

INTISARI

Kebutuhan propilen glikol di Indonesia terus meningkat setiap tahunnya, namun sebagian besar kebutuhan tersebut masih dipenuhi melalui impor karena belum adanya industri dalam negeri dengan kapasitas produksi yang memadai. Oleh karena itu, dirancang pabrik propilen glikol dari bahan baku gliserol dengan kapasitas 225.000 ton/tahun yang berlokasi di kawasan industri Cilegon, Banten. Pemilihan gliserol sebagai bahan baku didasarkan pada ketersediaannya yang melimpah sebagai produk samping industri biodiesel di Indonesia, sehingga proses ini dinilai lebih ramah lingkungan dan berkelanjutan dibandingkan proses konvensional yang menggunakan propilen oksida. Proses pembuatan propilen glikol dilakukan melalui reaksi dehidrasi-hidrogenasi gliserol dengan bantuan katalis $\text{Cu/ZnO/Al}_2\text{O}_3$ di dalam trickle bed reactor pada suhu 210°C dan tekanan 40 atm, sehingga diperoleh konversi gliserol sebesar 99% dan produk propilen glikol dengan kemurnian 99%. Berdasarkan analisis kelayakan ekonomi yang telah dilakukan, diperoleh nilai Fixed Capital Investment (FCI) sebesar US\$ 168.341.238,87 dan Total Capital Investment (TCI) sebesar US\$ 959.263.438,13. Nilai Return on Investment (ROI) sebelum dan sesudah pajak masing-masing sebesar 35% dan 39%, dengan Pay Out Time (POT) sebelum dan sesudah pajak selama 1,442 tahun dan 2,597 tahun. Selain itu, diperoleh Internal Rate of Return (IRR) sebesar 6,71%, Break Even Point (BEP) sebesar 32,02%, dan Shut Down Point (SDP) sebesar 11,07%. Berdasarkan hasil perhitungan tersebut, dapat disimpulkan bahwa pabrik propilen glikol dari gliserol ini layak untuk didirikan.

Kata Kunci: propilen glikol, gliserol, dehidrasi-hidrogenasi, trickle bed reactor, kelayakan ekonomi

SUMMARY

The demand for propylene glycol in Indonesia keeps increasing every year, yet most of this demand is still met through imports because domestic industries have not been able to provide sufficient production capacity. Therefore, a propylene glycol plant using glycerol as the raw material was designed with a production capacity of 225,000 tons/year, located in the Cilegon industrial area, Banten. Glycerol was chosen as the raw material because it is widely available as a by-product of the domestic biodiesel industry, making this process more environmentally friendly and sustainable compared to the conventional process based on propylene oxide. Propylene glycol is produced through a dehydration-hydrogenation reaction of glycerol using a Cu/ZnO/Al₂O₃ catalyst in a trickle bed reactor at a temperature of 210°C and a pressure of 40 atm, resulting in a glycerol conversion of 99% and a product purity of 99%. Based on the economic feasibility analysis, the Fixed Capital Investment (FCI) obtained is US\$ 168,341,238.87 and the Total Capital Investment (TCI) is US\$ 959,263,438.13. The Return on Investment (ROI) before and after tax is 35% and 39%, respectively, with a Pay Out Time (POT) before and after tax of 1.442 and 2.597 years. In addition, the Internal Rate of Return (IRR) is 6.71%, the Break Even Point (BEP) is 32.02%, and the Shut Down Point (SDP) is 11.07%. Based on these calculations, it can be concluded that this propylene glycol plant from glycerol is feasible to be established.

Keywords: propylene glycol, glycerol, dehydration-hydrogenation, trickle bed reactor, economic feasibility