BIOETHANOL PLANT FROM CORN STALK
by FERMENTATION PROCESS

Name  : 1. Nurcholis   (2307 030 019)  
       : 2. Kartika Wardhani  (2307 030 088)  
Department : DIII Teknik Kimia FTI-ITS  
Supervisor  : Prof.Dr.Ir.Danawati Hari Prajitno,M.Pd

ABSTRACT

Bioethanol plant from corn stalk by fermentation process are formed to produce alternative fuel and to reduce of crisis energy.

Bioethanol plant from corn stalk by fermentation process have three steps, the first is pre treatment process, fermentation and distillation. The pre treatment process have two treatment. First, hydrolysis process to convert hemi-cellulose to xylose with addition catalyst of $\text{H}_2\text{SO}_4$ 4.4% at reactor 1$^{st}$ hydrolisa. And second, hydrolysis process to convert cellulose to glucose with addition catalyst of $\text{H}_2\text{SO}_4$ 8%. at 2$^{nd}$ hidrolisa reactor. Fermentation process to convert glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) to bioethanol ($\text{C}_2\text{H}_5\text{OH}$) by saccharomyces cereviceae and addition nutrition $\text{H}_3\text{PO}_4$ and $(\text{NH}_4)_2\text{SO}_4$ as nutrition for the requirement of yeast. At this fermentor, have been formed bioethanol 37%, and then purified again at 1$^{st}$ distillation and 2$^{nd}$ distillation become the bioethanol 99.6 %.

Bioethanol plant from corn stalk by fermentation process is location planning at Tuban, East Java. This plant is operate semi continue during 300 days per year by 24 hours operate and capacities production 17.213.593 liter bioethanol / year. Raw material is used corn stalk 224.624,02 kg/day with the cellulose composition 45%, hemiselulosa 35%, lignin 15%, ash 5%, and also indirect material $\text{H}_2\text{SO}_4$ 1.162.049 kg/day is used at hydrolysis process, $\text{H}_3\text{PO}_4$ 19.708 kg/day and $(\text{NH}_4)_2\text{SO}_4$ 19.708 kg/day as nutrition for the yeast, saccharomyces cereviceae
19.708 kg/day, and antifoam 5.632 kg/day. For the requirement of utility is needed sanitation water is 84 m$^3$/day, cooling water is 90,972,160 m$^3$/day, boiler water is 2,906,880 m$^3$/day, process water is 231,944 m$^3$/day, make up water is 9,678,592 m$^3$/day, and recycle water is 84,200,448 m$^3$/day.

**Keyword**: Bioethanol, corn stalk, fermentation.