

Al₂O₃助剂对Co/SiC催化剂F-T反应性能的影响

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Effect of Al₂O₃ addition on the catalytic performance of Co/SiC catalyst for Fischer-Tropsch synthesis

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摘要 分别采用沉淀法、尿素水解法制备Al₂O₃/SiC复合载体,采用等体积浸渍法制备Co/Al₂O₃-SiC催化剂。结合N₂吸附、XRD、H₂-TPR、XPS等表征手段,研究Al₂O₃助剂对钴基催化剂物相结构、还原行为以及F-T合成性能等的影响。结果表明,氧化铝加入后增强了载体与钴物种之间的相互作用,提高了钴物种的分散度,降低了钴物种的还原度。尿素水解法引入Al₂O₃后,载体与钴物种具有适中的相互作用,表现出较高的反应活性。沉淀法制备的载体负载钴物种后由于较强的金属-载体相互作用,表现出较优的稳定性。

关键词: 费托合成 钴基催化剂 氧化铝助剂 尿素水解法 沉淀法

Abstract: Two Al₂O₃-modified catalysts were prepared by urea hydrolysis method and precipitation disposition method respectively. Combined with N₂ adsorption, XRD, XPS and H₂-TPR, the effects of Al₂O₃ on the physico-chemical properties and catalytic properties for the Fischer-Tropsch synthesis were investigated. It was found that the metal-support interaction could be effectively strengthened for both catalysts. Consequently, the dispersion of the catalyst was enhanced and the Fischer-Tropsch synthesis activity was increased. The results also indicated that the modification of Co/SiC catalyst strongly depended on the preparation method. The highest CO conversion was observed on the catalyst prepared by urea hydrolysis method due to the superior dispersion and good reducibility. Besides, the catalytic stability was enhanced due to the stronger interaction between cobalt and Al₂O₃ prepared by precipitation disposition method.

Key words: Fischer-Tropsch synthesis cobalt-based catalyst Al₂O₃ promoter urea hydrolysis precipitation disposition

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