Sreepair Whungklomklang 2009: Biohydrogen Production by Catalytic Steam Reforming of Bio-oil Derived from Jatropha Stem Using Ni-Cu Supported on Nanosized-CeO_2. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Associate Professor Apinya Duangchan, Ph.D. 112 pages.

The study of production of biohydrogen via catalytic steam reforming of bio-oil from pyrolysis of Jatropha stem at 400°C was studied by using Ni-Cu supported on nanosized-CeO_2. The catalytic steam reforming reaction was carried out in a fixed bed reactor which N_2 was a carrier gas. The steam/carbon mole ratio was 10. Flow rates of the bio-oil and water were 1.49 and 5.95 ml/h, respectively. The effects of temperature (600, 650 and 700°C), methods of preparation of catalyst (microemulsion and impregnation methods), single metal catalysts (Ni/CeO_2 and Cu/CeO_2) and bimetal catalyst (Ni:Cu/CeO_2) at different ratios (1:1, 1:2 and 2:1 by mole) on the hydrogen yield were studied.

The results showed that Ni/CeO_2 prepared by microemulsion method gave H_2 yield higher than Ni/CeO_2 prepared by impregnation method by 10% at 600°C. When the reaction temperature was increased from 600 to 700°C, the H_2 yield increased with temperature. The highest H_2 yield was 1.7% by mole at 700°C, which were 5.7 and 17 times those of 600 and 650°C, respectively. When using Ni/CeO_2 and Cu/CeO_2 catalysts at 700°C, H_2 yield increased to 2.4 and 3.6 times that of the non-catalyst, respectively. The results showed that Cu has higher activity than Ni. The H_2 yields of the reactions using bimetallic Ni-Cu/CeO_2 prepared by microemulsion method, at reaction temperature of 700°C in a descending order are as follows: Ni:Cu = 1:1 (5.3%) > Ni:Cu = 1:2 (3.7%) > Ni:Cu = 2:1 (3.5%) > Cu (2.9%) > Ni (1.9%) > no catalyst (0.8%).

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