

INTISARI

Pabrik butil klorid dari butanol dan asam klorida ini dirancang dengan kapasitas 60.000 ton/tahun dan beroperasi secara kontinyu selama 330 hari/tahun dan 24 jam/hari. Hasil yang diperoleh adalah butil klorid dengan kemurnian 99,4 %. Bahan baku yang digunakan adalah butanol 99 % sebanyak 48.133,95 ton/tahun dan asam klorida 36 % sebanyak 24.141,71 ton/tahun serta zinc klorida sebanyak 14.706,03 ton/tahun.

Reaksi ini dilakukan dalam fase cair. Butil klorid dibuat dengan cara mereaksikan butanol dan asam klorida secara kontinyu di dalam reaktor alir tangki berpengaduk dengan bantuan katalis zinc klorid ($ZnCl_2$). Reaksi berlangsung pada suhu 102 °C dan tekanan 2 atm. Reaksi ini bersifat eksotermis sehingga panas yang dikeluarkan selama reaksi diambil oleh air pendingin melalui koil pendingin yang berada di dalam reaktor.

Pabrik ini direncanakan akan didirikan di Gresik, Jawa Timur dengan luas tanah 100.000 m² dan mempekerjakan 154 orang karyawan. Kebutuhan steam sebanyak 15.462,56 kg/jam, air sebanyak 34.634,26 kg/jam, bahan bakar sebanyak 510,10 kg/jam, udara instrumen sebesar 40,32 m³/jam, dan kebutuhan listrik 420,49 kW.

Modal tetap yang diperlukan sebesar US\$ 26.908.521,50 + Rp 378.384.114.636,53 , modal kerja Rp 132.217.738.500,77. Dari hasil perhitungan diperoleh *Return on Investment* (ROI) sebelum pajak 86,41 %, sesudah pajak 84,07 %. *Pay Out Time* (POT) sebelum pajak 0,561 tahun, sesudah pajak 1,063 tahun. *Break Even Point* 52,48 %, *Shut Down Point* 29,82 % dan *Discounted Cash Flow Rate Of Return* 29,36 %. Berdasarkan hasil perhitungan evaluasi ekonomi tersebut, maka pabrik butil klorid dengan kapasitas 60.000 ton/tahun menarik untuk dikaji lebih lanjut.

ABSTRACT

A butyl chloride plant from butanol and hydrochloric acid is designed for the production capacity of 60,000 ton/year and operates continuously for 330 day/year and 24 h/day. The result is butyl chloride with a purity of 99.4%. The raw materials used are 99% of butanol about 48.133,95 ton/year and 36% of hydrochloric acid about 14.706,03 ton/year and zinc chloride about 2,998.947 ton/year.

This reaction is conducted on the liquid phase. Butyl chloride is made by reacting butanol and hydrochloric acid in a continuously flow stirred tank reactor in the presence of zinc chloride ($ZnCl_2$). The reaction operates at of 102 °C of temperature and 2 atm of pressure. This reaction is exothermic so the heat that released during the reaction taken by cooling water through a cooling coil inside the reactor.

The plant is planned to built in Gresik, East Java, with a land area of 100.000 m² and employs 154 employees. The requirement of steam is about 15.462,56 kg/h, water about 34.634,26 kg/h, fuel about 510,10 kg/h, instrument air about 40,32 m³/h, and the requirement of electricity about 420,49 kW.

This chemical plant need to be covered by fixed capital of U.S. \$ 26.908.521,50 + Rp. 378.384.114.636,53, working capital of U.S. From an economical analysis show that Percentage of Return on Investment (ROI) before tax is 86,41 % while after tax is 84,07 %. Pay Out Time (POT) before tax is 0,561 year while after tax is 1,063 year. The value of Break Even Point (BEP) is 52,48 %, while Shut Down Point (SDP) 29,82 % and the value of Discounted Cash Flow Rate Of Return is 29,36 %. Based on the calculation of the economic evaluation result, it can be conclude that Butyl Chloride plants visible to be built.