

Application of Bioethanol Dehydration Column Using Hydrophilic Adsorption Method By Natural Zeolite

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ABSTRACT

The world's primary energy demand is expected to rise quite high along with population growth and world economic growth. Bioethanol is a renewable alternative energy of ethanol compounds fermented using the yeast. The obstacle faced in the production of FGE (Fuel Grade Ethanol) is the purification of bioethanol. Ethanol at 95.5% will form azeotropic mixture with water so it is difficult to separate with simple distillation. One way to separate the azeotropic mixture is by the adsorption method applied to the dehydration column made of stainless steel. This study aims to compare the performance of dehydration columns with different treatment on zeolite as adsorbent, i.e. by activation and without activation. The zeolite activation process is done by adding alumina ions from alum ($Al_2(SO_4)_3$) which serves to make the zeolite became hydrophilic with a decrease of Si / Al ratio by 2.54%. Based on the result of research that has been done on non activation zeolite, bioethanol concentration is 97.3%, bioethanol concentration increase as much as 2.87%, zeolite capacity 15.72%, adsorption rate is 0.1061 ml/s, and bioethanol rendemen 84.65%. While the activated zeolite application in bioethanol dehydration process showed that the bioethanol content obtained was 99.34%, the rise of bioethanol content was 4.52%, the water zeolite capacity was 22.12%, the adsorption rate was 0.1144 ml/s and the bioethanol rendement amounted to 86.05%. The use of the dehydration column of the adsorption method with the activated zeolite resulting high rendement with the bioethanol content already beyond the azeotropic point.

Keywords: Adsorption, azeotrop, bioethanol, dehydration, hydrophilic.