
INTISARI

Reaksi pembentukan *Vinyl Chloride Monomer* dari batubara berlangsung di *plasma reaktor* untuk memproduksi asetilen (C_2H_2) dan *fluidized bed* reaktor untuk memproduksi VCM dari asetilen dan HCl. Reaksi pertama terjadi di fase padat dengan suhu operasi $1727^{\circ}C$ dan tekanan 2 atm sedangkan reaksi kedua terjadi di fase gas dengan suhu operasi $170^{\circ}C$ dan tekanan 4 atm. Dikarenakan kedua reaksi ini merupakan reaksi eksotermis, maka pada masing-masing reaktor dipasang sistem pendingin menggunakan air sebagai pendingin.

Kapasitas pabrik ditetapkan sebesar 120,000 ton per tahun. Energi yang dibutuhkan sebesar 310.784.704,1 kJ per jam, yang terdiri dari kebutuhan pemanas, steam dan operasional pabrik. Kemudian, kebutuhan air mencapai 116.407,37 kg per jam untuk utilitas pabrik, air pendingin dan keperluan lainnya. Sehingga untuk memproduksi satu ton VCM dibutuhkan energi sebesar 20.511.790 kJ dan air sebesar 7.682,89 kg.

Pabrik Vinyl Chloride Monomer ini akan didirikan di Bontang, Provinsi Kalimantan Timur dengan karyawan sejumlah 112 orang. Pabrik ini memproduksi VCM dengan kemurnian 99,9 persen massa.

Investasi modal tetap pabrik ini adalah sebesar \$ 70.371.780,08 + Rp 104.047.829.876,37 dan modal kerja sebesar \$ 26.836.023,95 dengan nilai POT *before tax* 1,83 tahun sebesar dan POT *after tax* sebesar 2,3 tahun. *Return on investment* (ROI) *before tax* sebesar 45 % dan ROI *after tax* sebesar 33,4 %. Nilai *break even point* (BEP) sebesar 32,24 % dan nilai *shut down point* sebesar (SDP) sebesar 14,6 %. *Discounted cash flow of return* (DCFRR) sebesar 33,12 % Dengan peninjauan secara ekonomi dan kebutuhan akan VCM di Indonesia, maka pabrik VCM ini cukup menarik untuk dikaji lebih lanjut dan didirikan di Indonesia.

Kata kunci: Batubara, *Vinyl Chloride Monomer*, *Thermal Plasma Reactor*.

ABSTRACT

The formation of Vinyl Chloride Monomer from coal is conducted in a plasma reactor for acetylene (C_2H_2) production and fluidized bed reactor for VCM production from acetylene and HCl. The first reaction is occurred in the solid phase with the operating temperature of $1.727^\circ C$ and a pressure of 2 atm, while the second reaction is occurred in the gas phase with an operating temperature of $170^\circ C$ and a pressure of 4 atm. Both of reactions are exothermic reaction, hence each reactors need an installed cooling systems using water as a coolant.

The VCM plant is designed to produced 120.000 tonnes VCM per year. The energy is required as many as 310.784.704,1 kJ per hour, consist of equipment heating, steam and plant operations. As well as, the need for water reaches 116,407.37 kg per hour for utility plant, cooling water and other needs. Hence, production of one ton VCM requires 20.511.790 kJ of energy and water is amounted to 7682.89 kg.

The VCM plant will be erected at Bontang, province of East Borneo with and number of employee required are 112 persons. The plant produces VCM with a purity of 99.9 percent of the mass.

The fixed capital investment of plant is \$ 70.371.780,08 + Rp 104.047.829.876,37, meanwhile the working capital is \$ 26.836.023,95. Based on profitability analysis, this VCM plant is considered attractive in term of economical profit with the value of POT before tax as many as 1.83 years and POT after tax as many as 2.3 years. Meanwhile, the value of return on investment (ROI) before tax is 45% and the ROI after tax is 33.4 %. The value of break even point (BEP) is calculated as many as 35.51%, the value of the shut down point (SDP) of 15.6%, and discounted cash flow of return (DCFRR) of 32.12 %. Based on economical reviews and the need for the establishment of VCM plant in Indonesia, the plant is quite appealing for further study.

Keywords: Coal, Vinyl Chloride Monomer, Thermal Plasma Reactor.