



Heterolytic C-H Activation of Propane using Chromium Single-Site Heterogeneous Catalyst

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The term single-site heterogeneous catalysts is the combination of homogeneous and heterogeneous catalysts leading to highly metal dispersion resulting the high activity and selectivity. The preparation of metal over a support by the strong electrostatic adsorption (SEA) is the methodology which gives high ratio of single-site metal active site. In this work, the dehydrogenation of propane using Cr/SiO₂ prepared by SEA were studied and compared with Cr/SiO₂ prepared by impregnation method. XANES spectra of all catalysts prepared by impregnation reveal that the lower the % loading leads to the higher tetrahedral Cr species which could be Cr single-site specie. The TPR profile of 2%wt. Cr/SiO₂ has a higher reduction peak than 5% wt. indicating Cr species are in different environment. In similar condition of propane dehydrogenation at 550°C, the impregnation of 2% wt. Cr/SiO₂ (TOF = 2.85 h⁻¹) is roughly triple active than 5%wt (TOF = 0.91 h⁻¹). In comparison between the SEA and impregnation with 2% loading, the result shows that SEA has a higher activity than impregnation method which is higher Cr dispersion.

Keywords: Single-site heterogeneous catalyst; Propane dehydrogenation; Chromium, Heterolytic C-H bond