

## INTISARI

*Pentachlorophenol* dapat digunakan untuk fungisida, herbisida, insektisida dan pestisida (Alfred dkk., 1954). Namun akhir-akhir ini *pentachlorophenol* sudah dilarang untuk penggunaan tersebut karena termasuk dalam golongan B3 (bahan beracun dan berbahaya) serta bersifat karsinogenik, sehingga penggunaan produk ini kini makin dibatasi hanya untuk industri non makanan seperti pengawetan kayu, penyamakan kulit dan konstruksi/bangunan.

Pembuatan *pentachlorophenol* dari *hexachlorobenzene* dan NaOH berlangsung dalam beberapa tahap. Mula-mula padatan NaOH dilarutkan dengan pelarut metanol, kemudian larutan NaOH diumpankan bersama-sama dengan padatan *hexachlorobenzene* ke dalam reaktor alir tangki berpengaduk yang disusun seri sebanyak tiga buah. Sebagian pelarut metanol di-*recycle*, sedangkan produk utama *pentachlorophenol* bersama dengan *impurities* lainnya diencerkan dan diumpankan ke dalam *netralizer* bersama-sama dengan larutan HCl 33% untuk menetralkan sisa NaOH dan membuat suasana campuran menjadi asam, sehingga *pentachlorophenol* berubah fasa dari cair menjadi padat, sedangkan senyawa lainnya tetap berada dalam fasa cair. Padatan *pentachlorophenol* dimurnikan menggunakan *centrifuge*, kemudian dikeringkan di dalam *rotary dryer*.

Pabrik ini dirancang dengan kapasitas 20.000 ton/tahun. Produk *pentachlorophenol* dengan kemurnian 98,70% diproduksi dari *hexachlorobenzene* sebanyak 23.868,02 ton/tahun dan NaOH sebanyak 8.381,38 ton/tahun. Kebutuhan utilitas meliputi air sebanyak 329.578,79 ton/tahun; *steam* sebanyak 21.679,43 ton/tahun; dan listrik dengan daya 387,94 kVA. Pabrik ini direncanakan untuk didirikan di Kota Bontang, Propinsi Kalimantan Timur dengan luas tanah 6,25 Ha. Total karyawan yang dibutuhkan ialah sebanyak 180 orang.

Dari perhitungan hasil evaluasi ekonomi diperoleh parameter sebagai berikut: *Fixed Capital Investment (FCI)* sebesar US\$ 18.016.641,02 + Rp 134.529.983.120,76; *Working Capital (WC)* sebesar US\$ 14.475.853,17 + Rp 13.111.568.672,76; Keuntungan sebelum pajak Rp 224.981.238.519,45; Keuntungan setelah pajak Rp 112.490.619.259,72; *Return On Investment before taxes* = 59,56%; *Return On Investment after taxes* = 29,78%; *Pay Out Time before taxes* = 1,44 tahun; *Pay Out Time after taxes* = 2,51 tahun; *Break Even Point (BEP)* = 56,15%; *Shut Down Point (SDP)* = 39,98%, *Discounted Cash Flow Rate of Return (DCFRR)* = 31,63% .

Berdasarkan data-data diatas, pabrik *pentachlorophenol* dari *hexachlorobenzene* dan NaOH dengan kapasitas 20.000 ton/tahun menarik untuk dikaji lebih lanjut.

Kata Kunci : *Pentachlorophenol*, *Hexachlorobenzene*, NaOH

## ABSTRACT

*Pentachlorophenol is an ingredient that can be used as the manufacture of fungicides, herbicides, and pesticides. But lately, Pentachlorophenol has been banned for such use because it is included in the class of toxic and dangerous component as well as carcinogenic, so the use of these products are now decreasingly limited to non-food industries such as wood preservation industries, leather tanning, and building construction.*

*Pentachlorophenol production from hexachlorobenzene and NaOH takes places in several stages. Initially, NaOH solids are dissolved in methanol, then solutions of NaOH is fed together with the solid hexachlorobenzene into the stirred tank reactors in three series pieces. Most of methanol then be recycled, while the main product pentachlorophenol along with other impurities diluted and fed into netralizer together with HCl 33% solution to neutralize residual NaOH and create the atmosphere of the mixture becomes acidic, so pentachlorophenol changes phase from liquid to solid, while other compounds remain in the liquid phase. Pentachlorophenol solids purified using a centrifuge, then dried in a rotary dryer.*

*The plant is designed with a capacity of 20,000 tons/year. Products of pentachlorophenol with a purity of 98.70% is produced from hexachlorobenzene as much as 23,868.02 tons/year and NaOH as much as 8,381.38 tons/year. Utilities includes water as much as 329.578,79 tons/year; steam as much as 21,679.43 tons/year; and 387.94 kVA electrical power. The plant is planned to be established in the City of Bontang, East Kalimantan Province, with an area of 6,25 hectares. Total employees are needed as much as 180 people.*

*The calculation results the economic evaluation parameters obtained as follows: Fixed Capital Investment (FCI) of US\$ 18,016,641.02 + Rp 134,529,983,120.76; Working Capital (WC) of US\$ 14,475,853.17 + Rp 13,111,568,672.76; Profit before tax of Rp 224,981,238,519.45; Profit after tax of Rp 112,490,619,259.72; Return On Investment before taxes = 59.56%; Return On Investment after taxes = 29.78 %; Pay Out Time before taxes = 1.44 years; Pay Out Time after taxes = 2.51 years; Break Even Point (BEP) = 56.15%; Shut Down Point (SDP) = 39.98%, Discounted Cash Flow Rate of Return (DCFRR) = 31.63% .*

*Based on the data above, plant of pentachlorophenol from hexachlorobenzene and NaOH with a capacity of 20,000 tons/year is interesting for further studies.*

**Keywords:** *Pentachlorophenol, Hexachlorobenzene, NaOH*