Synthesis and characterization of supported sugar catalyst by dip coating method

Abstract

Sugar catalyst is a novel solid acid catalyst with reactivity comparable to that of sulphuric acid in biodiesel production. However, the fine powder form of sugar catalyst with the non-porous structure might cause large pressure drop in a packed bed reactor due to low bed porosity, affecting the reaction conversion especially in gas phase reaction. Furthermore, higher pressure drop requires higher electrical energy to drive the fluid through. Increasing the particle size is anticipated to be able to overcome the pressure drop matter. Hence, a deposition of sugar catalyst on larger particle materials was studied. Three types of materials were used for this investigation namely aluminum, silica and clay. The deposition was done via dip-coating method. The materials were characterized for their total acidity, thermal stability, functional groups, surface area, and element composition. The total acidity for SCDCAl, SCDCSi, and SCDCCl were 0.9 mmol/g, 0.2 mmol/g, and 0.4 mmol/g, respectively. The ratio of char deposited on SCDCAl, SCDCSi and SCDCCl were 0.9 g of support/g of carbon, 0.040 g of support/g of carbon, and 0.014 g of support/g of carbon respectively. FTIR and EDX analyses were carried out to determine the presence of active sites of the catalysis by identifying the functional groups such as –COOH, -OH, -SO3H. The results showed that –SO3H was detected on the surface of synthesized catalysts, except for SCDCC1.The pore size of SCDCAl, SCDCSi and SCDCCl were classified as macropores because the average diameter were greater than 50nm.. The catalysts were stable up to 400 °C. The results showed that the dip- coating method could deposit sugar catalyst on aluminum, silica, and clay at low total acidity concentration.