Abstrak

Benzonitrile dibuat dengan mereaksikan gas Amoniak dan Toluene di dalam *bed* katalis Vanadium-Titanium-Oxide pada suhu 310-350°C dan tekanan 3 atm. Panas reaksi yang timbul dibawa dengan gas inert Nitrogen sehingga reaktor tidak perlu pendingin. Gas yang keluar dari reaktor kemudian didinginkan hingga hidrokarbon sisa hasil benzonitrile dan air terembunkan sehingga terpisah dengan *non condensable gas.* Cairan yang terjadi dipisah antara fasa air dan hidrokarbon. Fasa hidrokarbon kemudian didistilasi untuk didapatkan benzonitrile, sedangkan fasa air yang mengandung amoniak 'distrip' dengan stripper bersama cairan yang berasal dari absorber yang berfungsi menyerap gas amoniak sisa yang terikut di *non condensable gas*. Kapasitas Pabrik 50.000 Ton/tahun. Bahan baku yang diperlukan meliputi 1057 kg/jam ammonia dan 6508 kg/jam toluene. Utilitas yang dibutuhkan meliputi air 85 m^3/jam, bahan bakar 420 kg/jam, dan listrik 1455 kW.

Pabrik akan didirikan didaerah Cilegon, Banten di atas tanah seluas $\pm$ 3 ha, termasuk perumahan dan perluasan. Hasil evaluasi ekonomi menunjukkan :

1. *Fixed Capital* : Rp 347,000,000,000
2. *Working Capital* : Rp 644,000,000,000
3. *Percent return of Investment (ROI) before tax* : 54,39 %
4. *Percent return of Investment (ROI) after tax* : 27,20 %
5. *Pay Out Time (POT) before Tax* : 1,6 tahun
6. *Pay Out Time (POT) after Tax* : 2,8 tahun
7. *Break Event Point (BEP)* : 40,30 %
8. *Shut Down Point (SDP)* : 29,32 %
9. *Discounted cash Flow (DCF)* : 13,34 %

Ditinjau dari segi ekonomi, pabrik benzonitrile dari toluene dan amoniak dengan kapasitas 50.000 ton/tahun ini cukup menarik bila didirikan di Indonesia.

Abstrack

Preliminary plant design of Benzonitrile with capacity 50.000 tons/year is planned to be built in Cilegon, the province of Banten, in the area of land of 20,000 m^2. This chemical plant will be operated for 330 days or 24 hours a day with total 150 employees.

Benzonitrile made by reacting Ammonia and Toluene gas in Vanadium-Titanium-Oxide catalyst bed at temperature 310-340 °C and pressure of 3 atm. Heat reaction brought by Nitrogen inert gas so that reactor didn't need cooler. Secretory gas from reactor, then cooled till hydrocarbon, benzonitrile and water condensed so that apart with the non condensable gas. Formed dilution separated between water and hydrocarbon. Hydrocarbon phase which contain benzonitrile then distillated to get benzonitrile, while water phase which contain ammonia separated by stripper with dilution come from absorber which function as permeate ammonia gas followed in non condensable gas. Raw materials needed are Toluene 6508 kg/hour and Ammonia 1057 kg/hour. The utility needed are 85 m^3/hour of water, 420 kg/hour of fuel and the power of electricity 1455 kW.

1. *Fixed Capital* : Rp 347,000,000,000
2. *Working Capital* : Rp 644,000,000,000
3. *Percent return of Investment (ROI) before tax* : 54,39 %
4. *Percent return of Investment (ROI) after tax* : 27,20 %
5. *Pay Out Time (POT) before Tax* : 1,6 years
6. *Pay Out Time (POT) after Tax* : 2,8 years
7. *Break Event Point (BEP)* : 40,30 %
8. *Shut Down Point (SDP)* : 29,32 %
9. *Discounted cash Flow (DCF)* : 13,34 %

Based on the above factors, it can concluded that preliminary plant design of Benzonitrile with capacity 50.000 tons/year visible to be built.