

## ABSTRAK

Cumene/ *isopropylbenzene* ( $C_9H_{12}$ ) merupakan bahan baku untuk pembuatan aseton dan fenol. Pabrik cumene memberikan prospek yang sangat baik, mengingat kebutuhan cumene di Indonesia yang semakin meningkat dan belum ada pabrik cumene di Indonesia. Desain awal pabrik cumene dari *propylene* dan *benzene* direncanakan dibangun di Cilegon, Banten di tanah seluas 67.990 m<sup>2</sup> dengan kapasitas produksi 30.000 ton/tahun. Pabrik kimia ini akan dioperasikan selama 330 hari atau 24 jam sehari dengan total 165 karyawan. Bahan baku yang dibutuhkan adalah *propylene* sebanyak 10.665,8981 ton/tahun dan *benzene* sebanyak 20.299,2760 ton/tahun.

Cumene diproduksi dengan menggunakan proses *Q-max* yang dilakukan di dalam reaktor *fixed bed multitubes* berlangsung pada fase gas menggunakan katalis *QZ-2000*. Reaksi bersifat eksotermis dengan kondisi operasi pada suhu 350°C dengan tekanan 25 atm. Produk yang dihasilkan adalah cumen dengan kadar 99,94%. Unit pendukung proses pabrik meliputi unit kebutuhan air, *steam*, udara tekan, tenaga listrik dan bahan bakar. Total air yang digunakan sebanyak 251.038,1720 kg/jam. Kebutuhan *steam* sebesar 40.631,1224 kg/jam. Udara tekan sebesar 37,3824 m<sup>3</sup>/jam, listrik sebesar 200,5688 kWh, dan bahan bakar sebesar 2,9678 m<sup>3</sup>/jam. Sebuah parameter kelayakan pendirian pabrik menggunakan analisa ekonomi dengan Modal Tetap (*Fixed Capital Investment*) sebesar Rp 962.242.585.237,00 dan Modal Kerja (*Working Capital*) sebesar Rp 81.048.730.001,00. Total penjualan sebesar Rp 932.382.000.000,00 dan total *production cost* sebesar Rp 694.793.305.446,78. Didapatkan keuntungan sebelum pajak Rp 237.588.694.553,22 dan keuntungan setelah pajak Rp 213.829.825.097,90.

Dari analisa ekonomi dapat ditunjukkan bahwa *Percent return on investment* (ROI) sebelum pajak 35,8% dan ROI setelah pajak 25,05%. *Pay out time* (POT) sebelum pajak 2,79 tahun sedangkan setelah pajak 3,99 tahun. *Break event point* (BEP) sebesar 45,81%. *Shut down point* (SDP) sebesar 19,48%. Dari hasil analisa ekonomi pabrik cumene dengan proses *Q-max* ini layak untuk didirikan di Indonesia.

**Kata-kata kunci:** cumene, Cilegon, proses *Q-max*, analisa ekonomi

## ABSTRACT

Cumene / isopropylbenzene (C<sub>9</sub>H<sub>12</sub>) is a raw material for the manufacture of acetone and phenols. Cumene factories provide very good prospects, given the increasing needs of cumene in Indonesia and there are no cumene factories in Indonesia. The initial design of a cumene plant from propylene and benzene is planned to be built in Cilegon, Banten on a land area of 67,990 m<sup>2</sup> with a production capacity of 30,000 tons / year. This chemical plant will be operated for 330 days or 24 hours a day with a total of 165 employees. The raw materials needed are propylene as much as 10,665,8981 tons / year and benzene as much as 20,299.2760 tons / year.

Cumene is produced using the Q-max process carried out in a fixed bed multitubes reactor taking place in the gas phase using a QZ-2000 catalyst. The reaction is exothermic under operating conditions at 350°C at a pressure of 25 atm. The product produced is cumen with 99.94% content. The plant's supporting units include water, steam, compressed air, electricity and fuel. The total water used was 251,038,1720 kg / hour. The need for steam is 40,631,1224 kg / hour. Compressed air at 37.3824 m<sup>3</sup> / hour, electricity at 200.5688 kWh, and fuel at 2.9678 m<sup>3</sup> / hour. A parameter for the feasibility of establishing a factory uses economic analysis with Fixed Capital Investment of Rp 962,242,585,237.00 and Working Capital of Rp 81,048,730,001.00. Total sales of Rp 932,382,000,000.00 and total production cost of Rp 694,793,305,446.78. Earned profit before tax Rp 237,588,694,553.22 and profit after tax Rp 213,829,825,097.90.

From the economic analysis it can be shown that the Percent return on investment (ROI) before tax is 35.8% and ROI after tax is 25.05%. Pay out time (POT) before tax is 2.79 years while after tax is 3.99 years. Break event point (BEP) was 45.81%. Shut down point (SDP) of 19.48%. From the results of the economic analysis of the cumene plant with the Q-max process it is feasible to be established in Indonesia.

**Key words:** cumene, Cilegon, Q-max process, economic analysis