

ABSTRACT

Lapindo mud is a hot mud that came out due to oil drilling by PT Lapindo Brantas, and is known to contain 18.27% Al_2O_3 . The Al_2O_3 content in lapindo mud has the potential to be utilized as a base material for the synthesis of mesoporous γ -alumina, which functions as an adsorbent to remove pollutants in water. This study aims to determine the effectiveness of mesoporous alumina capacity as a congo red dye adsorbent and the optimum temperature at various hydrothermal temperatures (100, 120, 140, 160 °C, and without hydrothermal treatment) in the synthesis of mesoporous γ -alumina. The process begins with the extraction of Al_2O_3 from Lapindo mud through reflux method, followed by the synthesis of mesoporous γ -alumina using Cethyltrimethylammonium Bromide (CTAB) template and characterization using X-Ray Fluorescence (XRF), Fourier Transform Infrared Spectroscopy (FTIR), Gas Sorption Analyzer (GSA), and X-Ray Diffraction (XRD). The extraction characterization results showed the Al_2O_3 content of 69.97%. FTIR characterization showed symmetrical stretching vibrations and bending vibrations of Al-O-Al, while XRD identified the amorphous nature of the sample. GSA results show that the sample with the highest pore volume is 140°C with a surface area of 337.146 m²/g and a pore volume of 0.661 cm³/g. The acidity test shows that the 120 °C sample has the highest acidity of 47.058 mmol/g with Bronsted acid sites identified through FTIR adsorption of ammonia. The adsorption capacity towards congo red shows that 120 °C has the highest capacity of 1.595 mg/g. The optimum hydrothermal temperature for the synthesis of mesoporous γ -alumina is 120°C. This research provides insight into the potential of Lapindo mud as a source of alumina that can be utilized as an adsorbent.

Keywords : Lapindo mud, Al_2O_3 , Cethyltrimethylammonium Bromide

Menyetujui,

Pembimbing I

Pembimbing II



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