrial problems.

Dr Prasada Rao has made outstanding contributions to applied research process development and commercialization in fertilizer, petrochemical and petroleum refining fields some of his most significant contributions are listed below

Fertilizer Catalysts

Dr T S R Prasada Rao began his research career in 1967 at Fertilizer Corporation of India Limited (FCI), Sindri, for about 7 years, till Dr Prasada Rao moved to IPCL in 1974. He worked on Fertilizer Catalysis and the most acclaimed work of his was the **Development and Commercialization (in several Indian fertilizer plants) of low temperature and high temperature shift catalysts for the conversion of Carbon Monoxide (CO) to Carbon Dioxide (CO₂)**. These catalysts are in commercial operation in several fertilizer plants for almost two decades.

Xylene Isomerization

Dr Prasada Rao joined the Research (R&D) Centre of the Indian Petrochemicals Corporation Limited (IPCL), Baroda in 1974. It was at IPCL R&D Dr. Prasada

Rao spent the maximum time of his research career contributing seminally to Petrochemical Catalysis. Dr. Prasada Rao is also credited as one of the significant contributors to the development and institutionalization of IPCL Research Centre.

Dr. Prasada Rao's most acclaimed contribution at IPCL R&D Centre-also a landmark Technology Development in India, was his leading and seminal role in the development and commercialization at IPCL R&D Centre of **Zeolite Catalyst (marketed worldwide presently by IPCL by IPCL under the brand name 'ENCILITE)** and **process for Xylene Isomerisation** in collaboration with the National Chemical Laboratory (NCL), Pune and the Associated Cement Companies (ACC), Mumbai. This catalyst and process are comparable to the best available technology in the world today and in some respects even superior. **Indian Chemical Manufacturers Association (ICMA) recognized this achievement through its Forward Technology Development Award to IPCL in 1985.** This catalyst and process replaced an imported technology and has been in commercial operation since the last thirteen years at IPCL, Baroda. For the first time an Indian company, IPCL with Engineers India Limited (EIL) were ready to give the complete process for Xylofining all over the world. The ENCILITE success story helped save to IPCL crores of rupees in foreign exchange.

Dehydrogenation Catalysts

Development and successful commercialization of **Pt/Al₂O₃ catalyst for dehydrogenation of heavy C₁₁-C₁₄ Paraffins. The dehydrogenation of heavy Paraffins to Mono-Olefins is an important step in the manufacture of Linear Alkyl Benzene ((LAB).** At present there are three LAB plants in the country. All these plants are dependent on monopolistic imported catalysts. Therefore, the development of this catalyst holds immense importance. The most critical requirement of the catalyst is micro-spheroidal γ -Alumina with unique pore structure and bulk density and properly dispersed Platinum with a suitable promoter, which on the laboratory scale was successfully completed. The catalyst was charged in the commercial reactor at IPCL, Baroda and has been running successfully. This process development was selected for DSIR award in 1998.

Bimetallic Reforming Catalyst

Catalytic reforming is one of the major conversion processes in Petroleum Refining and Petrochemical industries. Catalyst is the heart of the process and the technology is a guarded secret and the monopoly of a few multinationals. Bimetallic Platinum Reforming catalysts are superior catalysts for production of aromatics. Dr Prasada Rao has led the catalyst development team and resulted in the successful commercialization of this catalyst in reformers of MRL, Chennai (6.2 tonnes of catalyst) and IPCL's Gujarat Aromatics production plant (8.2 tons). Both the plants are running successfully and the catalyst is showing superior performance. This development has broken the monopoly of a few MNCs and resulted the savings of ~ Rs. 5.0 crores foreign

exchange outflow and Rs 145 crores savings on product value. *This is the first state-of-the-art catalyst developed indigenously and commercialised in the Petroleum Refining industry in India which bagged CSIR Technology Award, 1992.*

Single - Step Adipic acid Process

All over the world, scientists are investing lot of time to develop economically viable oxidation process for single step adipic acid from cyclohexane. IIP successfully developed a superior catalyst formulation for this process in collaboration with Adarsh Chemicals and ABB Lummus Crest Inc., USA and Praxair Inc., USA. *A number of patents were obtained and applied in different countries on this process.*

Catalyst Formulation and Process for NTGG

Developed the promising catalyst formulations based on modified *Pentasil* zeolites for conversion of Naphtha (NGL & light naphtha) to Gasoline and Gas (NTGG) Process. Pilot plant studies are continuing and will be commercialized soon by Gas Authority of India Limited, New Delhi and BPCL Bombay. *This is one of the most promising processes developed by IIP and it is the basic research outcome of one of Dr Rao's Ph.D. students.*

Development of FCC Catalyst Formulations

FCC is the workhorse of the modern refinery and developing catalyst formulations in this area has enormous commercial and technological significance. FCC catalyst formulations containing modified zeolite and matrix with requisite physico-chemical properties has been successfully demonstrated on the laboratory scale and scale up work is in progress.

Catalyst for Dehydration of Alcohols

Dr Prasada Rao guided the research team in developing efficient alumina based catalyst for 'Dehydration of Alcohols'. This technology was licensed to Oxide (India) Private Limited and India Glycols Limited is negotiating for commercialisation of this catalyst.

Catalyst Formulations for Sweetening Process

Promising cobalt pthalocyanine based sweetening catalysts for oxidation of odorous mercaptans were developed. The activity evaluation results are highly promising and confirmed by UOP, USA after evaluating these catalysts in their laboratories. This provides remarkable opportunities for India to enter into the specialized field, monopoly of MNCs mainly UOP. Upscaling studies are in final stages of completion (Supported by BPCL, Bombay).

Development of Catalytic Converter

Problems of pollution caused by automobiles in our metropolis reached next to unbearable. IIP under the leadership of Dr Rao in association with BHEL, NCL and ARAI formulated the joint strategy to develop indigenous catalytic converter for decreasing the vehicular pollution. Dr Rao's team developed catalytic converter containing noble metals based catalyst formulations.

Development of Hydrotreating Catalyst and Process for Diesel Desulfurization :

Environmental regulations all over the world are becoming stringent and this requires the limit of sulfur in the diesel to be below 0.05 wt% from the present 1.0 wt% level. This requires deep desulfurization using highly active catalysts. A program is initiated with two crore financial support from centre for high technology.

Etherification of FCC Light Gasoline with Alcohols

Fuel ethers with their clean burning characteristics and high octane content derived from FCC olefin streams are responsible for decreasing the release of pollutants into atmosphere. Fuel ethers can increase the oxygen content with simultaneous decrease of olefinic content in gasoline. Promising commercial catalyst formulations for conversion of active olefins to ethers with alcohols in light FCC gasoline were identified and optimization of process on bench scale with these catalyst formulations are continuing (Supported by CHT).

Soker Visbreaking

Visbreaking is one of the simplest and low capital processes for converting heavier petroleum fractions in the petroleum refinery. IIP and EIL together developed many thermal conversion processes and commercialized. IIP joined hands with Stone & Webster Eng. Corp, USA for global licencing of visbreaking technologies. **Soker Visbreaking** technology joined in the list of IIP award winning technologies by winning the CSIR Technology award for 1998.

Basic Research Contribution

It is very difficult to pursue basic research in an industrial R&D centre compared to an academic setting where there is encouragement and atmosphere for such a research. In spite of this limitations Dr Prasada Rao convinced the importance of fundamental research, albeit with applied orientation and apportioned his time to publish papers in journals of international repute and in international conferences. He edited three books and authored over hundred publications and thirty seven foreign and Indian patents. His contributions are well cited in reputed review journals like *Advances in Catalysis*, *Catalysis Reviews in Science and Engineering* and *Catalysis Science and Technology* and other journals like *Journal of Catalysis*, *Applied Catalysis* etc. His scientific contributions are recognized by inviting

him to be on the editorial board of Applied Catalysis. He was the first Indian to be invited to be on this prestigious journal's editorial board. In addition he was on the editorial board of petroleum Asia Journal, Indian Journal of Chemical Technology, Fuel Science and Technology (Dhanbad), Hydrocarbon Technology (India). His outstanding contributions were recognized by electing him as a fellow of a number of highly respected professional societies such as, Indian National Academy of Engineering (FNAE) Indian Academy of Sciences (FASc), Fellow of Andhra Pradesh Academy of Sciences and he is member of New York Academy of Sciences.

Dr Prasada Rao is a strong believer and promoter of basic research which he considers is the backbone of future innovations and inventions. He made significant contributions to science in a variety of ways in addition to his innovative managerial accomplishments for overall progress of the Institute. He has wide variety of interests in the area of catalysis such as synthesis of new materials and novel applications to realize the potential of catalysis in different processes.

Oxidation / Ammoxidation / Oxychlorination of Olefins

A. In selective Oxidation of Ethylene to Ethylene Oxide, the optimization of Ethylenedichloride as moderator on commercial silver catalysts have helped to understand the role of Ethylenedichloride (EDC) and its optimum level and this led to improved performance of commercial catalysts. The x-ray photoelectron spectroscopic studies of deactivated silver catalyst from industrial reactors provided valuable clues to understand the catalyst deactivation mechanism.

B. Ammoxidation of Propylene

Several important fundamental aspects of ammoxidation of propylene on molybdate catalysis was studied. The aspects investigated include the following :

- ❖ Genesis of multicomponent molybdate and individual molybdates of Bi, Fe, Co and Ni with a view to understand the structural evolution of multicomponent molybdates (MCM).
- ❖ Establishing the types of bismuth molybdate phases that exist in MCM systems.
- ❖ Classification of lattice oxygen of the individual molybdates and MCM systems into selective and non-selective parts over establishing correlation between the amount of selective oxygen and selectivity.
- ❖ The role of iron as (1) a promoter in MCM system as a redox couple, (2) in forming the active oxide phase (i.e. Bi-Fe-Mo) and, in altering the surface Bi/M ratio and its effect on activity and selectivity.

- ❖ Transformation in molybdates after use in ammoxidation that results in the formation of FeMoO_4 and surface enrichment of Bi, Mo and Fe as observed by XPS.
- ❖ Redox behavior of simple and complex molybdate systems as studied by temperature programmed reduction and oxidation.
- ❖ Role of alkali metal promoters like potassium in improving selectivity by modification of acidity, and minimising the formation of by-products.
- ❖ Dr. Prasada Rao and his co-workers proved for the first time that the shell and core model is not applicable to multi component molybdate catalysts supported on SiO_2 used in Ammoxidation of propylene.

C. **Oxychlorination of Ethylene**

Significant contributions were made to understand the aspects of deactivation of oxychlorination catalysts. These studies unravelled hitherto unknown solid state textural and chemical changes that occurred during reaction. It was proved that these changes invariably lead to catalyst deactivation. One of the ways suggested to control deactivation is to have an efficient design of the catalyst shape. This work was presented at 9th International Congress on Catalysis at Calgary, Canada and received wide appreciation.

Zeolite Catalysis

Dr Rao has been working on different facets of zeolite synthesis, characterisation and catalysis related to Petroleum Refining, Petrochemicals to and chemical applications. His group synthesized and characterised many new metal substituted zeolites like Chromosilicates and have demonstrated the benefits of silylation of Gallosilicates in the Para Selective Alkylation of Mono Alkyl Benzenes. They have synthesized the ZSM-5 with comparable activity without the use of template to decrease the zeolite production cost and avoid the pollution due to templates release and burning. His Group also provided an evidence for molecular traffic control mechanism in pentasil zeolites.

Hydroprocessing Catalysis

The hydroprocessing team headed by him demonstrated that the performance of hydrotreating catalysts like $\text{CoMo}/\text{Al}_2\text{O}_3$, $\text{Ni-W}/\text{Al}_2\text{O}_3$ are profoundly influenced by calcination temperature and advocated the need to optimize these conditions. They have also shown that different functionalities like HDS, HYD takes place on different sites and oxygen chemisorption is not specific to any one of the functionalities of these catalysts but measures general state of dispersion. His group also elucidated the role of support.

Catalyst Formulations for Thiols Oxidation by Metal Chelates

Dr Prasada Rao and his research group demonstrated the efficiency of Fe(III) EDTA in aqueous Methanol system in converting hydroquinones to Quinones in presence of molecular oxygen, with excellent selectivity

Characterization of Catalysts

The Research group led by Dr Rao extensively used characterization techniques such as high vacuum system, chemisorption techniques, TPD/TPR, microcalorimetry, XRD, IR etc. to identify and estimate the active sites, factors responsible for catalyst deactivation and effect of process variables on active site environment. Some of the important findings of his multi technique approach are.

- ❖ Established the causes of *dehydrogenation catalyst deactivation* by using surface spectroscopic techniques.
- ❖ Through their micro calorimetric studies with n-Butyl Amine as base elucidated and the Acid site interactions in dealuminated Y-zeolites. In addition, Dr Prasada Rao has published excellent reviews on spectroscopic applications of industrial catalysts, design of FCC catalysts and hydroprocessing catalysis and hydrofinishing.
- ❖ Provided an evidence for molecular traffic control mechanism in pentasil zeolites.

Dr Prasada Rao as a person

Dr T S R Prasada Rao is a combination of many desirable and noble qualities of mind and heart that makes an instant and pleasantly lingering image of him in those who come into contact with him. Dr Rao is a warm humble human being extremely sensitive to human emotions. He is highly affable person warm, discerning and responsive. He respects others opinion and appreciative of others, irrespective of their standing and always willing to help them where ever he can. His transparent simplicity, radiating smile, uninhibited mannerism, his body language exuding sincerity, makes people feel at ease with him. His whole personality emphasizes with the other person with equal ease and dignity irrespective of rank or positions he holds. He will not fail to greet any person big or small at a seminar or meeting he is present. His unassuming nature make instant friends, as our good friend Professor G D Yadav put it, he is a good catalyst who converts whom so-ever that comes in contact into friends with 100% selectivity. It is not an exaggeration to say that even his critics sing a song in his praise without realizing that they were supposed to criticize him in the first place, under his charming influence. His indeed is a magnetic and magnificent personality.

He is highly religious and God fearing person. His day starts with a prayer and ends with a prayer. His religious bent of mind, I was told, was gift from his grand mother, Smt. Annapurna who was very religious. In his childhood she

encouraged him to cultivate the habit of praying God. He is not afraid of anybody other than God. He never forgets his gratitude to any person who did good to him. He always remembers how professor M M Sharma supported him encouraged him innumerable ways and considers him as his mentor although he never had any degree from UDCT. He never forgets to mention about the support, trust and confidence reposed on him by professor S K Joshi and Dr R A Mashelkar.

I have the pleasure of visiting his house frequently. He and his wife Mrs. Turaga Sujatha Venkatewari Prasada Rao are perfect hosts taking care of his guests with friendly and engaging formality. Both enjoy calling friends home and visiting them in reciprocation.

As an Administrator

To head a lab consisting of 600 odd people with scientific, technical and administrative functions is not a easy job for ordinary person but Dr Prasada Rao took to management like duck to waters. He not only accepted the job of Director and succeeded beyond expectations but also put the laboratory on firm pedestal with recognition nationally and internationally. His photographic memory allows him to remember every person by name; and concerns of every persons are recorded and attended in time. His freely flowing and charming personality keeps all the people at ease. Dr Prasada Rao always busy on working days and even on holidays exchanging his views, discussing about policies and procedures, offering advice, under standing others point of view. He never used power, but used his power of persuasion to get things done. His personal relations and public image is such that every employee would not mind to go an extra mile for him. Every employee has enough opportunities to meet him and express his concerns with him directly. The way he agrees for various things requested gives the impression that the word 'no' is not in his dictionary. He simplified the procedures for purchase of chemicals and equipment and he is a firm believer that rules are made to help people and should be interpreted to make things easy and fast. He always make it a point to appreciate good work done by any employee. He always listens to what other people have to say in all meetings and gives due consideration to accommodate relevant views. But even while being all things all people Dr Rao manages in the end to convince one and all his point of view. It takes tough managers to get things done but it needs leaders to get the organization going. He is an appropriate blend of these two requirements. Some people may say he is lucky, without realizing succeeding day in and day out for a long time in every job taken up needs lot more than good fortune.

Major Contributions of Dr T S R Prasada Rao as the Director

Dr T S R Prasada Rao took over the reins of the Indian Institute of Petroleum on 20th September 1990. He quickly realized that the institute needs to be galvanized to set on the path of progress and self supporting. Dr Rao's immediate priorities were to run the institute smoothly, modernize the laboratory by procuring the sophisticated instruments, develop the reliable

infrastructure such as regular power supply, communication systems, educate the IIPians about the need of attitudinal changes to realize their importance and innovative potential, inculcate the team spirit. In addition, he guided the institute for greater intimate interaction with the user industry, funding agencies and the government. He has devised mechanisms to make the industry aware of the past achievements and future potential of this institute, with well developed infrastructure and experienced scientific personnel. Many of the institute's programs were directed towards overall progress of the institute. In tune with growing awareness among CSIR labs about self reliance and accountability, he has concentrated on industry - laboratory- interactions by organizing the industry meets. These efforts in addition to contributing towards increase of extra-budgetary resources also helped to build a lasting impression in the higher echelons of petroleum refining and other industry. Another important aspect that received great attention is infrastructure in the institute. The remarkable performance of Indian Institute of Petroleum in the last eight years is built on the edifice supported by sound managerial skills backed by excellent interpersonal skills, and a vision about the institutes potential and a strategy to achieve the objective. A very brief account of Dr Prasada Rao's major contributions as the Director of IIP is presented in the following write-up.

1. Reorganization of the Institute

Institute with aged manpower leads to lack of dynamism and motivation which inevitably leads to decrease in efficiency. Proper organizational structure to communicate with various sections of the institute and entrust the responsibility at various levels plays critical role in realizing the objectives. For all round growth of the institute, devolution of power, delineating responsibility are the necessary components for the effective functioning and timely realization of goals. Realizing these points, the institute was reorganised into groups and areas managed by a three-tier system consisting of Group Leader, Area Leader and Area Co-ordinator. Reorganization of the system brought more accountability and fixing the responsibilities to carryout the well defined tasks. Reorganization of institutional setup increased the efficiency of communication and functioning.

2. New Directions for Growth of the Institute

Ever since he assumed the office of the director, he devised strategies to convert his vision of progress such as financial self-sustainability, realizing the potential of the institute in service of the industry and society and overall professional growth of IIP employees to name a few. To achieve these objectives, he led the institute into new directions in self - reliance, effective functioning, self-motivating and goal-oriented working. He laid emphasis on effective communication among groups and areas inside the institute on one hand and communication with user industry, funding agencies and sister R&D institutions on the other hand. He gave a new dimension to the information exchange and pooling of resources with other organizations. Indian Institute

of Petroleum, under his leadership, learned to participate and compete with global players of international repute like UOP, Stone and Webster, Mobil, Amoco etc. His shrewd strategies encouraged the above global players to become the partners of IIP for developing improved technologies and commercialization of IIP technologies globally.

2.1 Industrial Relations-Relations with SWA and Workers Federation

He realized the fact that associations like Scientific Workers Association, Workers Federation serve the healthy purpose of representing the community needs and maintained cordial relations with both the associations. He has kept open the channels of communication and taken a sympathetic view about their genuine demands. This resulted in an era of peaceful coexistence. It is no exaggeration to say that not a single day was lost due to strikes or any other form of non-cooperation in last eight years in this institute which was earlier known for acute disturbances due to disharmony between the management and the workers. This is a result of trust and confidence built over the years through words and deeds of Dr Prasada Rao among all sections of scientific community and identifying problem areas early and devising timely and acceptable solutions quickly.

2.2 Communications

Communication of the institute with the out side world, communication of management with scientists and other categories of workers is of immense importance in achieving progress. Introduction of group leader concept and three-tier management system has opened up new avenues for communication. Regular group meetings, meetings of group leaders with area leaders, meetings of Area leaders with Area Co-ordinators of the institute and the Director has led to vast improvement in communication within the institute. Dr Prasada Rao has opened up various communication channels with industry through training programmes, newsletters etc. This has increased awareness about the capabilities and potential of the institute and better appreciation of the rapid strides the institute is making. As a publicly funded national institute, this institute has a responsibility to the taxpayer. Realizing this, from time to time, the work of the institute is appraised to press and Open-Days were organized for the benefit of the public.

3. Institutional Interactions – Pooling of Resources & Information

Dr Rao strongly believes in the concept that the strong interaction between research laboratory and user industry is extremely important in achieving significant success in the development of technologies and research in the frontier areas of science and technology. Realizing the importance of the above mentioned objectives he strongly advocated laboratory industry interaction and within first few years of his tenure at IIP, he developed close links with all the refineries in petroleum industry. Reflecting his interaction with industry a

number of projects were sponsored by various industries amounting to 1441 lakhs were sponsored by industry during this period.

Dr Rao is a firm believer in the importance of basic science and it is the backbone of future inventions and innovations and promoting government agencies for enhanced funding in this area. With this belief, he carefully cultivated as the culture to have closer association with the academic institutes and other organizations in addition to having developing excellent and enduring relationship with user industry. He has healthy and fruitful relationships with government agencies like Department of Science and Technology, Department of Biotechnology, Centre for High Technology in pursuit of financial self reliance of the Institute and promoting the research in the applied areas of science. He has also promoted relations with various universities by encouraging their students to get training at this institute and also encouraging IIP staff to visit various organizations. Thus, he contributed significantly in developing, nurturing & fostering enduring relationships with the user industry, Government agencies and Academic institutions.

4. Major Breakthroughs

Dr Prasada Rao's untiring and relentless efforts towards technology development and transfer of technologies and commercialization of promising technologies with the technology partners has resulted in a number of breakthroughs in his tenure as the director. Some of the important breakthroughs in different areas of applications are listed below.

(A) Petroleum Refining / Catalysis

1. Food Grade Hexane Using NMP as the solvent - BPCL, Mumbai
2. Lube Oil Base Stocks Using NMP - EIL, New Delhi and MRL, Chennai
3. Development of Sweetening Catalysts - BPCL, Mumbai
4. Petrochemical Grade Hexane - OCL
5. Electrode Pitches - GIL, Bangalore
6. Development of Metal Chelate catalysts for Desulphurisation of fuel Gases - CRL, Cochin
7. Development of Catalyst formulations for NGL/Light Naphtha to LPG/Aromatics - GAIL, New Delhi and BPCL, Mumbai
8. Development of FCC Catalysts - IOC (R & D), Faridabad
9. Development of Catalytic Converter - BHEL, Bangalore and IARI, Pune

(B) Chemicals / Petrochemicals/Chemical Intermediates

1. Adipic Acid - ACF, Gujarat and ABB Lummus, USA
2. Isophthalic Acid - ACF, Gujrat
3. Low Pressure Process for NMP - ACF, Gujarat
4. High Temperature Antioxidants - AEC and TFCL, Madras
5. Sulfolane - Cadila, Ahmedabad
6. Multifunctional Additives
7. Additive for Dewaxing / Deoiling

(C) Petroleum Products Application

1. CNG 3 Wheeler - GAIL, New Delhi
2. LPG Stove - PCRA, Delhi

5. Recognition and Awards

During this tenure as the Director the Institute as well as scientists of the institute received several awards by various agencies in the country. CSIR has instituted CSIR Technology Awards for recognising excellence in technology development in 1990 and the Institute bagged the award seven times in eight years.

Awards to the Institute

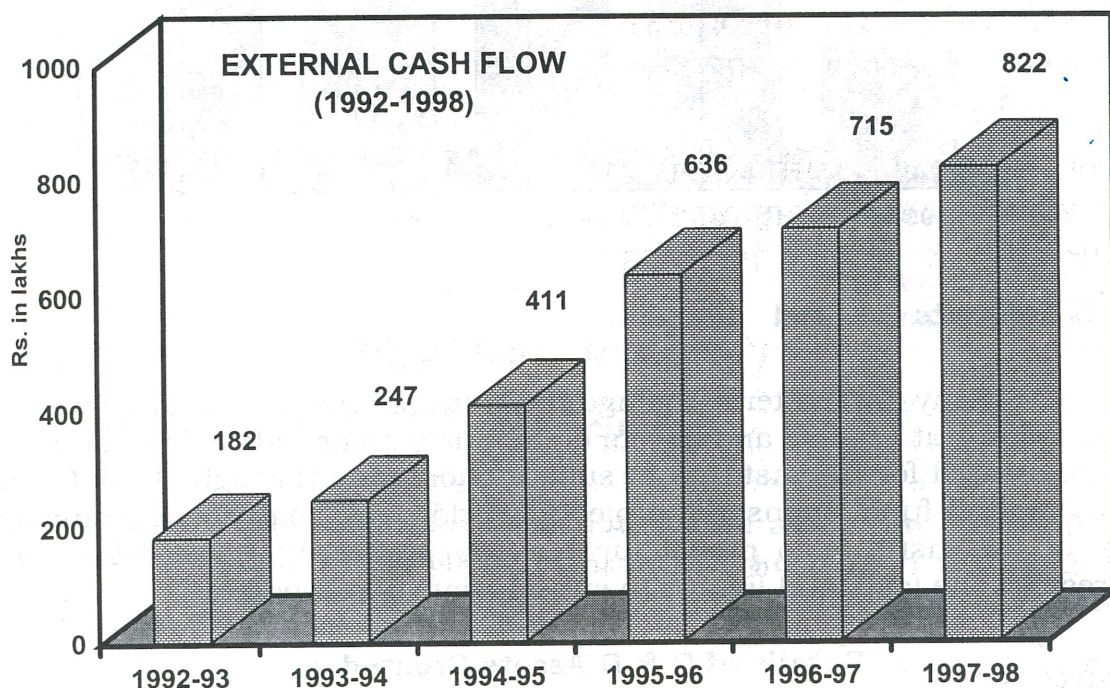
1. CSIR Technology Award for the development of Soker Visbreaking Technology, 1998
2. CSIR Technology Award for Sulpholane Production Technology, 1997
3. CSIR Technology Award for Business Development for the year, 1996
4. CSIR Best Technology Award in the area of Engineering and Technology for the Development of Low Air Pressure (LAP) Multi-fuel, Burner, 1994
5. CSIR Technology Award for Food Grade Hexane, 1993
6. CSIR Technology Award for Bimetallic Reforming Catalyst, 1992
7. CSIR Young Scientist Awards, 1990 & 1993
8. CSIR Technology Award for B/T Production Through Sulfolane Extraction, 1990
9. Vasvik Award in the area of Industrial and Domestic Combustion, 1993
10. Hari Om Ashram Preeti S S Bhatnagar Award for the year, 1993
11. Second Rajbhasha Award, 1997

6. Strategies for Marketing of Technologies and Technology Transfers

Doing science and developing technologies, and marketing the technologies are two sides of a coin. More often than not scientists are only exposed to science side of this aspect. Realizing that in the era where R&D is looked as business, marketing plays a vital role, he devised strategies to make the users aware of the achievements of the institute through Industry-R&D meets at various metropolitan cities. The industry people are encouraged to visit the institute and learn more about the potential of the institute. He not only contributed to the Indian Institute of Petroleum's marketing strategies but also contributed to evolve strategies at CSIR level in his capacity as a member of the committee that was constituted for this purpose. He persuaded CEO's of petroleum sector companies to be on the Research Council so that they get educated about our institute and also effectively participate, discuss and evolve strategies in fine-tuning the institute-programmes towards greater industrial relevance. Under Dr Prasada Rao's leadership a number of technologies were transferred which valued about 650 lakhs.

7. External Cash Flow and its Growth

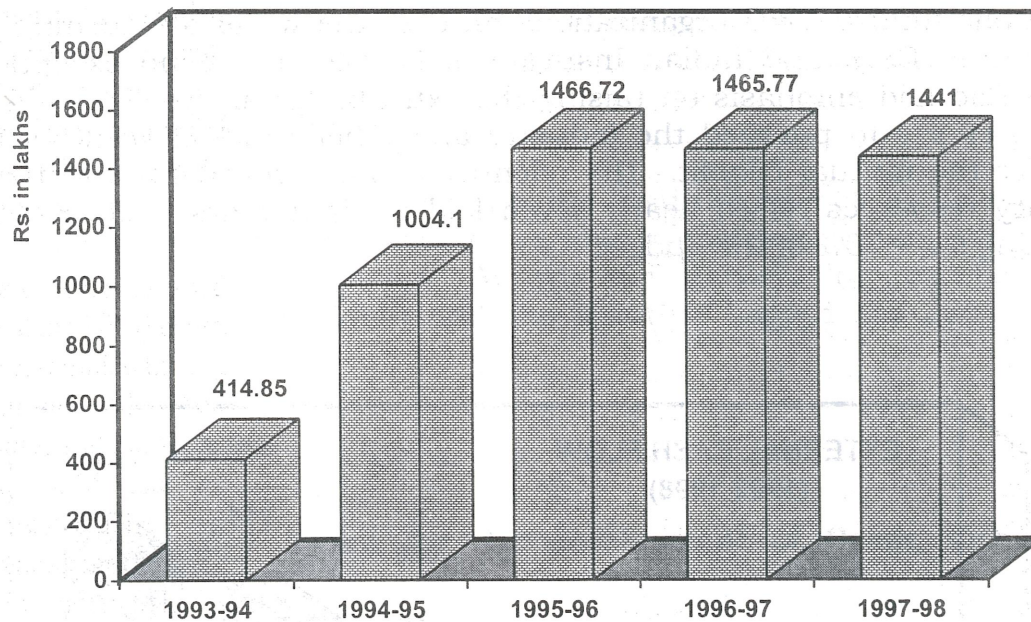
Public-funded R&D organizations all over the world are turning to self reliance and, CSIR and Indian Institute of Petroleum are no exception. Dr Prasada Rao laid emphasis on raising the extra-budgetary resources through intensive efforts to pursued the industry and other funding agencies to join hands for the mutual benefit. His relentless efforts bore fruit and the extra budgetary resources raised nearly seven fold in eight years to Rs 822 lakhs, accounting for ~ 70% of the budget.



8. Sponsored Projects Taken-up

Under the leadership of Dr T S R Prasada Rao, the credibility of IIP has increased many fold in the eyes of Industry and sponsored projects of IIP started increasing in leaps and bounds. Whereas the value of sponsored projects taken-up during 1990 was Rs.38 lakhs, which increased enormously within eight years to 1441 lakhs in 1997-1998. The year-wise increase in the value of sponsored projects is given in the bar chart below.

ONGOING SPONSORED PROJECTS
(As On 31st March, 1998)



9. R & D Assets Created

There may be many parameters to gauge the growth, prosperity and success of an organisation but finance and assets created is a clear indicator of success. The assets created for the institute in such a short time through OIDB Grant, laboratory reserve fund, sponsored projects, World Bank Loan clearly indicated the urge of the institute to propel further into prosperity. The table given below presents the facts and figures to substantiate above points.

Details of R & D Assets Created

	Rs. In Lakhs
From OIDB Grant	918
From Industry	484
World Bank Loan	1600
Total	3002

10. OIDB Grant

The institute obtained a grant of Rs 9.18 crores from OIDB to modernise the laboratory facilities. The institute started in early sixties needed upgradation of obsolete equipment and modernisation of laboratory facilities with new and the state-of-the-art equipment. This is an essential requirement, as the

competition among R&D institutes is severe and the institute with good facilities in addition to capable manpower will have an edge. This type of equipment and the amount of expenditure is beyond the means of regular budget. The Oil Industry Development Board (OIDB), an apex funding body in oil industry, was approached, convinced of the necessity by Late Mr. Lovaraj Kumar, Chairman Research Council of the institute. This successful effort resulted in modernization of the laboratory and utilized to modernize the laboratory.

11. World Bank Loan

Globalization of R & D and consequent competition with well established R & D establishments all over the World calls for top class infrastructure and Research facilities. In addition, due to extensive and far-reaching changes occurring in information technology and to meet the challenges as we move in to next millennium confidently, there is an urgent necessity to modernize infrastructure facilities to introduce new sophisticated local area computer network, Internet facilities, UPS system and a new high capacity generator to ensure uninterrupted power supply to carry out experiments round the clock, to establish advanced pilot plant facilities and new engine testing and analytical equipments. Keeping these things in mind a loan of Rs 16 crores was successfully obtained from world bank.

12. Infrastructure added to the Institute

It was realized in the beginning itself that the infrastructure is very important for the effective functioning of the institute and keeping in pace with the outside world. Communication facilities are very important to keep in touch with outside world as well as for information exchange within the institute. Realizing this, a modern digital electronic telephone exchange was installed with a capacity to meet the internal as well as external needs. In addition infrastructure was provided for installing a 250 line telephone exchange inside the colony to further augment communication facilities.

Power is most essential input in meeting the project dead lines and its importance is obvious in this user industry friendly scenario. To solve the power problems faced by the institute a new electric substation was installed and this with the help of new generators is expected to meet growing demand for power in years to come. Library is the most important source of information which opens windows to new ideas, new processes and new concepts. The library budgets have been continuously increased. Subscription to new journals, books have significantly increased inspite of tight financial situations. The library building was extended with a new wing to meet the growing space requirements. In addition many new equipments were added, a large number of personal computers were introduced to facilitate effective working and local area networking (LAN) of these computers is completed. A new 120 KVA uninterrupted power supply system was installed to improve the productivity.

13. Human Resource Development

It is realized that human resources are the most important component of the R&D outfit. There is necessity to nurture, educate and encourage the scientific personnel for their continuous overall development. Taking this aspect in view the scientists were encouraged to attend National and International seminars and deputed abroad to gain new experience and exposure to better facilities. A large number of people were sent abroad for training in various aspects. IIP scientists and group-three staff were encouraged to visit industry to be in touch with new developments under the programme of 'visit industry'. Technical staff were encouraged to avail study leave facility to improve qualifications. Dr Prasada Rao strongly believes that training in behavioral aspects is also important to scientists and other staff. Therefore, in addition to the above measures, the institute under the direction of Dr Prasada Rao, has conducted several personality improvement courses by experts in the area for developing leadership skills, stress management, management of insult situations for various categories of staff like scientists, technical assistants and administrative staff.

14. ISO 9001 Certification

Every organization strives to be efficient and improve upon it and IIP has given priority to total quality management and in installing systems for efficient functioning of the institute. Development technologies and marketing globally demands quality systems which could be achieved through ISO 9001 Quality System. An effort in that direction is applying for 9001 certification. Enormous amount of effort spanned over one year with the help of management committee and 30 internal auditors under the guidance of Dr. T. S. R. Prasada Rao helped the institute in obtaining ISO 9001 certification from Det Norske Veritas, Netherlands in March 1998, for the development of products and processes and evaluation and testing of petroleum and its products. This is a feather in IIP's cap as there are only a few such organizations in India, and this being the third R&D laboratory of CSIR, to achieve such a distinction.

15. Training of Industry Personnel

He realized training of engineers/senior executives from refineries and automotive and other related industries is an integral part of over all IIP activity. This activity received considerable impetus under the guidance of Dr T S R Prasada Rao because of his industrial R&D back ground and first hand information of the industry's requirements. In fact his activity has now been turned into a very significant interaction medium between IIP and the industry.

In the recent years the thrust has been on conducting training programmes for international clients. The continuous efforts born fruit in last two years and IIP conducted training programme for Saudi Arabia Standards Organization, Kingdom of Saudi Arabia.

16. Enhanced Emphasis to TIFAG

A new Technology Information Forecasting and Assessment Group (TIFAG) was created to serve the industry externally as well as institute internally. This cell aims at bringing technology awareness, by compiling the state the art reports and assessment of new technologies that are being implemented in other parts of the world. In addition, this cell has contributed in bringing out feasibility reports for some clients interested in setting up new refineries. Demand forecast of petroleum and petroleum products form important activities of the cell. The reports and services by the Group are valued very much inside as well as outside the institute.

17. National and Global Alliances / Collaborations

Dr Rao's relentless efforts towards self reliance and commercialization of IIP technologies resulted in a licensing of technologies in all parts of India. The following map depicts IIP's alliances with various industries in India.

National Alliances

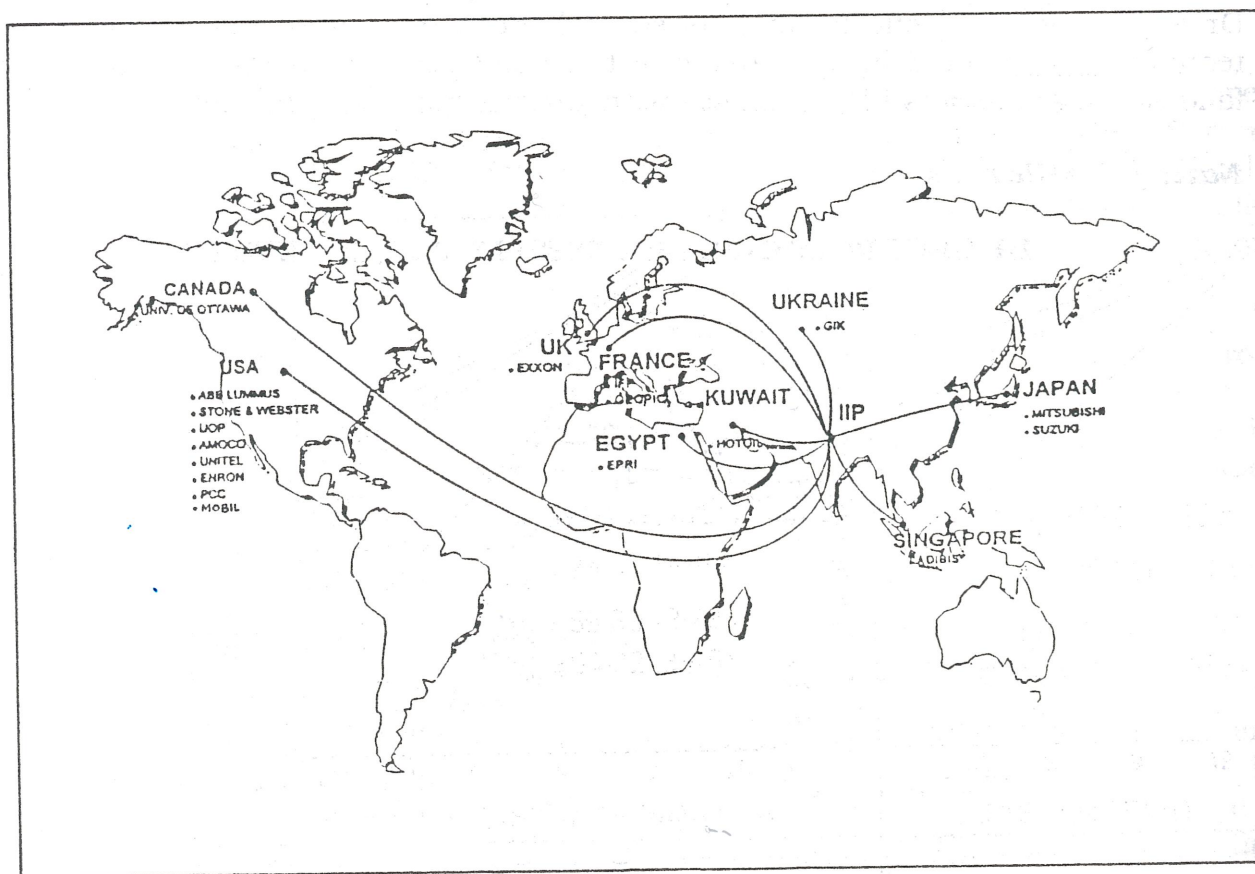
IIP TECHNOLOGIES LICENSED IN THE COUNTRY



Global Alliances

Realizing that globalisation of R & D offers a unique opportunity to establish international linkages to complement and strengthen the skills already existed in the institute and evolve a strategy to augment our scientific and financial resources, Dr T S R Prasada Rao made extensive efforts to establish international collaborations. Under his leadership in recent years Indian Institute of Petroleum has made rapid strides in this direction. Already links are established with ABB Lummus Crest, UOP, Unitel, Stone & Webster, Mobil, Amoco etc. of USA. Negotiations are in progress with several organizations including SABIC Saudi Arabia, Glitsch Technology Corporation USA, Chevron USA etc companies. Under his dynamic and forward looking leadership the institute established enduring and fruitful global linkages with a range of institutes and companies around the world.

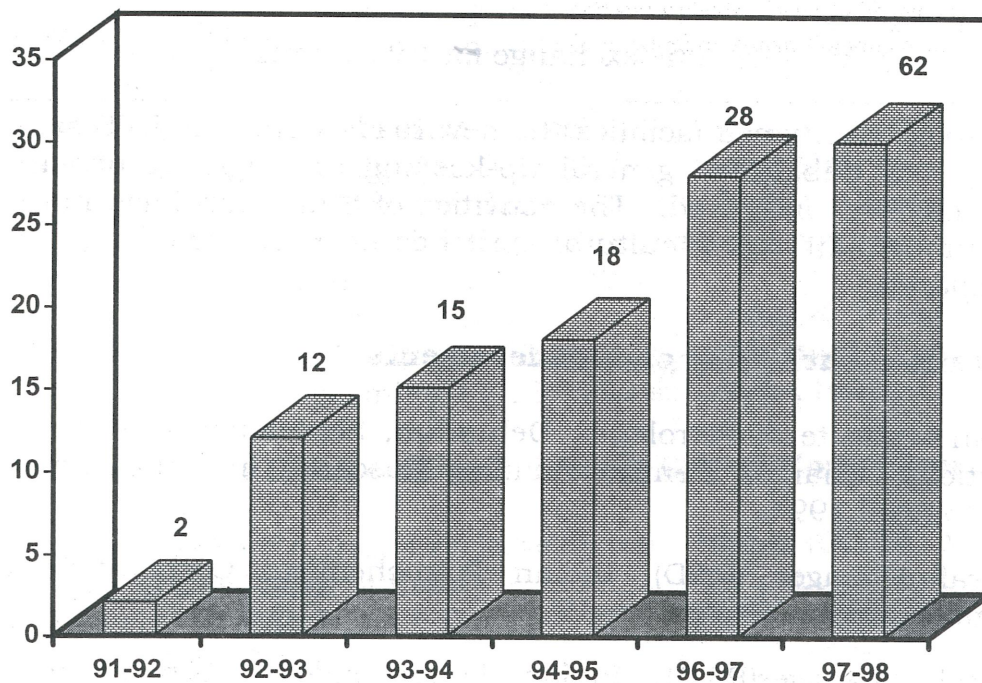
IIP'S GLOBAL LINKAGES



17. Visits Abroad of IIP Scientists

Dr T S R Prasada Rao laid emphasis on exposure and training of scientists in reputed organizations the number of scientist visiting abroad increased several folds from 62 scientists in 1997-98 compared two in 1990-91.

**VISITS ABROAD OF IIP SCIENTISTS
(1991-1998)**



18. Intellectual Property Protection and Patents

In the realm of R&D as business, the protection of intellectual property and proper patenting to acquire rights over the invention are of utmost importance. No user would like to buy a technology that is not properly protected. Realizing this fact, increasing efforts were on towards bringing awareness about intellectual property rights and encouragement and education of the scientists to realize the importance patenting and cultivate the art of writing legally sound patents in collaboration with Intellectual Property Management Division (IPMD) of CSIR. Several lectures by experts from IPMD were arranged and scientists were encouraged to interact with IPMD personnel of CSIR to hone their patent writing skills. These intensive efforts resulted in increased number of international and national patents over the last eight years.

19. Community Welfare

Dr Rao has given a big boost for developing infrastructure facilities in-side the colony as welfare measures to contribute towards well being of the residents of IIP colony. The following facilities were provided during his tenure :

1. A Central School, for the children for the employees of the institute. This has been the dream of the employees since the last 30 years. Dr Prasada Rao could achieve this during the very short period.
2. An exclusive LPG Store for storing and distribution of LPG gas to the colony residents.
3. Children's Parks at various locations in the colony and boundary walls and gates for all the quarters in the institute. A gymnasium for the use of colony residents.
4. A separate 250 line telephone exchange for IIP campus.

In addition to above mentioned facilities the new roads were laid, UPS system, New generator, New substation general up-keeping and lighting of various parts of the colony was improved. The activities of Staff Club have not only increased in number but a new cultural sprit has been promoted among IIP families and children.

Important Details about Career and Achievements

Director, Indian Institute of Petroleum, Dehradun, September 1990 to date.
 Director (Additional Charge), Central Building Research Institute, Roorkee, January 1993 to April 1994.

Deputy General Manager (R&D), Indian Petrochemical Corporation Ltd. Baroda, December 1989 to September 1990.

Senior Research Manager(R&D), Indian Petrochemical Corporation Ltd. Baroda, September 1984 to September 1989.

Principal Research Officer (R&D), Indian Petrochemical Corporation Ltd. Baroda, May 1982 to September 1984.

Senior Scientist (R&D), Indian Petrochemical Corporation Ltd. Baroda, March 1979 to May 1982.

Scientist (R&D), Indian Petrochemical Corporation Ltd. Baroda, April 1974 to March 1979.

Research Chemist Assistant Technologist, Fertilizer Corporation of India, Sindri 1967 to 1974.

Some Important Endowment / Plenary / Invited Lectures

Dr Prasada Rao was invited to give a number of endowment lectures, plenary lectures and invited talks by prestigious professional organization on various topics and chaired a large number of Sessions in various National as well as International Symposia. A few of them are recorded in the following :

1. Zaheer Memorial Lecture in 34th Annual Convention of Chemists, University of Delhi, December, 1997
2. The Catalysis Society of India, Eminent Scientist Award Lecture, April 2-4, 1997

3. The Principal NN Godbole Memorial Lecture, Banaras Hindu University, Varanasi, March, 1997
4. Invited Lecture at 5th World Congress of Chemical Engineering, San Francisco, USA, 1996.
5. The M G Krishna Memorial lecture, Andhra University, Vishakhapatnam, April 1995
6. The Plenary lecture at the 11th National Symposium on Catalysis at IICT, April 1994, Hyderabad
7. The R A Rajadhyaksha Memorial lecture, September 1995 at UDCT, Bombay
8. The Invited lecture at "2nd Workshop on Catalyst Design" on "Design of FCC Catalysts" during Nov. 9-16, 1992, Trieste, Italy
10. The C K Murthy Memorial lecture at the Indian Chemical Engineering Congress, Indian Institute of Chemical Engineers, A C College of Technology, Madras Dec. 18-21, 1991
10. The Invited lecture at "Workshop on Catalyst Design" on "Design, Development and Commercialization of Zeolite based Catalyst for Xylene Isomerization", December 11-13 1990 at Trieste, Italy

Chairmanship and Membership of Various Expert Committees

1. Member, the Oil Industry Development Board (OIDB), Ministry of Pet. & Natural Gas, Govt. of India
2. Advisor, Research and Development, Gas Authority of India Limited (GAIL), New Delhi
3. Member, Rakesh Mohan Committee for Petrochemicals
4. Member, Energy Board, Confederation of Indian Industry (CII), India
5. Co-ordinator (Catalysis), Indo-Russian Integrated Long Term Program (ILTP), DST, Govt. of India
6. Member, Expert Group constituted by Ministry of Petroleum & Natural Gas to review Technological Gaps in Indian Refining Industry
7. Member, Council of International Congress on Catalysis
8. Member, Mashelkar Committee for suggesting marketing strategies for CSIR
9. Chairman, Ministry of Petroleum & Natural Gas Investigation Committee of Gujarat Refinery Fire Accident & Member, HPCL Vizag Plant Fire Accident, 1997
10. Member, Governing Body, Petroleum Conservation Research Association (PCRA)
11. Member, Central Grievances Committee of CSIR
12. Member, Scientific Advisory Committee, Department of Petroleum & Natural Gas
13. Member, Governing Body, Council of Scientific and Industrial Research
14. Member, Society of Council of Scientific and Industrial Research
15. Visitor's (President of India) nominee of selection committee for Professors at Department of Chemistry, Indian Institute of Technology, Kanpur
16. Member, Research Advisory Council, Indian Petrochemicals Corporation Limited R&D, Baroda.

17. Member, Academic Council, University of Roorkee
18. Member, Mineral Awards Committee, Ministry of Minerals
19. Member, Engineering Sciences Committee of CSIR
20. Member, Technical Advisory Board (Chemical Sciences & Technology)
21. Member, Governing Body, LPG Equipment Research Centre, Bangalore
22. Member, Research Council, Indian Institute of Chemical Technology, Hyderabad
23. Member, Research Council, Central Building Research Institute, Roorkee
24. Member, Advisory Council, Department of Chemistry, IIT, Delhi
25. Member, Research Council, National Environmental Engineering Research Institute, Nagpur
26. Member, Research Council, Central Fuel Research Institute, Dhanbad

**AN INTERVIEW WITH
DR T S R PRASADA RAO**

INTERVIEW

Q1. During long and successful tenure as the director of Indian Institute of Petroleum. What are the challenges you have faced ?

Ans. When I joined this institute in September 20, 1990, four major challenges confronted me in making this great institute into vibrant and realize its potential. The first major challenge is to make my own scientists realize how good they are, what great capabilities they have, what great potential the institute has to serve the industry and the country. Here I played the role of Jambavanta to motivate people.

The second great challenge is to change the attitudes of the people. It is the people who make the institute and not facilities or buildings. Therefore, change in attitudes of the people will change the institute for better. I tried to bring aggressiveness in approach and an attitude to think big. All this was proceeded on an in built optimism and tremendous confidence in the abilities as well as the expertise of the institute's work force.

The third challenge is relations with Workers Association (WA), Scientific Workers Associations (SWA) and other professional bodies. The associations proved beyond doubt that they pay utmost respect and display commitment if the management is transparent and takes the role of a champion of employees well-being.

The fourth challenge is to bring the institute closer to the user industry. I strived hard to make the industry recognize us by allowing them to know more about our institute. We have demonstrated that we are capable in meeting the challenges and we can deliver the goods.

Q2. You have claimed earlier that IIP will be soon a global player ? What are the reasons behind such an optimism ?

Ans. First of all, we have excellent scientists whose caliber is at par with any international scientist and they are highly experienced with tremendous knowledgebase and on top of it all my scientists are ambitious to do world class research. We have very modern infrastructure. More than that IIP has at least a dozen technologies that are on par, in excellence, with those technologies that are with our global competitors. These technologies are monopolies of one or two companies in the world and IIP is one of them. Now the question comes why now ? Why not few years back? During previous years, our priority was to develop and commercialize the technologies in India. Having once proved commercially and successfully operated in the Indian plants, we have a ready commercial reference as well as the confidence to become a global supplier of the technology. Our strategy is to become a global player through strategic alliances with some of the major oil companies in the world and some of the technologies we may market ourselves globally.

Q 3. At present we are net importers of catalysts. What are IIP's efforts in reducing the imports?

Ans. We have had some successes in this area and I am confident that many more catalytic technologies based on Indian know-how will be commercialized and IIP will play a vital role in this. IIP has already developed reforming catalysts, catalysts for conversion of light paraffins. We have diesel desulfurization catalysts. We have reached comfortable stage in developing desulfurization catalysts. We developed our own catalytic converter for cars which is ready for commercialization. We are also negotiating with international catalyst suppliers for collaboration. We have recently modernized our catalyst evaluation facilities with 3 million dollars.

Q.4 How are the research facilities at IIP ?

Ans. We have the best facilities here. During my tenure as the director of the institute, we have obtained grants for modernizing the institute. I consider that IIP is sitting on a gold mine in terms of resources and potential. Funds will not be a problem if industry have the confidence in the expertise and infrastructure of the institute. What I did for this institute as the director is strengthening of these two critical components by creating world class research facilities. When I joined the institute, the institute's extra budgetary resources were 70 lakhs. Now, we are getting 70 lakhs as interest on our term deposits alone. This will give an idea about the potential of the institute.

Q.5 Did the Institute benefited from ISO certification ?

Ans. I consider ISO certification is a milestone in IIP's history. We have received about 50 congratulatory messages from a cross section of the industry; some of them have no business with us. It shows that this certification brought recognition to the institute. The overwhelming faith that the industry has is further enhanced by ISO certification.

Q.6 You are a highly religious person can you tell us who sowed these religious seeds and what made you sustain this faith

Ans. First of all let me tell you, I came from a modest background of Andhra Brahmin family. I got this habit from my home itself. My grand mother encouraged me to participate in puja which she used to perform daily. She taught me that this is your path. When you are in trouble you think the God. Overcoming various obstacles and difficulties that I faced reinforced my faith in the God. Success reinforces your faith in the God and sustains your devotion.

Q7. What is the role of your wife in your achievement?

Ans. She supported me very well. My staying for long hours, initially it needed adjustment. She resigned her job to take care of me and additional family responsibilities. She is religious but not as religious as I am.

Q.8 Looking back 32 years of career as a scientist what are your achievements. Are you satisfied with your career as a scientist?

Ans. I do not say I am satisfied. I have a balanced approach about what I wanted to do. I could not do as much catalysis as I wanted to do. There is always a conflict between the scientist in me and my duties as the director of the institute. This institute demanded my complete attention for its all round growth and as a result I could not concentrate much time to pursue catalysis, which my natural instincts demand. I concentrated on institute at the cost of catalysis. However, it gave me satisfaction and I have no regrets at all. If I were the director of some other laboratory, I could have devoted more time on catalysis. When I accepted the position of the Director, Dr.A P Mitra, then the DG CSIR told me "you are my last hope". In my opinion, science has no meaning, if it does not serve the society. My final message is to serve the Indian oil industry with confidence and with total commitment by directing the institute's activities to address the problems as well as the aspirations of the industry. My way of serving the country in the larger societal context is with the Missionary zeal and dedication by orienting all of my energies around the issues related to the technologies, starting from the 'concept to commercialization'.

Q.9 What is the secret of your success at IIP?

Ans. I am able to bring a lot of innovations in the management system of the institute. I made them to realize their inherent professional strengths and how good they are? What the potential they have?
For example sulfolane technology was lying in the shelf for a long time. The sulfolane technology is the monopoly of two companies in the world. We commercialized this process with the help of Cadila, Ahmedabad. The quality of sulfolane produced by the IIP technology is superior to the product of Shell and Philips technologies. We get royalty every year. Apart from royalties, we got tremendous confidence and courage to advance further to compete with the world majors in the critical areas of technology development.

Q.10 You came up from a modest and humble background. What is your message for success in life?

Ans. According to me if you have God's grace, if you are optimistic, if you have commitment, and if your thinking and the policies are people oriented, you will be successful irrespective of your background. Lack of money never effected me. The 'WILL' to do is more important. You should have positive approach. It is the divinity, which gives the required strength to me. God gave me optimistic approach and I am literally following the same. My life and the achievements are the fruits of this path.

Q.11 What is the secret of your looking young at sixty?

Ans. When you are positive you look younger.



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