

ABSTRAK

Butil Asetat banyak digunakan antara lain sebagai solven, bahan pengharum, dan pemberi rasa sintetik. Pabrik Butil Asetat dirancang dengan kapasitas 20.000 ton/tahun didirikan untuk memenuhi kebutuhan dalam negeri dan selebihnya diekspor. Bahan baku untuk memproduksi Butil Asetat membutuhkan Butanol sebanyak 13.041,360 ton/tahun, Asam Asetat sebanyak 12.734,403 ton/tahun dan katalis Amberlyst 15 sebanyak 6.033,535 ton/tahun. Pabrik direncanakan berdiri pada tahun 2023 di Sidoarjo, Jawa Timur. Pabrik direncanakan dibangun di tanah seluas 20.201 m². Tahapan proses produksi Butil Asetat meliputi persiapan bahan baku, pembentukan Butil Asetat di reaktor, dan pemurnian produk. Reaksi pembentukan Butil Asetat merupakan reaksi esterifikasi Asam Asetat dan Butanol dengan katalis jenis *ion exchange resin* yaitu Amberlyst 15. Reaksi tersebut berlangsung pada fase cair - cair dengan katalis padat. Reaksi dilakukan di dalam reaktor alir tangki berpengaduk (RATB) yang beroperasi pada suhu 93⁰C dan tekanan 1 atm. Utilitas pendukung proses meliputi penyediaan air sebanyak 1.474.293,990 ton/tahun. Kebutuhan steam sebanyak 48.007,319 ton/tahun, air pendingin sebanyak 1.153.635,162 ton/tahun, bahan bakar sebanyak 1.396,200 m³/tahun, dan listrik sebanyak 1.910.064,844 kW/tahun yang diperoleh dari PLN dan cadangan dari generator listrik. Bentuk perusahaan adalah Perseroan Terbatas (PT) dengan struktur organisasi *line and staff*. Sistem kerja karyawan berdasarkan pembagian jam kerja yang terdiri dari karyawan *shift* dan *non-shift*. Analisa dalam evaluasi ekonomi dari perancangan ini menunjukkan keuntungan sebelum pajak Rp 75.453.029.804 sedangkan keuntungan setelah pajak Rp 56.589.772.353 dengan total penjualan Rp 854.399.998.177 dengan biaya tetap Rp 35.614.356.522, biaya variabel Rp 601.493.998.008 dan biaya regulasi Rp 141.838.613.842. *Return of Investment* (ROI) sebesar 15,89%. *Pay Out Time* (POT) sebesar 3,86 tahun. *Break Event Point* (BEP) 50,88%. *Shut Down Point* (SDP) 27,70% dan DCFR 19,42%. Pabrik ini beresiko rendah karena proses berjalan pada kondisi operasi operasi yang rendah, serta bahan baku yang digunakan tidak mudah meledak. Berdasarkan hasil ini dapat disimpulkan bahwa pabrik butil asetat dari butanol dan asam asetat dengan kapasitas 20.000 ton/tahun cukup menarik untuk dikaji lebih lanjut.

Kata-kata kunci: Butanol, asam asetat, butil asetat, amberlyst 15, RATB

ABSTRACT

Butyl acetate is widely used among others as a solvent, a fragrant ingredient, and a synthetic flavor. The Butyl Acetate Factory is designed with a capacity of 20,000 tons/year established to meet domestic needs and the rest is exported. The raw material for producing butyl acetate requires butanol as much as 13.041,360 ton/year, acetic acid as much as 12.734,403 ton/year and Amberlyst 15 catalyst as much as 6.033,535 ton/year. The factory was planned to operate in 2023 in Sidoarjo, East Java. The planned factory is built on a land area of 20,201 m². The stages of the production process of Butyl acetate includes preparation of raw materials, formation of butyl acetate in reactors, and product purification. The reaction to produce butyl acetate is an esterification reaction of acetic acid and butanol with an exchange resin catalyst of Amberlyst 15. The reaction takes place in a liquid-liquid phase with a solid catalyst. The reaction is carried out in the stirred tank flow reactor (RATB) operating at the temperature of 93°C and pressure of 1 atm. The process supporting utilities include water supply as much as 1.474.293,990 ton/year. Steam needs as much as 48.007,319 ton/year, cooling water as much as 1.153.635,162 ton/year, fuel as much as 1.396,200 m³/year, and electricity as much as 1.910.064,844 kW/year obtained from PLN and a spare from an electrical generator. The company's form is limited liability company (LLC) with the organizational structure of line and staff. Employee working system based on the division of working hours consisting of shift and non-shift employees. Analysis of the economic evaluation of this design shows the profit before tax Rp 75.453.029.804 while the profit after tax Rp 56.589.772.353 with total sales of Rp 85.399.998.177 with a fixed cost of Rp 35.614.356.522, variable cost Rp 601.493.998.008 and regulated cost Rp 141.838.613.842. Return of Investment (ROI) amounted to 15.89%. Pay Out Time (POT) of 3.86 years. Break Event Point (BEP) 50.88%. Shut Down Point (SDP) 27.70% and DCFR 19.42%. The plant is at a low risk because the process runs under low operating conditions, and the raw materials used are non-exploding. Based on these results it can be concluded that the plant of butyl acetate of butanol and acetic acid with a capacity of 20,000 tons/year is quite interesting to studied further.

Key words: Butanol, acetic acid, butyl acetate, amberlyst 15, RATB