

ABSTRAK

Telah dirancang pabrik metil klorida dengan kapasitas 660.000 ton/tahun dengan bahan baku metanol 99,3 % dan asam klorida 100%. Metil klorida sendiri dapat digunakan sebagai refrigeran, solven, dan karet sintetis. Disamping itu metil klorida juga dipergunakan sebagai intermediate dalam pembuatan tetra metyl lead dan silikon. Pabrik direncanakan didirikan di Bontang, Kalimantan Timur karena telah tersedianya sarana penunjang dengan baik.

Reaktor yang digunakan adalah Fixed Bed, dengan kondisi operasi : temperatur 105 °C dan tekanan 1,935 atm dengan katalisator silika-alumina gel. Reaksi berlangsung pada fase gas, bersifat eksotermis dan irreversible. Proses pembuatan metil klorida berlangsung dalam 3 tahap, yaitu : tahap penyiapan bahan baku, tahap reaksi dan tahap pemisahan dan pemurnian produk.

Kebutuhan utilitas adalah sebagai berikut: air secara kontinyu sebanyak 1325800,08 kg/jam yang meliputi air pendingin sebanyak 144792,66 kg/jam, air umpan boiler sebanyak 1195344,98 kg/jam, dan air untuk rumah tangga sebanyak 15662,44 kg/jam. Kebutuhan uap air (steam) sebanyak 996120,823 kg/jam. Kebutuhan listrik sebanyak 480,7608 Kwh. Bahan bakar yang dibutuhkan sebanyak 344,1391 kg/jam solar. Udara tekan yang dibutuhkan sebanyak 9,3456 m³/jam dengan tekanan 5 atm.

Pabrik direncanakan menempati tanah seluas 44500 m² dengan total investasi \$10.872.234,47 + Rp 477.941.792.489,26 meliputi modal tetap \$ 10.707.605,05 + Rp 324.535.008.174,24 dan modal kerja \$ 164.629 + Rp 153.406.784.315 dengan keuntungan sebelum pajak sebesar Rp 122.282.622.594 dan keuntungan setelah pajak sebesar Rp 63.586.963.749. Berdasarkan analisa kelayakan diperoleh Break Event Point (BEP) 42,69 % (syarat BEP 40-60%) , Shut Down Point (SDP) 20 % dan Discounted Cash Flow Rate 18,05%. Sementara itu, Return on Investment sebelum pajak (ROI_b) sebesar 25,26% dan Return on Investment sesudah pajak (ROI_a) sebesar 12,13%, Pay Out Time sebelum pajak (POT_b) sebesar 3 tahun (syarat POT_b untuk pabrik beresiko tinggi > 2 tahun) dan Pay Out Time sesudah pajak (POT_a) sebesar 4,9 tahun

Berdasarkan hasil evaluasi ekonomi dapat disimpulkan bahwa perancangan pabrik Metil klorida dari Metanol dan Asam Klorida dengan kapasitas 30.000 ton/tahun ini layak untuk didirikan.

Kata Kunci: metil klorida, metanol, asam klorida, fixed bed, alumina

ABSTRACT

The methyl chloride plant with capacity of 660.000 ton/year with raw material of 99,3% purity methanol and 100% purity hydrochloric acid has been designed. Methyl chloride itself could be used as refrigerants, solvent and syntethic rubber. Also, it could be used as intermediate in the making of tetra methyl lead and silicon. It has been planned that the factory is going to take place in Bontang, East Kalimantan because of the well availability support and facilities.

Fixed Bed Multitubular is the reactor that will be used, with the operation condition : 105 °C temperature, and 1,935 atm pressure with silica-alumina gel as the catalyst. The reaction take place in the gas phase. The reaction is exothermic and irreversible. Methyl chloride manufacturing process take place in 3 steps, that is : preparation of raw materials, reaction phase, separation phase and the products purification .

The utility requirements are: water flows continuously as much as 1.325.800,08 kg/hour which include: cooling water 177.468,98 kg/hour, boiler feed water 1195344,98 kg/h, and domestic water 15.662,44 kg/hour. Steam requirement is 996.120,823 kg/hour. Electricity requirement is 480,761 Kwh. Fuel requirement -that is going to be used for generator- is 344,1391 kg/hour of diesel fuel. Compressed air requirement is 9,3456 m³/h with 5 atm pressure.

The factory was planned to occuppies a 44500 m²land with total investment of \$10.872.234,47 + Rp 477.941.792.489,26, which include fixed capital of \$ 10.707.605,05 + Rp 324.535.008.174,24 and working capital of \$ 164.629 + Rp 153.406.784.315 with profit before tax of Rp 122.282.622.594, and profit after tax of Rp.63.586.963.749. Based on feasibility analysis, it is obtained that Break Event Point (BEP) is 42,69% (BEP requirement is 40-60%), Shut Down Point (SDP) 20 % and Discounted Cash Flow Rate is 18,05 %. Meanwhile, the Return on Investment before tax (ROI) is 25.26 % and Return on Investment after tax (ROI) is 12.13%, Pay Out Time before tax (POT) is 3 years (POT requirement, for factory with high risk plant > 2 years) and Pay Out Time after tax (POT) is 4,9 years.

Based on the results of the economic evaluation, it is concluded that the methyl chloride plant design from methanol and hydrochloric acid with capacity of 30.000 ton/year is quite feasible to be build.

Keywords: methyl chloride, methanol, hydrochloride, fixed bed, alumina