ABSTRAK

Desain awal perancangan pabrik cinnamaldehid dari acetaldehid dan benzaldehid kapasitas 30.000 ton /tahun direncanakan akan dibangun di Batam Kep. Riau, dengan luas area 25.405m². Pabrik ini akan beroperasi selama 330 hari dalam setahun atau 24 jam sehari dengan jumlah pekerja 150 orang.

Bahan baku Cinnamaldehid yang dibutuhkan adalah 1254.1631 kg/jam, dan Benzaldehid yang dibutuhkan 5218.8436 kg/jam. Proses produksi cinnamaldehid dilakukan dengan mereaksikan cinnamaldehid dan benzaldehid di reaktor tangki alir berpengaduk selama 1 jam pada kondisi operasi 74°C dan tekanan 1 atm. reaksi yang terjadi di dalam reaktor tangki alir berpengaduk (RATB) mereaksikan acetaldehid dengan kemurnian berat 99%. Dan benzaldehid dengan kemurnian berat 99%. Sehingga menghasilkan produk akhir berupa cinnamaldehid 99%. Kemudian, unit utilitas menyediakan kebutuhan air 20096,4242 kg/jam, *steam* 6093,8250 kg/jam, udara tekan 500 kg/jam, listrik 486,4015 kW, dan bahan bakar 711,0723 kg/jam. Pemenuhan kebutuhan listrik disuplai oleh PLN dan generator sebagai cadangan.

Analisa ekonomi dari pabrik menunjukkan jumlah *fixed capital investment* sebesar Rp. 1.051.293.049.213,80; *working capital investment* sebesar Rp 182.353.502.937; *manufacturing cost* sebesar Rp 1.184.135.494.455; *general expenses* sebesar Rp 398.484.981.004. Keuntungan sebelum pajak sebesar Rp 177.942.955.541 dan keuntungan setelah pajak sebesar Rp 124.560.068.879. *Return on investment* sebelum pajak sebesar 65,04 %. dan setelah pajak sebesar 45,53 %. *Pay out time* sebelum pajak adalah 1,33 tahun dan setelah pajak adalah 1,8 tahun. Nilai *break event point* adalah 56,42 %, *shut down point* adalah 31,81%, dan *discounted flowrate of return* adalah 18,85 %. Berdasarkan evaluasi ekonomi dapat dinyatakan bahwa pabrik bioetanol dari ampas tebu kapasitas 50.000 KL/tahun ini layak untuk didirikan.

Kata-kata kunci: Cinnamaldehid, Acetaldehid, Benzaldehid, Reaktor RATB

ABSTRACT

Preliminary design of cinnamaldehide plant made of raw materials acetaldehyde and benzaldehide with capacity 30.000 ton/years had been planned to be built in Batam,Riau Island, in the area of land 25.405m². *This chemical plant would be operated for 330 days/year or 24 hours a day with 150 employees.*

Raw material needed was acetaldehide 1254.1631 kg/hour, and benzaldehyde5218.8436 kg/hour . The cinnamaldehid production process was carried out by reacting cinnamaldehyde and benzaldehyde in a stirred flow tank reactor for 1 hour at 74 ° C operating conditions and 1 atm pressure. The reaction that occurs in a stirred flow tank reactor (RATB) reacts with acetaldehyde with a purity of 99% and benzaldehyde with 99% heavy purity. So that the final product is 99% cinnamaldehyde and then, the utility of consist 20096,4242 kg/hours of water, 6093,8250 kg/hours of steam, 500 of compressed air, 486,4015 KWh the power of electrical, and 711,0723 of fuel oil. The electrical requirements was supplied by PLN and also use generator set as reserve.

Economic analysis shows that fixed capital investment for Rp 1.051.293.049.213,80; working capital investment for Rp 182.353.502.937; manufacturing cost for Rp 1.184.135.494.455; general expenses for Rp 398.484.981.004. The profit before tax is Rp 177.942.955.541 and the profit after tax is Rp 124.560.068.879. Return on investment before 65,04 % and it's after tax is 45,53 %. Pay out time before tax is 1,33 years and it's after tax is 1,8 years. The value of break event point is 56,42 %, shut down point is 31,81%, and discounted flowrate of return is 18,85 %. Based on the economic evaluation, it can be concluded that plant design of cinnamaldehide from acetaldehyde and benzaldehide with capacity 30.000 ton/years visible to be built.

Keywords: Cinnamaldehide, Benzaldehide, Acetaldehide, Stirred flow tank reactor (RATB)