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Characterization and catalytic activity of os / bentonite catalyst for hydrogenolysis of glycerol (Article)

[Pencirian dan aktiviti pemangkin os / bentonit untuk tindak balas hidrogenolisis gliserol]

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Abstract

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In this study, osmium catalysts (Os / Bentonite , Os /TiO_2) and ruthenium catalysts (Ru/ Bentonite , Ru/TiO_2) with 5% wt/wt metal loading were prepared using impregnation method and applied to convert glycerol , a renewable feedstock, to value-added chemical, 1,2-propanediol. Among these catalysts, the bentonite supported Os catalyst showed high performance with conversion and selectivity to 1,2-propanediol which were 63.3% and 82.7%, respectively. Catalytic performances of these catalysts were evaluated in glycerol hydrogenolysis using stainless steel autoclave reactor equipped with a magnetic stirrer at 150 □C, hydrogen pressure 20-40 bar for 7 hours reaction. The effect of glycerol concentration and reaction temperature were investigated to obtain optimum conditions due to glycerol conversion and products selectivity greatly depend on these factors. Experimental results show that hydrogenolysis of glycerol at 160 □C reaction temperature and 5% glycerol concentration gives a conversion of glycerol up to 100.0% with 82.9% selectivity of 1,2-propandiol. This study showed that bentonite which is cheap and abundant clay is potentially a good catalyst support material. The Os / bentonite catalyst was characterized by Temperature Programmed Reduction (TPR), nitrogen adsorption-desorption analysis (BET), Temperature Programmed Desorption-Ammonia(TPD-NH_3) for obtaining some physicochemical properties of the catalysts.

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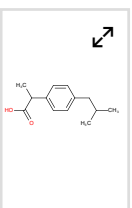
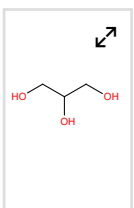

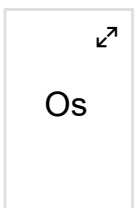

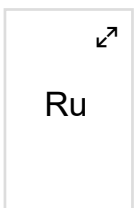

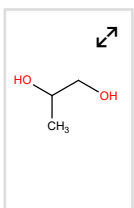

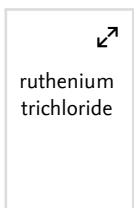

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