

INTISARI

Prarancangan pabrik polistiren dari monomer stiren dilakukan untuk mengevaluasi kelayakan pendirian pabrik. Pabrik polistiren dirancang dengan kapasitas 90.000 ton/tahun selama 330 hari/tahun dan 24 jam/hari. Jumlah bahan baku yang dibutuhkan untuk menghasilkan polistiren sesuai kapasitasnya adalah 142.558 ton/tahun monomer stiren, 84.511 ton/tahun etilbenzen, dan 252 ton/tahun benzoil peroksida.

Polimerisasi monomer stiren dilakukan dengan metode *solution polymerization* dengan etilbenzen sebagai pelarut dan benzoil peroksida sebagai inisiator. Reaksi polimerisasi terjadi di reaktor alir tangki berpengaduk pada suhu 90⁰C dan tekanan 1 atm. Hasil reaksi kemudian diolah hingga menghasilkan produk *general purpose polystyrene* (GPPS) berbentuk granul.

Lokasi pendirian pabrik bertempat di Cilegon, Banten, dengan luas tanah 2 ha dan mempekerjakan 135 orang karyawan. Kebutuhan energi untuk menjalankan pabrik ini meliputi kebutuhan listrik sebanyak 4.237 kW . Sedangkan kebutuhan air untuk proses adalah sebanyak 11,2 m³/jam.

Proses produksi polistiren membutuhkan modal tetap sebesar \$ 20.475.363 + Rp 121.823.377.890 dan modal kerja sebesar \$ 33.658.587 + Rp 2.901.672.022 Keuntungan yang didapatkan sebelum pajak yaitu sebesar \$ 8.986.647 dan \$ 4.493.323 setelah pajak. Hasil perhitungan evaluasi ekonomi untuk pabrik dengan jenis *low risk*, dapat diketahui nilai ROI sebelum pajak 30,80% dan sesudah pajak 15,40%, PoT sebelum pajak 2,45 tahun dan sesudah pajak 3,94 tahun, BEP 50,83%, SDP 30,08%, dan DCFRR 17,99%. Dapat disimpulkan bahwa pabrik ini menarik secara ekonomi dan layak untuk dikaji lebih lanjut.

Kata kunci : Monomer Stiren, Etilbenzen, Benzoil Peroksida, *Solution Polymerization*

ABSTRACT

The pre-eliminary design of the polystyrene plant from styrene monomer is intended to determine the feasibility study of the plant. This factory is designed to produces polystyrene with a production capacity of 90.000 tons/ year and operates for 330 days / year and 24 hours / day. The process of producing polystyrene uses styrene monomer as much as 142.558 tons / year, 84.511 tons / year ethylbenzene, and 253 tons/year benzoyl peroxide.

Poymerization of styrene monomer is conducted by the solution polymerization method with ethylbenzene as solution and benzoyl peroxide as initiator. All raw materials are processed in a continous stirred tank flow reactor which is run at a pressure of 1 atm and a temperature of 90°C. This reaction will produce general purpose polystyrene (GPPS) granules as the product.

This factory is planned to be located in Cilegon, Banten with an area of 2 ha and trains 135 workers. The electricity needs of the factory amounted to 4.237 kW. For water process requirements, 11,2 m³/ hour are needed.

To establish this factory, it takes a fixed capital of \$ 20,475,363 + Rp 121,823,377,890 and working capital of \$ 33,658,587 + Rp 2,901,672,022. The profits obtained before being taxed amounted to \$ 8,986,647 while the profits obtained after being taxed amounted to \$ 4,493,323. After calculating the economic evaluation, it is known that the Return of Investment (RoI) before tax is 30.80% and after tax is 15,40%, Payout Time (POT) before tax is 2,45 years and after tax is 3,94 years, Breakeven Point (BEP) is 50,83%, Shut Down Point (SDP) is 30,08% and Discounted Cash Flow Rate of Return (DCFRR) is 17,99% per year. Based on the results of the economic evaluation, it can be concluded that this polystyrene plant is interesting and deserves further study.

Keywords: *Polystyrene, Styrene Monomer, Benzoyl Peroxide, Solution Polymerization*