4TH MEETING

HELD AT

DEPARTMENT OF PETROLEUM, MOPC&F, SHASTRI BHAWAN, NEW DELHI

ON

JANUARY 9 -10, 1982

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Brief record of the 4th meeting of Scientific Advisory Committee for Department of Petroleum

Venue : Room of Secretary, Department of Petroleum, Shastri Bhawan, New Delhi.

Date : January 9/10, 1982.

(A list of the participants is attached) (Annexure-I)

The Committee confirmed the minutes of the 3rd meeting held on November 9, 1981. Itemwise action taken on the various decisions taken during the last meeting were then discussed. The status of the actions taken and the further work done for the same are briefly given below:

a) Utilisation of $C_2/C_3/C_4$ fractions of cat-crackers

Adv.(PC) informed that M/s. Badger have already been contacted to determine their interest in offering the technology for ethyl benzene from dilute ethylene available from FCC off gases. Their response is awaited.

b) Filled Polypropylene

A note on the subject prepared by IPCL was circulated to the members before the meeting. Further work to be done would be discussed as a part of the IPCL proposal on reinforced thermoplastics.

c) Butyl Rubber Technology

A note on the subject prepared by IPCL was circulated to the members before the meeting. After brief discussion, it was agreed that this work would be undertaken jointly by IPCL and EIL and would become a part of IPCL R&D programme. Avenues of collaboration with national laboratories will also be further explored if found necessary.

d) ISRO spin off of technology for elastomer/plastic/thermoset research.

The Committee was informed that an IPCL team had

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discussions with ISRO to examine possibilities of commercialisation of various products of ISRO for non-space applications and this matter would be pursued further and a detailed market survey would be conducted by IPCL and a report submitted. In this context, it was also decided that Deptt. of Petroleum would obtain BICP report on polyols and circulate it to the members of the Committee.

e) Higher Alfa-olefins

A (PC) informed the Committee that the Department has already contacted the potential licensors of the technology and the matter was being pursued. He also informed that the availability of n-paraffins from different crudes both in the context of IPCL expension and possibilities of LAB plant at other location was being examined. It was decided that data collected on the subject may be circulated to the members.

The Committee then took up the item-wise discussions on the agenda for the meeting.

1. Recommendations of the Thermosetting Resin Committee

The Committee was informed about the background of the setting up of the Thermo-setting Resin Committee and recommendations made by it. The members strongly supported the recommendations made by this Committee and agreed that thermoset resins with their high performance index and their suitability for use in combination with renewable resources have a crucial role to play in consumer products. The members also supported the recommendations of the Committee related to Engineering Plastics and desired that efforts should be made to promote production and use of engineering plastics. In the case of manufacture of Poly-carbonate, the Committee recommended that attempts should be made to obtain technology for this important material.

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The Committee also desired that information on cost, energy saving and the advantages of replacement of a) corrugated roofing sheets by FRP material may be obtained by the Department of Petroleum(PO) and Dr. Gupta of IIT, Delhi for submission to the Department of Revenue in the context of the proposal of revision of duty on thermoset resins, and b) doors and windows of bus and bicycle frames.

2. IPCL's Report on catalyst development and testing

A note prepared by the National Chemical Laboratory outlining the various options for development, manufacture, evaluation and commercialisation of indigenous catalysts and related processes was submitted to the Committee. After a detailed discussion, it was agreed that the Committee would support the IPCL proposal of setting up of facilities for testing and evaluating the catalysts in hydro-carbon processing industry and that, these facilities would be available, on merits of the case, to all other organisations who would like to these for testing and cooperative development of catalysts with IPCL. It was also decided that a group consisting of i) Dr. Doraiswamy, NCL, ii) A representative from RRL, Hyderabad, iii) Representative from FPDIL, iv) Representative from EIL would visit Baroda to examine the details of equipment and manpower required and other aspects related to IPCL's proposal on catalysts.

3. IPCL's proposal for expansion of R&D Centre, Research Programme for Polyolefines, butyl rubber, filled thermoplastics, etc.

The proposals submitted by IPCL on the above were discussed at length. The members expressed that IPCL R&D should lay emphasis on:

a) absorption and upgrading of technology acquired by them,
b) development with specific objectives, identifying a few projects and time target for each project.
c) A microbiology and toxicology division may be created with dominant emphasis on problems of environmental planning and control, and
d) Independent recruitment and training plan for the R&D activities.

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It was emphasised by the members that IPCL research facilities should be viewed in the larger national context and not only on the marketing and other needs of IPCL.

Keeping the above in view, it was decided that a group consisting of the following members would visit Baroda for examining equipment, programme, time phasing and the manpower planning for the R&D programme with particular reference to the work on polyolefines and synthetic fibres:-

i) Dr. Gupta, IIT, Delhi.
ii) Dr. S.K.Gupta, IIT, Kanpur.
iii) Dr. V.M.Nadkarni of NCL
iv) Prof. Sukhdev, Director, Multi-chem Labs., Baroda.
v) Dr. Parekh, Sesmira
vi) A representative from EIL.

IPCL agreed to prepare and circulate a note on absorption and upgrading of technology carried out so far in IPCL.

4. EIL Research Centre

Details of programmes to be undertaken in the first phase of R&D programme of EIL, as worked out in the discussions EIL had with Prof. Sharma and Dr. Doraiswamy (Annexure-2) were discussed in the meeting. After a detailed discussion, the Committee recommended that EIL Research Centre as outlined should be set up as early as possible.

5. Recommendation of Working Group on Science & Technology with regard to appointment of Scientific Advisers in economic Ministries.

The Secretary, Department of Science & Technology outlined the background and considerations related to the above and invited comments of the Committee. The Committee, in principle, concurred with the recommendations of the Working Group on S&T. The members, however, felt that a mechanism for the appointment of Adviser and their integration in the existing structure have to be carefully

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worked out for achieving the objectives outlined. There may be a need for more than one Adviser to cover very diversive fields.

6. Items for discussions in the next meeting of the Committee.

i) Proposals of IOC on expension of their R&D facilities.

ii) Working of Petroleum Products Development Coordination Group (PPDCG) and utilisation of IIP R&D facilities.

iii) R&D proposal in refining processes including hydro-cracking. Adviser (R) would get the necessary documents prepared and circulate to the members of the Committee, before the meeting.

ANNEXURE

List of Participants who attended the Scientific Advisory Committee Meeting on 9th & 10th January, 1982.

1. Dr. J.N.Baruah, Director, Regional Research Laboratory.
2. Shri V.B.Gupta, Prof. I.I.T., Delhi.
3. Dr. P.K.Mukhopadhyaya, Manager, R&D, EIL.
4. Shri R.S.Sivaram, Principal Research Officer, IPCL.
5. Shri R.Y.N.Sharma, Principal Research Officer, IPCL.
6. Dr. I.S.Bhardwaj, IPCL.
7. Prof. Sukhdev, Director, Malti Chem Laboratory.
8. Shri J.K.Ahuja, Principal Scientist officer, DST.
9. Dr. S.Varadarajan, C & M.D., EIL.
10. Shri K.K.Bhattacharyya, Dy. Director, IIP.
11. Shri P.K.Goel, General Manager, IOC.
12. Shri J.L.Vasudev, GM (Tech.), IOC.
13. Shri A.A. Krishnan, Ex.Dir.(P), JPC.
14. Dr. K.Aghoramurthy, Adv.(PC) Min. of Petroleum.
15. Dr. G.Jayaramarao, Adv.(R) Min. of Petroleum.
16. Dr. Thyagarajan, Director, Regional Research Laboratory.
17. Prof. M.M.Sharma, Chemicals Engineering Department of Chemical Technology.
18. Shri L.Kumar, Secretary, Min. of Petroleum.
19. Shri M.P.Modi, Joint Secretary, Min. of Petroleum.
20. Shri L.K.Doraiswamy, NCL.
21. Shri V.M.Nadkarni, NCL.
22. Dr. R.A.Mashelkar, NCL.

ANNEXURE II

NOTES ON FIL ENGINEERING RESEARCH CENTRE

The following presents the outcome of discussions, the agreed scope and outline of the projects.

Distillation:

Considerable information could be generated by studying in laboratory-scale facilities, such as, vapour-liquid equilibrium stills and laboratory-size columns, using standard mixtures of organic compounds with appropriate facilities for analysis. The large atmospheric pressure-vacuum column (1.2m dia. and 10m height) will be of value. Analytical instruments and control facilities can be built up in stages according to requirements. Suitable facilities for storage of organic materials may be provided along with utilities and facilities for safety, fire fighting, effluent disposal, etc. The facilities should be of stainless control, preferably using microprocessor and data logger. Energy conservation modes may also be incorporated in the experimental facilities. The objectives would be to optimize distillation facilities, energy conservation, etc. Experiments will be carried out with different internals, such as, trays, random and regular packings. The impacts are expected to be in the field of petroleum refining and petrochemicals. Although experiements will not be carried out for gas fractionation, olefin separation, etc., from the experiements with standard systems, the effects of physical properties would be established to enable predictions for the above systems.

In ascertaining utilities and offsites, care may be taken to design all these with a special research investigation potential, so that useful information could be obtained for auxiliary facilities as well as primary distillation.

It wss suggested that extra cost for specifying the column and auxiliaries upto 10 atm. may be stablished.

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In case this is within 20% of the cost for column and auxiliaries for vacuum to atmospheric operation, the facilities may be designed for operation upto 10 atm.

It is desirable to prepare a feasibility report on distillation, outlining the objectives, broad details of hardware and associated facilities, cost, analytical support facilities, number of personnel - scientists and technicians required and a brief outline of the possible study. Facilities especially for large-scale column may have to be operated on continuous basis with three shifts. The extent of office, building, etc. needed may be outlined. A very approximate estimate of return on such investment over five years period may be outlined. Large scale facility on distillation could be made available to other institutions in the country when needed. At some time distillation with chemical reaction may be investigated in the facility.

Absorption:

Small scale laboratory facilities are appropriate. Large scale facilities, when required, may be set up at the operating plant.

Extraction:

The scale-up facilities, including equilibrium still and extraction system, including extractor, stripper and regeneration columns with diameters upto 0.2 m may be provided.

Adsorption & Membrane Separations:

The laboratory scale facilities proposed to initiate work on adsorption and membrane separations were considered worthwhile. However, for development and supply of adsorption and membrane separations, appropriate tie-ups with other institutions should be developed.

Safety Research:

It was suggested that facilities available at Defence Research Centres should be explored before considering these facilities in HIL's Research Centre.

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Unconventional Cracking for Olefins:

New concepts to be investigated may be brought out. Also, the facilities including analytical support may be spelt out.

Burner/Furnace Development:

The proposed mobile rig for taking measurements in the industrial furnaces should be expedited. To increase the rate of data generation, possibility of having multiple mobile rigs may be considered.

In principle, it was agreed that burner/furnace development stationary rig is worthwhile. However, the sophistication may be built up in phases. Again the facilities and programme may be outlined in greater details. Consultations may be carried out with BHEL to develop further details on this project.

Incinerator Development:

This was considered a worthwhile project and may be taken up.

Heat Transfer:

Condensation of multicomponent mixture, particularly in presence of noncondensables and at high vaccum is an uncertain area and investigations need to be carried out.

Steam-jet Ejectors:

To have full knowledge of steam-jet ejectors, an experimental programme is envisaged.

OUTLINE OF THE FACILITIES FOR EIL ENGINEERING RESEARCH CENTRE

1. Distillation laboratory facilities:

   a) Vapour-liquid equilibria still for homogenous systems operating under vacuum and atmospheric pressure in glass. 1 no.

   b) Vapour-liquid equilibria still for homogenous systems operating upto 10 atm in SS 316. 1 no.

   c) Vapour-liquid equilibria flow still for homogenous and heterogenous mixtures in (i) glass and (ii) metal 2 nos.

   d) Oldershaw column with 100 actual plates (in sections) complete with reboiler, condenser and automatic control instruments
      (i) in glass 3
      (ii) in metal 3

   e) Packed column for atmospheric and vacuum service.
      (i) in glass 2
      (ii) in metal 2

   f) Spinning band column
      (i) in glass
      (ii) in metal

2. Distillation large rigs:

   a) Distillation rig 1.2M x 10M operating in the range 5 mm Hg to atmospheric pressure and temperatures upto 300°C complete with reboiler, condenser, feed vessels, pumps, instruments, etc. 1 no.

   b) Air water simulator 1.2 M Ø complete with air blower and cooler and water recirculation facilities 1 no.

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3. Extractor development:

a) Liquid-liquid equilibria still operating upto 10 atm. 1 no.

b) Liquid-liquid extraction assembly complete with extractor, stripper and regeneration facilities. Column diameters around 0.2M. 1 no.

c) Different types of extractor to match item (b).

i) Perforated tray

ii) RDC

iii) Packed column

iv) Mixer-settlers

4. Absorption:

Absorption cells for phase equilibria determination at atmospheric and higher pressures

i) in glass 1 no.

ii) in metal 1 no.

5. Adsorption (vapour and liquid phase):

a) Apparatus for determination of adsorption and desorption isotherms. 1 no.

b) Apparatus for breakthrough curve determination. 1 no.

c) Studies on regeneration and life test

d) System with adsorption and desorption facilities. Columns around 10 cm dia. 1 assembly

6. Membrane separation:

Cell containing membrances on suitable supports for establishing permeability of components of test mixtures. 1 assembly

7. Safety research:

a) Explosion bombs of different sizes to experimentally determine the explosivity limit of organic compounds of interest. 2 nos.

b) Adiabatic still for holding liquids at different temperatures and measuring change with time. 1 no.

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8. Unconventional cracking:

Exploratory work for production of olefins by catalytic cracking or operations under extreme conditions, such as, high temperature, low pressure and low residence time will be investigated. Lab. reactor assembly will be 25 mm dia. 1 assembly

9. Burner/furnace development

Combustion chamber to accommodate burner upto 10 MM Kcal/hr with cooling surfaces for heat removal. Instrumentations for measurements of temperature, pressure radiative heat flux gas compositions, soot, etc. 1 assembly

10. Incinerator development:

Combustion chamber to burn 50-100 kg/hr of liquid/ gaseous wastes and associated absorption system to remove pollutants in the flux gas. 1 assembly

11. Steam-jet ejectors:

A rig to test steam-jet ejectors and the associated variables. 1 assembly

12. Heat transfer rig:

In commercial size equipment condensation of multi-component mixure in presence of noncondensates will be studies. 1 assembly

13. Gas-liquid-liquid separators:

A rig with horizontal and vertical separators with different internals to investigate seperation characteristics. 1 assembly

14. Analytical facilities:

- Gas-liquid chromotographs 6
- PIAND analyser 1
- Liquid chromotograph 1

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