

Characterization and Activity of V_2O_5/CeO_2 -MgO Catalysts for Dehydrogenation of Ethylbenzene to Styrene

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A series of CeO_2 -MgO oxides with different molar ratio of Ce/Mg were prepared by co-precipitation method. Vanadium oxide in the range 3 - 20 wt% was impregnated on 1Ce-9Mg-O oxide. The catalysts were characterized by N_2 sorption, XRD, XPS, 51V MAS NMR, FT-IR, and TPR. Vanadium oxide was finely dispersed up to 10 wt% on 1Ce-9Mg-O support. Isolated VO_4 species with vanadium atom in distorted tetrahedral coordination were observed by 51V NMR analyses. The formation of $Mg_3(VO_4)_2$ which is known as non-active phase in the dehydrogenation of ethylbenzene was observed above 10 wt% $V_2O_5/1Ce-9Mg-O$. For the vanadia loading up to 10 wt% the ethylbenzene conversion and the styrene selectivity to styrene were increased to 42 and 93%, respectively, whereas above 10 wt% V_2O_5 the conversion decreased progressively and the styrene selectivity was still maintained.