ABTRACT

PREPARATION AND CHARACTERIZATION OF NANOCATALYST $Ni_{(1-x)}Cu_xFe_2O_4$ AND ACTIVITIY TESTS IN CONVERSION OF (CO_2+H_2)

By

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Air pollution is a mingling of harmful elements into the atmosphere which can cause the environmental damage, the disturbances in human health, and the climate change. The climate change due to the global warming has been increasingly concerned to our life on earth, it is caused by the increase in the concentrations of greenhouse gases (GHG) that were formed in the layers of the earth's atmosphere. One of the efforts to tackle the greenhouse gases is through the conversion, particularly the conversion of CO_2 gas which has the largest composition in the greenhouse gases. One of the conversion method that has been developed was the catalytic hydrogenation to produce a variety of products that are more useful among them is alcohol. This conversion method performed with the aid of a catalyst. In this research, preparation of $Ni_{(1-x)}Cu_xFe_2O_4$ (where x = 0.1 to 0.3) nanocatalysts with a freezedry sol-gel method was performed, aand was followed by the catalytic activity test of the catalyst in the conversion reaction of (CO_2 + H_2) into alcohol, and other organic compounds at temperature of 200°C - 400°C. The result of characterization of the catalyst indicated that the formation of crystalline phases $Ni_{(1-x)}Cu_xFe_2O_4$ (where x = 0.1 to 0.3) was 80-98%. The results of size analysis using Debye-Scherrer method and measurement using TEM showed that the size of the catalyst was in the range of 10.61 to 24.84 nm. The analysis results of particle size distributions using the PSA indicated that the nanometer-scale catalyst was obtained in the range of 12.5 to 19.3%. The result of activity of the $Ni_{(1-x)}$ $Cu_xFe_2O_4$ catalyst in the conversion of CO_2/H_2 showed that the $Ni_{(1-x)}$ $Cu_xFe_2O_4$ catalyst was active, however it was not selective for the formation of ethanol. The analysis by chromatography gas showed that the $Ni_{0,8}Cu_{0,2}Fe_2O_4$ catalyst with the calcination temperature of 600°C and reaction temperature of 200°C was the most active in the conversion of CO_2 / H_2 to produce ethanol, i.e. 1.62%.

Keywords:Debye-Scherrer method, freezedry sol-gel method, nanocatalyst, pectin