



## INTISARI

Asam adipat dibuat dengan mereaksikan sikloheksena dan hidrogen peroksida 30 % dengan bantuan katalis yaitu asam fosfat dan asam tungstat untuk meningkatkan *yield* dan menghambat proses dekomposisi hidrogen peroksida. Reaksi pembentukan asam adipat berlangsung secara isotermis pada suhu 80°C dan tekanan 1 atm dalam reaktor alir tangki berpengaduk berjumlah tiga dengan disusun seri. Konversi total pada reaktor ini adalah 80 % dengan kemurnian produk 98 %.

Pabrik asam adipat ini direncanakan akan didirikan di Cilegon, Jawa Barat pada tahun 2018 dengan luas area sebesar 17.500 m<sup>2</sup> dan membutuhkan pekerja sebanyak 216 orang. Pabrik dirancang dengan kapasitas 100.000 ton/tahun dan beroperasi secara kontinyu selama 330 hari/tahun. Sikloheksena sebanyak 59106,1711 ton/tahun, hidrogen peroksida sebanyak 109895,8093 ton/tahun, asam fosfat sebanyak 1439,8425 ton/tahun dan asam tungstat sebanyak 3672,9879 ton/tahun dibutuhkan untuk menghasilkan asam adipat sebanyak 100.000 ton/tahun. Untuk utilitas dibutuhkan air sebanyak 457653,4000 m<sup>3</sup>/jam.

Modal tetap sebesar \$72,630,885 serta modal kerja sebesar \$ 51,981,474 dibutuhkan untuk mendirikan pabrik asam adipat ini. Keuntungan yang diperoleh sebelum pajak sebesar \$19,238,186/tahun dan keuntungan sesudah pajak sebesar \$9,619,093/tahun. Dari hasil perhitungan diperoleh *Break Even Point* 46,75 %, *Shut Down Point* 20,78 %, *Return on Investment* (ROI) sebelum pajak 26,49 %, *Return on Investment* (ROI) sesudah pajak 13,24 %, *Pay Out Time* ( POT ) sebelum pajak 2,75 tahun, *Pay Out Time* (POT) sesudah pajak 4,32 tahun, dan *Discounted Cash Flow Rate of Return* 12,3 %. Berdasarkan hasil perhitungan evaluasi ekonomi tersebut, maka pabrik asam adipat yang berkapasitas 100.000 ton/tahun cukup menarik untuk didirikan.

Kata kunci : Asam adipat, sikloheksena, H<sub>2</sub>O<sub>2</sub>



## ABSTRACT

*Adipic acid is made by reacting cyclohexene and hydrogen peroxide 30% with the aid of phosphoric acid and tungstic acid as catalyst to increase the yield and inhibit the process of decomposition of hydrogen peroxide. The formation reaction of adipic acid is isothermic, which takes place at a temperature of 80°C and 1 atm pressure in three continuous stirred tank reactor in series. The total conversion of 80% is achieved with a product purity of 98%.*

*The adipic acid manufacturing plant is planned to be built in Cilegon, West Java in 2018 with a total area of 21,000 m<sup>2</sup> and will be requiring as many as 216 workers. The plant is designed with a capacity of 100,000 tons/year and operated continuously for 330 days/year. As much as 59106.1711 tons/year cyclohexene, 109,895.8093 tons/year hydrogen peroxide, 1439.8425 tons/year phosphoric acid, and 3672.9879 tons/year tungstic acid are required to produce adipic acid as much as 99387.9129 tons/year. For utilities, 457,653.4000 m<sup>3</sup>/hour of water is needed in the operation.*

*To build this adipic acid plant, a fixed capital of \$ 72,630,885 and working capital of \$51,981,474 are required. It is estimated that the profits earned before taxes is \$19,238,186/year meanwhile the profit after taxes is \$ 9,619,093/ year. From the calculations, it is found that the Break Even Point is achieved at 46.75 % of normal capacity, Shut Down Point is 20.78 %, Return on Investment (ROI) before taxes is 26.49%, Return on Investment (ROI) after taxes is 13.24%, Pay Out Time (POT) before taxes is 2.75 years, Pay Out Time (POT) after tax is 4.32 years, and Discounted Cash Flow Rate of Return is 12.3%. Based on calculations of the economic evaluation, the adipic acid plant with a capacity of 100,000 tons/year is quite feasible to be built.*

*Keywords: Adipic acid, cyclohexane, H<sub>2</sub>O<sub>2</sub>*