Effect of oxidative agent and calcinations on the activity of V_2O_5/Ce-Mg-O catalyst in the dehydrogenation of ethylbenzene

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V_2O_5 catalysts ranging from 5 to 20 wt% supported on Ce-Mg-O oxides with Ce/Mg mol ratio of 2/8 are prepared by the co-precipitation method. The influence of the oxidative agent H_2O_2 and calcination temperature on the catalyst properties are studied. The catalysts are characterized by N_2 adsorption, XRD, FT-IR and SEM. XRD pattern shows that a large amount of MgO phase exists simultaneously with CeO_2 phase in 2Ce-8Mg-O oxide prepared with H_2O_2. This opinion is confirmed by FT-IR spectra, two characteristic peaks of the adsorbed CO_2 and Mg-O bond are observed. The difference of morphology is also observed in SEM. Vanadium oxide below 8 wt% is finely dispersed on the support surface while the non-active $Mg_3(VO_4)_2$ phase is formed if vanadia loadings above 8 wt%. Among the catalysts studied here, $8V_2O_5$/2Ce-8Mg catalyst outperforms all others in the dehydrogenation of ethylbenzene. For the vanadia loadings upto 8 wt% the ethylbenzene conversion and the styrene selectivity increase, whereas, above 8 wt% then the ethylbenzene conversion decreased progressively while the styrene selectivity is still maintained.