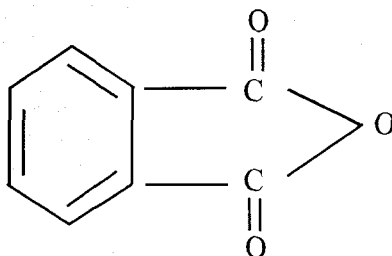


EXECUTIVE SUMMARY

1. INTRODUCTION

Phthalic Anhydride (PA) is a benzene dicarboxylic acid and is represented as:



- i) Principal use of PA is in Plasticizers, Alkyd resins, dyestuff intermediates and unsaturated polyester resins (PR).
- ii) The first preparation of Phthalic acid is credited to Laurent in 1836 by oxidation of tetra chloro naphthalene with nitric acid. BASF made the first break through in 1896 by oxidising naphthalene. Commercial production of PA by catalytic vapor phase oxidation of naphthalene began in USA in 1981.
- iii) A modified version low energy process (LEP) was developed in 1970s which operates at higher concentrations of O-xylene and consumes much less energy as compared to conventional process. The more recent development of Low Air Ratio (LAR) process is further extension of this.

2. PROCESS.

- i) The PA is manufactured by oxidation of O-Xylene or naphthalene. The

processes are:

- Vapour phase fixed bed process.
- Vapour phase fluid bed process.
- Liquid phase process.

Out of the above 3 categories vapour phase fixed bed process accounts for most of the plants in the world.

- ii) the main feedstocks are naphthalene and O-xylene. Naphthalene can be derived from either coal tar or petroleum. O-xylene is extracted from aromatic cut of naphtha.
- iii) O-xylene is predominant feedstock in India. All the Indian plants except Durgapur Chemical use O-xylene. Durgapur chemical unit is based on naphthalene.

A list of country wise producers is tabulated. On the global scene plant of 10-15 KTPA are built in developed countries.

The latest technology developments are focussing mainly on reducing energy consumption, compliance with environmental protection regulations through off gas treatment, vent gas recycling and utilising oxygen as make-up gas.

4.0

STATUS OF INDIAN INDUSTRY

In India, the growth of PA plants has taken place in distinct steps in 1968, 76, 84 & 85. The list of licensed and Installed capacities of PA plants in India is compiled and presented in Table 4.1. the largest operating units is that of Thirumalai Chemicals (20,000 TPA).100% export oriented unit of 45,000 TPA IG Petrochemicals is under implementation.

4.1

Initially, during 1970s PA industry in India had a poor start. However, it improved steadily afterwards. The sector wise consumption of PA was compiled and no large scale changes have been observed in the consumption pattern. There has been a small drop in the use of PA in plasticisers due to

substitution by chlorinated paraffin wax, etc. The PA production, consumption and projected demand data are compiled and presented in Tables. The product purity as produced by Indian manufacturers is acceptable for the requirement of user industry. The list of technology suppliers is also compiled. Herdillia Chemicals has reported successful development of a process to absorb maleic anhydride from switch condenser vent gases and its further conversion to fumaric acid. Except this no serious R&D effort have been made by Indian manufacturers to develop PA process.

5.0 TECHNOLOGY ABSORPTION AND GAPS.

Even though no serious steps have been taken towards indigenization of basic process design of PA technology, none the less the production technology has been fully absorbed as far as development of operational expertise is concerned. The know-how for Ambuja Petrochemical Plant was provided through Engineers India Ltd. who had bought technology from Alusuisse Italia. EIL has also negotiated with Alusuisse to license LEP technology also, for which they have agreed in principle.

In the field of catalyst as the entire demand of Indian industry is met by import, steps should be initiated for the development of suitable catalyst from indigenous resources to meet the need of the industry. This would give substantial foreign exchange savings.

6.0 RECOMMENDATIONS

- 6.1 Pthalic anhydride technology exists in India with Engineers India Ltd., and the same may be adopted for all future plants either grass root or expansions.
- 6.2 The improvements in PA industry mainly have been with respect to Air to o-xylene ratio, catalyst modifications and energy saving devises (LAR and LEP processes). The performance of the new plants using the above improved technologies need to be studied with respect to technical, economical and safety angles. If found suitable, attempts should be made to study if the old plants can be retrofitted to take advantage of these new processes.
- 6.3. Technologies exist for recovery of offgases from the scrubber to convert to useful byproducts. They need to be explored for application in existing units

thereby avoid pollution and improve the plant economics. This has become all the more attractive in view of the capacity expansions by most of the units.

- 6.4 Catalyst for PA is being imported at present. Now with 7 plants producing PA in India, the possibility of manufacturing the catalyst in the country may be initiated and thereby save the foreign exchange.
- 6.5 Catalyst development programmes in this field can be identified and taken up by a national laboratory or any other established R & D organisation in collaboration with industry.
- 6.6. Efforts are needed to expand the existing plant capacities in order to bring them to minimum economically viable size. However one more PA plant may be needed to be commissioned by 1994-95.