ABSTRACT

PRELIMINARY STUDY CELLULOSE CONVERSION TO ALCOHOL SUGAR USED $Ni_xFe_{2-x}O_4$ NANOCATALYST

By

Rizki Amalia

Preparation, characterization and catalytic test for cellulose conversion of $Ni_xFe_{2-x}O_4$ catalyst has been studied. Preparation of catalyst is made by some steps including mixing, evaporating, and calcinating. Characterization of the catalyst involved in acid sites using gravimetry and *Fourier Transform Infra Red* (FTIR) methods, crystalline phases using X-ray diffraction (XRD), and marphology of the catalyst's surface using *Scanning Electron Microscopy* (SEM). Furthermore, catalytic tests on cellulose conversion reaction is done by varying both temperature of reaction in a range of 100, 120, and 140 ^oC and time of reaction in 2 hours and the product is analyzed by *High Performance Liquid Chromatography* (HPLC). Acid content analysis using gravimetric method indicated that $Ni_{0.8}Fe_{1.2}O_4$ nanocatalyst has the highest acidity of 10.6 mmole pyridine/g catatlyst. FTIR analysis demosntrated from catalyst $Ni_xFe_{2-x}O_4$ (x= 0.2, 0.5, 0.8 and 1) that Lewis acid sites is more dominant than Brønsted – Lowry acid sites in the three nanocatalysts investigated. Then, Diffractogram analysis said that catalyst (x= 0.2, 0.5, 0.8 and 1) consisted of $NiFe_2O_4$, Fe_2O_3 and NiO crystalline phases. Surface marphology analysis showed that $Ni_xFe_{2-x}O_4$ (x= 0.5 and x= 1) nanocatalysts are not completely homogeneous, with particle sizes (x= 0.5) ranging between 330-167 nm and catalyst (x= 1) ranging between 167-125 nm of because proved that the size of particles is varied and a spherical shape. As shown in catalytic test, it can be said that catalyst is active to convert celluose into alcohol sugar (sorbitol, mannitol, and xylitol) as catalyst $Ni_xFe_{2-x}O_4$ (x= 0.5) at temperature of 120 ^oC and variable x= 1 at temperature of 140 ^oC.