

前驱物对NiO/SiO₂气凝胶催化剂性能的影响

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摘要 分别用硝酸镍、醋酸镍和氯化镍为活性组分前驱物,正硅酸乙酯为硅源,采用溶胶凝胶超临界流体干燥法制备了N-SiO₂, Ac-SiO₂和C-SiO₂催化剂,经TEM, TPR, XRD, IR等物性结构表征及催化加氢活性评价结果表明:前驱物对由溶胶凝胶法制备催化剂中氧化镍的分散性,晶粒大小及与载体的相互作用都有明显的影响, N-SiO₂催化剂有Ni-O-Si键形成, NiO呈簇团结构,粒径最小,分散性最好,但加氢活性最低; Ac-SiO₂和C-SiO₂催化剂中氧化镍呈微晶态,与载体相互作用较弱。在三种催化剂中, NiO与载体相互作用强弱顺序为: N-SiO₂ > Ac-SiO₂ > C-SiO₂,但加氢活性大小顺序相反为: C-SiO₂ > Ac-SiO₂ > N-SiO₂; C-SiO₂催化剂加氢活性和丁二酸酐的选择性均在99%以上。

关键词 [氧化镍](#) [二氧化硅](#) [凝胶](#) [催化加氢](#) [催化活性](#)

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Effect of Nickel Precursors on the Catalytic Performance of NiO/SiO₂

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Abstract The silica-supported nickel catalysts with different precursors of NiCl₂, Ni(CH₃COO)₂ and Ni(NO₃)₂ were prepared by sol-gel-SCFD method (hereafter referred to as C-SiO₂, Ac-SiO₂ and N-SiO₂). The physical properties and the structures of catalysts were characterized by TEM, XRD, TPR and IR; the activities of catalytic hydrogenation of maleic anhydride (MA) to succinic anhydride (SA) were examined in liquid phase catalytic hydrogenation process. The results show that the interaction between NiO and SiO₂, the forms and particle size of NiO, and the activities in the catalytic hydrogenation of MA to SA were affected by the precursors used. Compared with Ac-SiO₂ and C-SiO₂, the N-SiO₂ with Ni-O-Si bonds had the smallest NiO clusters and the best dispersion but the lowest hydrogenation activity; however, NiO in Ac-SiO₂ and C-SiO₂ existed as crystallites, the interaction between NiO and SiO₂ decreased in the order of N-SiO₂ > Ac-SiO₂ > C-SiO₂, and the hydrogenation activity increased in the order of C-SiO₂ > Ac-SiO₂ > N-SiO₂. In the case of C-SiO₂, both the hydrogenation activity and selectivity of MA to SA were more than 99%.

Key words [NICKEL OXIDE](#) [SILICON DIOXIDE](#) [GEL](#) [CATALYTIC HYDROGENATION](#) [CATALYTIC ACTIVITY](#)

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