

INTISARI

Asam stearat merupakan senyawa kimia yang masuk kategori asam lemak jenuh (*fatty acid*) dengan rumus kimia $C_{18}H_{36}O_2$. Senyawa ini digunakan sebagai bahan baku kosmetik, farmasi, pelumas, dan makanan. Di tahun 2032, konsumsi asam stearat di Indonesia diprediksi mencapai 356.291 ton dan produksi mencapai 311.139 ton. Mempertimbangkan hal tersebut, ada peluang untuk memenuhi sebagian kebutuhan impor dengan mendirikan pabrik asam stearat dari minyak kelapa sawit dengan kapasitas 30.000 ton/tahun. Pabrik ini akan didirikan di Dumai, Riau karena kaya akan sumber bahan baku minyak kelapa sawit serta geografisnya yang terletak di pinggir laut.

Pabrik ini terdiri dari dua proses utama, yaitu hidrolisis minyak kelapa sawit dan hidrogenasi asam lemak. Pada reaksi hidrolisis, minyak kelapa sawit akan direaksikan dengan *steam* pada suhu 250°C dan tekanan 45 atm. Sedangkan pada reaksi hidrogenasi, asam lemak tak jenuh yaitu linoleat dan oleat akan dihidrogenasi pada suhu 232°C dan tekanan 25 atm. Nantinya, produk utama asam stearat cair dan produk samping asam palmitat cair akan diubah menjadi *flake* dan dikemas dalam karung. Sedangkan produk samping gliserol akan dijual ke industri lain dalam fasa cair.

Untuk menghasilkan asam stearat 96% sebanyak 30.000 ton/tahun, asam palmitat 91% 26.960,0236 ton/tahun, dan gliserol 87% 7.378,3013 ton/tahun, diperlukan bahan baku berupa minyak kelapa sawit sebanyak 55.601,8900 ton/tahun, hidrogen 268,7153 ton/tahun, dan katalis *raney nickel* sebanyak 2.302,4245 ton/tahun. Untuk kebutuhan utilitas, diperlukan air sebanyak 344.602,4731 kg/jam, *steam* 23.440,0663 kg/jam, dan listrik 396,4364 kW. Total karyawan yang diperlukan sebanyak 206 orang dengan luas total area pabrik 21.496,17 m². Selain itu, juga diperlukan *fixed capital* sebesar \$16.451.509,65 + Rp63.097.632.986,55 dan *working capital* sebesar \$25.036.371,62 + Rp6.764.250,53. Dari hasil perhitungan analisis kelayakan, diperoleh BEP 54,96%, POT sebelum pajak 2,03 tahun, ROI sebelum pajak sebesar 43,20%, DCFRR 22,90%, dan SDP 31,91%. Berdasarkan hasil perhitungan tersebut, pabrik asam stearat dari minyak kelapa sawit dengan kapasitas 30.000 ton/tahun ini menarik untuk dikaji lebih lanjut.

ABSTRACT

Stearic acid is a chemical component that is classified as a saturated fatty acid with the chemical formula $C_{18}H_{36}O_2$. This compound is used as raw material for cosmetics, pharmaceuticals, lubricants, and food. In 2032, stearic acid consumption in Indonesia is predicted to reach 356,291 tons and production to reach 311,139 tons. Considering this, there is an opportunity to meet some of the import needs by establishing a stearic acid plant from palm oil with a capacity of 30,000 tons/year. The plant will be established in Dumai, Riau due to its rich source of palm oil raw materials as well as its geographical location on the seafront.

The plant consists of two main processes, namely palm oil hydrolysis and fatty acid hydrogenation. In the hydrolysis reaction, palm oil will be reacted with steam at 250°C and 45 atm pressure. While in the hydrogenation reaction, unsaturated fatty acids namely linoleic and oleic will be hydrogenated at a temperature of 232°C and a pressure of 25 atm. Later, the main product liquid stearic acid and the by-product liquid palmitic acid will be converted into flakes and packed in sacks. Meanwhile, the by-product glycerol will be sold to other industries in liquid phase.

To produce stearic acid 96% as much as 30.000 tons/year, palmitic acid 91% 26.960,0236 tons/year, and glycerol 87% 7.378,3013 tons/year, raw materials are required amount of 55.601,8900 tons/year of palm oil, hydrogen 268,7153 tons/year, and raney nickel catalyst 2.302,4245 tons/year. For utility needs, 344.602,4731 kg/hour of water, steam 23.440,0663 kg/hour, and 396,4364 kW of electricity are required. The total number of employees required is 206 people with a total plant area of 21.496,17 m². In addition, fixed capital of \$16.451.509,65 + Rp63.097.632.986,55 and working capital of \$25.036.371,62 + Rp6.764.250,53 are also required. From the results of the feasibility analysis calculation, BEP 54,96%, POT before tax 2,03 years, ROI before tax of 43,20%, DCFRR 22,90%, and SDP 31,91% were obtained. Based on the results of these calculations, the stearic acid plant from palm oil with a capacity of 30.000 tons/year is feasible for further study.