

Glycerol Etherification by tert-Butanol catalyzed by sulfonated carbon catalyst

Abstract

The recent discovery of sulfonated carbon catalyst made from sugar attracts attention owing to its renewable source. The sulfonated carbon catalyst shows higher reactivity on esterification and transesterification reactions over the conventional solid acid catalysts such as nobic acid and amberlyst. These findings are remarkable because the sulfonated carbon catalyst has a surface area much smaller than any other solid acid catalysts tested for esterification and transesterification reactions. This study reports the characteristics of the sulfonated carbon catalyst and its reactivity on glycerol etherification by fe/f-butanol. Sulfonated carbon catalyst was prepared by sulphonation of the sugar char, prepared by pyrolyzing sugar (D-glucose) at 400°C for 15 h under nitrogen flow in a tube furnace. The catalyst was characterized by specific surface area, thermo-gravimetric analysis, FT-IR and total acidity, which showed that the sulfonated carbon catalyst has a surface area of less than 1 m² g⁻¹ and decomposed under inert gas at around 236°C. The catalyst has a total acidity of 4 mmol g⁻¹, mainly contributed by -SO₃ moiety as indicated by the FT-IR analysis. Etherification sample analyzed on GC-MS showed the presence of mono-glyceiyl ethers isomers and di-glyceiyl ether isomers; however, tri-glyceiyl ether was not detected. The capability of the catalyst to promote the production of glyceryl ethers is a new application of the newly discovered sulfonated carbon catalyst; however, more experiments are required to elucidated catalyst reactivity, stability and selectivity under different reaction conditions. Di-glyceryl ethers are useful products in many applications such as biodiesel fuel additives. © 2010 Asian Network for Scientific Information.