ABSTRACT

Silica-alumina is a porous solid with a large surface area that has high adsorption ability and high thermal stability. Due to its acidity and large surface area, silica-alumina is also used as a catalyst. The formation of Bronsted acid in silica-alumina is caused by tetrahedral and octahedral aluminum coordination in the amorphous structure of silica-alumina. One way to obtain silica-alumina material is to use the hydrothermal method. Organic templates such as Tetrapropylammonium Hydroxide (TPAOH) and Tetrapropylammonium Bromide (TPABr) used in silica-alumina synthesis play a role in forming pores during the crystallization process and directing the structure. The TPAOH template was used because of the high OH- ion content required for the synthesis process in alkaline conditions. In the TPABr template it can interact with silica oxide and alumina precursors and form the desired pore structure. This research aims to obtain silica-alumina material with a variety of templates and determine the catalytic activity of the synthesized silica-alumina in the biofuel transesterification reaction. The research results show that the mesoporous silica-alumina catalyst has the same shape and size. Compared to SA-TPAOH, the SA-TPABr catalyst has a larger surface area, namely 4.041 m^2/g and 8.472 m^2/g. The SA-TPABr catalyst also has higher acidity, namely 19.6 mmol/g and SA-TPAOH 0.38 mmol/g. Testing the catalytic activity of the material using GC-MS on samples without a catalyst produced 70.14% biofuel, the SA-TPAOH catalyst produced 53.4% biofuel and the SA-TPABr catalyst produced 78.39% biofuel.

Keywords: Silica-Alumina, Template, Hydrothermal, TPAOH, TPABr, Transesterification, Biofuel