Hydrogen Production from Aqueous-Phase Reforming of Glycerol over Ni/γ-Al_2O_3 Catalyst

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Biomass-derived fuel has become more attractive because of environmental benefit and replacement of fossil fuel. However, increasing of biomass-derived fuel was resulted in over production of glycerol as by-products during biomass-derived fuel production. The conversion of glycerol to other valuable chemicals or energy resource has been considered as an attractive chemical process. Aqueous-phase reforming(APR) is one of the process which converts glycerol to hydrogen. This process was so occurred at low temperature less than 573K that steam and oxygenated hydrocarbons were not needed and production of CO was reduced. In this work, APR of glycerol over Ni/γ-Al_2O_3 was investigated in a fixed-bed reactor system varied with reaction temperature, pressure, Ni contents on support and Liquid Hourly Space Velocity(LHSV). Catalysts before and after the APR of glycerol were characterized by XRD, SEM, EDS, TPR and H2 pulse chemisorption. The conversion of glycerol was 40~70 % at 8 h on-stream and H_2 and CO_2 were the most composition of the gas product and a small amount of alcohols, 1,2-propanediol and ethylene glycol were formed.