

Title: Supported silicotungstic acid on zirconia catalyst for gas phase dehydration of glycerol to acrolein

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Abstract: The gas phase dehydration of glycerol to acrolein over a series of supported silicotungstic acid (HSiW) on zirconia (10HZ, 20HZ, 30HZ and 40HZ) has been investigated. The catalysts were characterized by temperature programmed desorption, nitrogen adsorption-desorption, thermogravimetric analysis, Fourier transform infrared spectroscopy, X-ray diffraction, field-emission scanning electron microscopy and energy dispersive X-ray techniques. The large pore diameters (>19 nm) of the prepared catalysts alleviated the coke deposition effect. Also, the specific surface area and acidity of the samples surged from 18 to 22 m²/g and 0.38 to 1.24 mmol/g cat, respectively by varying HSiW loadings from 10 to 40 wt% on zirconia. The highest acrolein yield achieved was 63.75% at 92% glycerol conversion over 30HZ catalyst for 10 wt% glycerol feed concentration and 300 C reaction temperature in 3 h. The combined physico-chemical characteristics of 30HZ made it more superior compared with other samples in the current study.