PREPARATION OF SUPPORTED SKELETAL NI CATALYST AND ITS CATALYTIC HYDROGENATION PERFORMANCE OF C_9 FRACTION FROM COKING PROCESS

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Currently, the inferior compressive strength of traditional Raney-Ni catalyst restricts its application in fixed-bed reactor. To approach this problem a series of supported skeletal Ni catalysts were prepared by mixing pseudo boehmite and Ni-Al alloy powder. In the process,the calcination temperature and atmosphere, mass ratio of pseudo boehmite to Ni-Al alloy powder and the sodium hydroxide solution concentration were investigated. The catalysts characterized by intelligent granule intensity tester(IGIT), scanning electron microscopy(SEM), X-ray photoelectron spectroscopy(XPS), X-ray diffraction (XRD),low temperature nitrogen adsorption, temperature programmed reduction of hydrogen (H_2-TPR), and thermogravimetric-differential thermal analysis (TG-DTA).The results were shown that the calcination atmosphere had a considerable impact on the compressive strength of the catalyst. Compared with air atmosphere, the compressive strength of the catalyst increased from 12.62 N/mm to 23.96N/mm, obviously, in argon atmosphere, which was almost twice as much as the former.The inherent reason for this was that the argon obviously inhibited the transform of $NiAl_3$ to Ni_2Al_3 in which the latter was the key factor to improve compressive strength. Additionally, coke-oven C_9 hydrogenation was used to evaluate the performance of the catalyst and the results indicated that the conversion of indene, the key component of coke-oven C_9, was as high as 90% in 1000h under the optimum reaction conditions:T=220^{o}C, P(H_2)=2.5MPa, H_2/oil=200(v/v), LHSV=3.0h^{-1}. Our data demonstrated that the supported skeletal Ni catalyst have a good industrial prospect in the fixed-bed reactor in future.

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