INTISARI

Asam tereftalat ($C_6H_4(COOH)_2$) adalah senyawa organik berbentuk kristal berwarna putih yang digunakan sebagai bahan baku pembuatan poliester tereftalat, poliester benang filamen, dan *polyester staple fiber* (PSF). Aplikasi lainnya dari asam tereftalat adalah *carrier* dalam produksi cat, *coating* serbuk, resin, perekat *hot-melt*, dan bahan komposit.

Pabrik Asam Tereftalat dari *p-xylene* dirancang dengan kapasitas 300.000 ton/tahun. *P-xylene* dan udara digunakan sebagai bahan baku utama sebanyak 202.094,25 ton/tahun dan 919.507,49 ton/tahun. Pabrik ini menggunakan proses *Amoco* yaitu reaksi oksidasi katalitik *p-xylene* dan udara dengan pelarut asam asetat. Reaksi dilakukan di *Bubble Column Reactor* pada suhu 200°C dan tekanan 16 atm dengan katalis Kobalt (II) Asetat. Produk padatan dipisahkan kemudian dimurnikan dengan proses purifikasi *Amoco*, yaitu hidrogenasi untuk mengurangi kadar 4-karboksibenzaldehid (4-CBA) sehingga diperoleh *Purified Terephthalic Acid* (PTA). Pemurnian dilakukan di *Bubble Column Reactor* pada suhu 250°C dan tekanan 43 atm. Produk didinginkan dan dikristalkan di *crystallizer* pada suhu 80°C dan tekanan 1 atm. Asam Tereftalat dipisahkan, dikeringkan, lalu disimpan pada kondisi atmosferik. Kemurnian akhir produk asam tereftalat sebesar 99,78%.

Pabrik ini akan didirikan di Kawasan Industri Tuban, Jawa Timur dengan luas lahan 6 ha dan membutuhkan 250 orang karyawan. Kebutuhan energi listrik untuk menjalankan pabrik sebesar 30.514,94 kW. Kebutuhan air dan udara untuk ulititas masing – masing sebesar 242.135,13 kg/jam dan 637.117,89 kg/jam.

Pabrik membutuhkan modal tetap sebesar $ 103.398.767,79 + Rp 418.196.154.238,29 dan modal kerja sebesar $ 66.249.659,83 + Rp 5.943.262.784,53. Pabrik ini tergolong *high risk* dengan ROI *before tax* 50,47%, POT *before tax* 1,65 tahun, BEP 45,62%, SDP 29,52%, dan DCFRR 24,52%. Berdasarkan hasil analisis kelayakan ekonomi, dapat disimpulkan bahwa pabrik asam tereftalat dari *p-xylene* layak dan menarik untuk dikaji lebih lanjut.

Kata kunci: asam tereftalat, p-xylene

ABSTRACT

Terephthalic acid ($C_6H_4(COOH)_2$) is an organic compound with white-colored crystal structure which is used as the raw material of terephthalate polyester, filament yarn polyester, and polyester staple fiber (PSF) production. Further applications of terephthalic acid are paint production's carrier, powder coating, resinm hot-melt adhesive, and composite material.

Terephthalic acid plant from p-xylene is designed with the capacity of 300,000 ton/year. P-xylene and air are used as the raw materials with 202,094.25 ton/year and 919,507.49 ton/year of materials required. This plant utilizes the Amoco process, which is a catalytic oxidation of p-xylene with air using acetic acid as the solvent. The reaction is done in a bubble column reactor at 200°C and 16 atm using cobalt (II) acetate as the catalyst. Solid product is separated and purified by Amoco Purification process, a hydrogenation to reduce 4-carboxybenzaldehyde (4-CBA) and obtains Purified Terephthalic Acid (PTA). The process is done in a bubble column reactor at 250°C and 43 atm. It is then cooled and crystallized in a crystallizer at 80°C and 1 atm. Terephthalic acid is further separated, dried, and stored at atmospheric condition. The final terephthalic acid purity is 99.78%wt.

This plant will be constructed in Tuban Industrial Region, East Java with 6 ha of land and 250 employees required. The total of electricity consumption to operate the plant is 30,514.94 kW. The amount of water and air required for utilities are 242,135.13 kg/hour and 637,117.89 kg/hour.

This plant required $ 103,398,767.79 + Rp 418,196,154,238.29 of fixed capital and $ 66,249,659.83 + Rp 5,943,262,784.53 of working capital. Terephthalic acid plant is considered as a high risk plant, with ROI before tax 50.47%, POT before tax 1.65 year, BEP 45.62%, SDP 29.52%, and DCFRR 24.52%. Based on the economic feasibility studies, it can be inferred that this terephthalic acid plant form p-xylene is appealing for further studies.

Keywords: p-xylene, terephthalic acid