ABSTRAK

Etilbenzena merupakan bahan intermediate yang digunakan sebagai bahan baku pembuatan *styrene monomer*. Proses pembuatan etilbenzena dengan proses *Mobil-Badger* adalah pembuatan etilbenzena menggunakan etilena dan benzena dengan katalis ZSM-5 Pabrik etilbenzena dirancang dengan kapasitas 120.000 ton/tahun, menggunakan bahan baku benzena sebanyak 606.418 ton/tahun dan etilen sebanyak 31.224 ton/tahun. Lokasi pabrik didirikan di kawasan industri Cilegon, Banten. Perusahaan akan didirikan dengan badan hukum Perseroan Terbatas (PT), dengan jumlah karyawan 120 orang. Pabrik direncanakan berdiri pada tahun 2024 dan beroperasi pada tahun 2025. Reaksi pembentukan etilbenzena dari benzena dan etilen melalui proses alkilasi dan transkilasi fase gas-gas dengan katalis padat. Reaksi alkilasi berlangsung di reaktor *fixed bed multitube* pada suhu 350^{O}C – 450^{O}C dan tekanan 20 atm. Reaksi transkilasi berlangsung di reaktor *fixed bed single bed* pada suhu 400^{O}C-450^{O}C dan tekanan 6 atm. Produk yang dihasilkan adalah etilbenzena dengan kadar etilbenzena sebesar 99,8%. Tahapan proses meliputi persiapan bahan baku, pembentukan etilbenzena di dalam reaktor, dan pemurnian produk. Pemurnian produk dilakukan di dalam menara distilasi. Unit pendukung proses pabrik, meliputi unit kebutuhan air, steam, udara tekan, tenaga listrik dan bahan bakar. Pabrik juga didukung laboratorium yang mengontrol mutu bahan baku dan produk sesuai dengan spesifikasi yang diharapkan. Selain itu terdapat unit pengolahan limbah yang menangani limbah baik padat, cair maupun gas yang dihasilkan dari proses produksi. Dari hasil ekonomi diperoleh ROI (*Return On Investment*) sebelum dan sesudah pajak sebesar 34% dan 18%, POT (*Pay Out Time*) sebelum dan sesudah pajak sebesar 2,4 tahun dan 4,1 tahun, BEP (*Break Event Point*) 42% dan SDP 25%. Sedangkan DCF (*Discounted Cash Flow*) sebesar 15,37%. Jadi dari segi ekonomi pabrik ini layak didirikan.

Kata-Kata Kunci: Etilbenzen, Bezena, Etilen.

ABSTRACT

Ethylbenzene is an intermediate material used as a raw material for making styrene monomers. The process of making ethylbenzene with the Mobil-Badger process is the manufacture of ethylbenzene using ethylene and benzene with catalyst ZSM-5. The ethylbenzene plant is designed with a capacity of 120,000 tons / year, using as many as 606,418 tons / year of benzene and ethylene as much as 31,224 tons / year. The location of the factory was established in the Cilegon industrial area, Banten. The company will be established with a Limited Liability Company (PT), with 120 employees. The plant is planned to stand in 2024 and operate in 2025. The reaction of the formation of ethylbenzene from benzene and ethylene through the process of alkylation and transcillation of gas gases with solid catalysts. The alkylation reaction takes place in a multitube fixed bed reactor at 350oC - 450oC and a pressure of 20 atm. Transcillation reaction takes place in a single bed fixed bed reactor at a temperature of 400oC-450oC and a pressure of 6 atm. The product produced is ethylbenzene with ethylbenzene content of 99.8%. The stages of the process include the preparation of raw materials, the formation of ethylbenzene in the reactor, and product purification. Purification of the product is carried out in the distillation tower. The plant's supporting units include water, steam, compressed air, electricity and fuel. The factory is also supported by laboratories that control the quality of raw materials and products in accordance with the expected specifications. In addition there is a waste treatment unit that handles solid, liquid and gas waste that is produced from the production process. From the economic results obtained ROI (Return On Investment) before and after taxes by 34% and 18%, POT (Pay Out Time) before and after tax by 2,4 year and 4,1 year, BEP (Break Event Point) 42% and SDP 25%. Whereas DCF (Discounted Cash Flow) of 15,37%. So from an economic standpoint this factory is worth establishing.

Keywords: Ethylbenzene, Bezene, Ethylen