UTILIZATION OF GLYCEROL TO ALCOHOLS BY HYDROGENATION OVER A SOLID CATALYST

Name / NRP : Alfian Rizki Maulana / 2308 100 019
M. Wisnu Muq’asfa / 2308 100 038
Department : Chemical Engineering - FTI - ITS
Advisor : Ir. Ignatius Gunardi, M.T.

ABSTRACT

Increasing the production of biodiesel from transesterification reaction of vegetable oil cause increasing the production of crude glycerol as by-product. One way can be developed to utilize glycerol is by converting to propylene glycol (1,2-propanediol), which is one type of fixative products through hydrogenation process over heterogeneous catalyst. This study used solid catalyst Ni/γ-Al₂O₃ to produce propylene glycol in determining the effect of catalyst, Ni loading, temperature, and reaction time to the amount of glycerol conversion and yield of propylene glycol produced. The study consisted of two phases of process, they are catalyst preparation and propylene glycol production. Catalyst preparation performed by impregnation, calcination, and reduction processes to obtain the solid catalyst of Ni/γ-Al₂O₃ based on variable of Ni loading used. After that, done the production process of propylene glycol in a stirred batch reactor corresponding to the amount of catalyst, Ni loading, temperature, and reaction time variables. The product produced then separated from Ni/γ-Al₂O₃ catalyst, then analyzed using gas chromatography (GC) to determine the amount of...
residual glycerol and propylene glycol generated. Based on the results of research could be concluded that the solid catalyst of Ni/γ-Al₂O₃ can be used for hydrogenation reaction of glycerol to propylene glycol. Greater amount of catalyst used increasing conversion of glycerol, which the best composition of Ni loading catalyst achieved in 15% Ni. Higher temperature and longer reaction time can increase yield of propylene glycol produced. The best operating conditions for hydrogenation reaction of glycerol to propylene glycol using solid catalyst of Ni/γ-Al₂O₃ reached at 200 Psi hydrogen pressure, 250°C, 10 hours, 5% content of Ni/γ-Al₂O₃ catalyst at 15% Ni loading to obtain conversion and yield of 100% and 71,1164% alternately.

Keywords: Biodiesel, Glycerol, Hydrogenation, Ni/γ-Al₂O₃ Solid Catalyst, Propylene Glycol