INTISARI

Dimetil tereftalat (DMT) merupakan senyawa ester aromatis yang digunakan sebagai bahan poliester. Dimetil tereftalat dihasilkan dari reaksi esterifikasi fasa gas antara asam tereftalat (AT) dengan metanol. Reaksi berlangsung secara eksotermis dan adiabatis dalam reaktor *fixed bed* yang berisi katalisator alumina aktif pada suhu 300 ^{o}C dan tekanan 1,5 atm. Konversi yang dihasilkan mencapai 99 % dan reaksi samping dapat diabaikan. Produk DMT dipisahkan dari campuran lalu dikristalkan, dikeringkan, dan didinginkan.

Pabrik DMT dirancang dengan kapasitas 60.000 ton/tahun. Kebutuhan bahan baku AT dengan kemurnian 99 %massa sebanyak 53.320,3761 ton/tahun dan metanol *grade* AA dengan kemurnian 99,85 %massa sebanyak 213.281,5042 ton/tahun. Bahan pembantu yang diperlukan berupa katalisator alumina aktif sebanyak 61,9824 ton/tahun.

Pabrik DMT beroperasi secara kontinu selama 330 hari/tahun. Untuk menunjang keberlangsungan proses produksi dibutuhkan air yang berasal dari laut sebanyak 63,1646 m^3/jam, *steam* sebanyak 9.149,1226 kg/jam, listrik sebanyak 383,6626 kW, udara tekan sebanyak 150 m^3/jam, dan bahan bakar *diesel fuel* sebanyak 1.358,8029 kg/jam.

Pabrik ini akan didirikan di Cilegon, Banten dengan luas area 2 ha dan membutuhkan 175 tenaga kerja. Dari hasil evaluasi ekonomi diperoleh kebutuhan modal tetap dan modal kerja masing-masing sebesar $ 21,454,637.01 + Rp 73.951.226.571,35 dan $ 19,841,309.76 + Rp 472.760.451.756,07. Hasil analisis kelayakan memberikan nilai ROI *before tax* sebesar 44,26 %, ROI *after tax* sebesar 33,20 %, POT *before tax* selama 1,88 tahun, POT *after tax* selama 2,37 tahun, BEP pada 54,28 %, SDP pada 42,96 %, dan DCFRR sebesar 34,68 %. Dengan berbagai pertimbangan tersebut dapat disimpulkan bahwa pabrik ini menarik untuk dikaji lebih lanjut.

ABSTRACT

Dimethyl terephthalate (DMT) is an aromatic ester compound applied as polyester material. Dimethyl terephthalate is produced from gas phase esterification reactions between terephthalic acid (AT) and methanol. The reaction takes place exothermally and adiabatically in a fixed bed reactor containing active alumina catalyst at 300 ^oC and 1.5 atm. The conversion reaches 99% and side reactions could be ignored. The DMT product is then separated from the mixture and then crystallized, dried, and cooled.

The DMT plant is designed with a capacity of 60,000 tons/year. The raw materials required are AT 99% as much as 53,320.3761 tons/year and methanol grade AA 99.85% as much as 213,281.5042 tons/year. The auxiliary material required is activated alumina catalyst as much as 61.9824 tons/year.

DMT plant operates continuously for 330 days/year. To support the sustainability of the production process, water required from the sea is 63.1646 m^3/hour, steam as much as 9,149.1226 kg/hour, 383.6626 kW of electricity, 150 m^3/hour of compressed air, and diesel fuel approximately 1,358.8029 kg/hour.

The plant will be established in Cilegon, Banten with an area of 2 ha and requires 175 labors. Economic evaluation gives the fixed capital and working capital required are $ 21,454,637.01 + Rp 73.951.226.571,35 and $ 19,841,309.76 + Rp 472.760.451.756,07 respectively. Profitability analysis gives ROI before tax value of 44.26%, ROI after tax of 33.20%, POT before tax about 1.88 years, POT after tax about 2.37 years, BEP of 54.28%, SDP of 42.96%, and DCFRR of 34.68%. Based on these considerations it can be concluded that this plant is worth to be studied further.