



The improvement of cobalt supported on silica catalysts prepared by strong electronic adsorption for cyclohexane dehydrogenation

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The activity of metal supported on silica catalyst highly depends on the metal dispersion. The strong electronic adsorption (SEA) methodology generally gives the high metal dispersion; however, the metal precursors have a largely impact to the loading and dispersion. This research investigated the use of various cobalt complexes supported on silica (Co/SiO₂) prepared by SEA for cyclohexane dehydrogenation compared with the wet impregnation (IM) method. Ultraviolet-Visible spectroscopy, inductively coupled plasma mass spectrometry, and temperature programmed reduction shows that the loading of cobalt on silica raises from [Co(bipy)₃](NO₃)₂ < [Co(NH₃)₅Cl]Cl₂ < [Co(NH₃)₆]Cl₃ < [Co(en)₂Cl₂]Cl. The order of the activity of cyclohexane dehydrogenation using Co/SiO₂ prepared by SEA with those cobalt precursors at 550 °C is reversed from the loading order. This could result from the charge density and steric effect of the precursors leading to the different adsorption and cobalt dispersion. Furthermore, the higher the % loading showed the lower the activity. In comparison between SEA and IM methodology, the Co/SiO₂ prepared by SEA was 2-6 times more active than the impregnation and had the lower deactivation.

Keywords: Strong electronic adsorption, Cobalt complexes, Cyclohexane dehydrogenation