

257c Acid-Functionalized Mesoporous Silica Catalysts for the Esterification of Fatty Acids in Beef Tallow

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Alkyl esters produced from cheap feedstocks such as animal fats and used cooking, which have high free fatty acid content, present significant processing problems in the standard biodiesel production since the free fatty acid saponifies the alkali catalyst leading to low yield and catalyst loss as well as an increase in purification costs. One approach for improving the processing of high free fatty acid feedstocks is to first esterify the free fatty acid to alkyl esters in the presence of an acidic catalyst. We recently demonstrated such a pretreatment step by using organosulfonic acid-functionalized mesoporous silica catalyst to catalyze the methanol esterification of free fatty acid in a model feed, which had 15% palmitic acid in refined soybean oil mixture.

This presentation will extend the catalytic application of the organosulfonic acid-functionalized mesoporous silica catalyst to the esterification of free fatty acid in unrefined beef tallow as a pretreatment step for biodiesel production. Issues concerning impurities in the feedstocks as well as a means of improving catalytic performance of the acid-functionalized mesoporous silica catalyst through alternative synthesis strategies will be discussed. The catalytic performance of the acid modified mesoporous silica will be compared to acidic homogeneous (e.g. H₂SO₄) and commercially available heterogeneous (e.g. Nafion) catalysts.