Promoting deoxygenation of triglycerides via Co-Ca loaded SiO2-Al2O3 catalyst

ABSTRACT

Triglycerides and fatty acid derivatives can be converted to hydrocarbon-grade green diesel that are entirely fungible to the fossil fuels. In the present study, deoxygenation (DO) process of triolein was studied by using mesoporous SiO2-Al2O3 supported Co-Ca catalyst. The presence of active metals (Co-Ca) showed high DO activity exclusively via decarboxylation/decarbonylation (deCOx) pathways with maximum hydrocarbon n-(C8-C20) yield of 73%, and high selectivity of n-C15 and n-C17 fractions. This results suggested the acid-base active sites of catalyst provide selective deCOx pathway of triglycerides structure. In additional, the presence of high surface area of Co-Ca/ SiO2-Al2O3 enhance the metal dispersion for better accessment of large molecular reactant with catalyst during DO process. An optimum Co metal content (10 wt.%) for deCOx reaction was observed, while an excess Co content is not preferable due to tendency of cracking effect. The efficiency of Co-Ca/SiO2-Al2O3 was investigated by using non-edible feedstock (e.g. Ceiba oil and Sterculia oil) along with catalyst stability study were carried out. Resulst also indicated that degradation of DO activity was due to the formation of coke.

Keyword: Deoxygenation; Mesoporous silica; Silica-alumina; Non-edible oil; High free fatty acid; Biofuel