Suchawadee Ratthanaberee 2009: Hydrogen Production from Pyrolysis Oil of Soybean by Catalytic Steam Reforming Using Co-Ni over Cerium Oxide Nanoparticles Prepared by Spray Pyrolysis. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Associate Professor Apinya Duangchan, Ph.D. 96 pages.

Catalytic steam reforming for hydrogen production was studied using bio-oil from pyrolysis of soybean cake as a raw material. The pyrolysis experiment was carried out in nitrogen atmosphere at 400℃. The yields of pyrolysis products were 23.6, 48.0 and 28.4% of solid , liquid (bio-oil), and gas, respectively. Bio-oil separated into 2 phases, organic phase and aqueous phase. The aqueous phase was used to produce H_2. The elemental analysis by gas chromatograph and mass spectrometer (GC-MS) showed average composition of $CH_{1.79}O_{0.51}N_{0.06}$ on dry basis. The Co-Ni/CeO_2 catalyst was prepared by impregnation method with mole ratio of Co-Ni:Ce equals 1:1 and mole ratios of Co:Ni equal 1:1, 2:1 and 1:2. The nanoparticles of CeO_2 catalysts were produced by spray pyrolysis at 650℃, using 0.05 M $Co(NO_3)_2$ $6H_2O$ solution. Nanoparticles of CeO_2 characterized by transmission electron microscope (TEM) was 6.8 ±2.9 nm. The reaction was performed in a fixed bed reactor at temperatures of 600, 650 and 700℃. Mole ratio of steam to carbon (s/c) was 20 and 0.15 g of catalyst powder was used. Gas product was analyzed by gas chromatograph (GC). As a result, the best temperature for hydrogen production was 650℃. The highest yield of hydrogen was 4.79 when using Co-Ni/CeO_2 at mole ratio Co:Ni equals 1:1.

_____ _____ __ / __ / __

Student's signature Thesis Advisor's signature