

## ABSTRAK

### PRARANCANGAN PABRIK NATRIUM HIDROKSIDA DARI NATRIUM KARBONAT DAN KALSIUM HIDROKSIDA DENGAN KAPASITAS 45.000 TON/TAHUN (Perancangan Reaktor (RE-201))

Oleh :  
Ela Fadila

Pabrik natrium hidroksida berbahan baku natrium karbonat dan kalsium hidroksida ini direncanakan akan didirikan di Gresik, Jawa Timur, dengan pertimbangan ketersediaan bahan baku, kelengkapan unit penunjang proses, sarana transportasi yang memadai, ketersediaan tenaga kerja, serta kondisi lingkungan yang strategis untuk kegiatan industri. Pabrik ini dirancang untuk memproduksi natrium hidroksida sebesar 45.000 ton/tahun dengan sistem kontinyu selama 24 jam/hari dan 330 hari/tahun. Bahan baku yang digunakan terdiri dari natrium karbonat sebanyak 68.694.285,4 kg/tahun dan kalsium hidroksida sebanyak 48.021.584,16 kg/tahun. Proses produksi natrium hidroksida dilakukan secara kontinyu, sehingga aliran bahan baku maupun produk dinyatakan dalam basis laju alit massa per satuan waktu. Untuk mendukung kelangsungan operasi, utilitas yang disediakan meliputi unit pengadaan air, unit penyediaan steam, unit penyedia udara tekan, unit penyediaan listrik, serta unit pengolahan limbah. Bentuk perusahaan adalah Perseroan Terbatas (PT) menggunakan struktur organisasi perusahaan line and staff dengan jumlah karyawan sebanyak 210 orang. Dari analisis ekonomi diperoleh:

Fixed Capital Investment	(FCI) = Rp. 1.097.912.917.902,56
Working Capital Investment	(WCI) = Rp. 121.990.324.211,40
Total Capital Investment	(TCI) = 1.219.903.242.113,95
Break Even Point	(BEP) = 40%
Shut Down Point	(SDP) = 30%
Pay Out Time	(POT) <sup>a</sup> = 1,76 tahun
Return on Investment before taxes	(ROI) <sup>b</sup> = 53%
Return on Investment after taxes	(RO) <sup>a</sup> = 42%
Discounted Cash Flow	(DCF) = 51%

Mempertimbangkan paparan di atas, sudah selayaknya pendirian pabrik natrium hidroksida dikaji lebih lanjut, karena memiliki keuntungan yang tinggi dimasa mendatang.

Kata kunci : Natrium Hidroksida, Natrium Karbonat, Kalsium Hidroksida.

## **ABSTRAK**

### **PRELIMINARY DESIGN OF A SODIUM HYDROXIDE PLANT FROM SODIUM CARBONATE AND CALCIUM HYDROXIDE WITH A CAPACITY OF 45,000 TONS/YEAR**

**(Reactor Design (RE-201))**

**Ela Fadila**

This sodium hydroxide plant, utilizing sodium carbonate and calcium hydroxide as raw materials, is planned to be established in Gresik, East Java. The location was selected based on the availability of raw materials, the completeness of supporting process facilities, adequate transportation infrastructure, workforce availability, and environmental conditions favorable for industrial activities. The plant is designed to produce 45,000 tons of sodium hydroxide per year through a continuous process operating 24 hours per day and 330 days per year. The raw materials required consist of 68,694,285.4 kg/year of sodium carbonate and 48,021,584.16 kg/year of calcium hydroxide. Sodium hydroxide production is carried out continuously; therefore, both raw material and product streams are expressed on a mass flow rate basis per unit time. To support continuous operation, utility facilities include water supply units, steam generation units, compressed air supply units, power generation units, and wastewater treatment units. The company is established as a Limited Liability Company (Perseroan Terbatas/PT) and adopts a line-and-staff organizational structure with a total workforce of 210 employees.

The economic analysis yields the following results:

Fixed Capital Investment (FCI) = Rp 1,097,912,917,902.56

Working Capital Investment (WCI) = Rp 121,990,324,211.40

Total Capital Investment (TCI) = Rp 1,219,903,242,113.95

Break Even Point (BEP) = 40%

Shut Down Point (SDP) = 30%

Pay Out Time (POT) = 1.76 years

Return on Investment before Taxes (ROI) = 53%

Return on Investment after Taxes (ROI) = 42%

Discounted Cash Flow (DCF) = 51%

Based on the results above, the establishment of a sodium hydroxide plant deserves further consideration, as it offers promising economic benefits and profitability in the future.

Keywords: Sodium Hydroxide, Sodium Carbonate, Calcium Hydroxide.