Mixed Zn/Al oxide based on activated red mud catalyst for synthesis of glycerol carbonate from glycerol and urea

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Red mud is an abundant waste from aluminum producing. Red mud is roughly treated by hydrochloric acid to improve the surface area and acidity characterizations. The treated material is called activated red mud (ARM). Zinc and aluminum are impregnated on red mud by hot wet impregnation with various molar ratio Zn:Al and various metallic weight loading. A series of Zn/Al oxide catalysts is also prepared as control samples. Catalysts are applied for the reaction between glycerol and urea under vacuum condition (3kPa) and temperature 140oC. Red mud as support improves the surface area and contributes to the acid-base balance of catalyst. It was found that comparing to Zn/Al oxide catalyst, using red mud as the support for Zn/Al oxide catalyst can achieve higher yield of glycerol carbonate with two times smaller amount of active component (Zn and Al). The best glycerol carbonate yield is 59.8% with catalyst 50%-9ZnO-1Al2O3/ARM.