Regeneration of mesoporous silica supported tungsten oxide catalyst for glycerol conversion reaction

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Biodiesel has gained a considerable attention in recent years. The production of biodiesel involves a transesterification of vegetable oils to afford biodiesel and glycerol. Glycerol can be transformed into diverse derivatives. Among them, acetalization of glycerol has been reported to yield five and six membered acetal. In this research, glycerol conversion with acetone has been studied using mesoporous WO_3/rod-type SBA-15 (WO_3/R-SBA-15) as a catalyst. A series of catalysts with varying WO_3 loadings (5~20 wt%) were prepared by incipient wetness impregnation method. The catalysts were characterized with XRD, Raman spectroscopy, SEM, N_2 sorption analysis, and NH_3-TPD. In the catalytic experiment, glycerol and acetone were fed, and the catalysts were added. Among them, 10 wt% WO_3/R-SBA-15 was found to be the most active catalyst. The catalyst exhibited 97% conversion with 97% selectivity for the five-membered cyclic product. Although the catalytic performance decreased in the 5th catalytic run, the catalyst was regenerated by calcination in 6th catalytic run. The excellent performance of the catalyst is mainly due to their high specific surface area and strong surface acid property.