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Co-Mo/γ-Al_2O_3催化剂的原位红外光谱表征研究

张玉涵[1,2], 凌凤香[2], 王少军[2], 赵国利[2]
1. 辽宁石油化工大学化学与材料科学学院, 辽宁 抚顺 113001;
2. 抚顺石油化工研究院, 辽宁 抚顺 113001

An *in-situ* FT-IR study on the CO and NO co-adsorption on the Co-Mo/γ-Al_2O_3 catalysts

ZHANG Yu-han[1,2], LING Feng-xiang[2], WANG Shao-jun[2], ZHAO Guo-li[2]
1. Liaoning Shihua University, Fushun 113001, China;
2. Fushun Research Institute of Petroleum and Petrochemicals, SINOPEC, Fushun 113001, China

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摘要 采用CO和NO作为探针分子,应用原位红外光谱法(*in-situ* FT-IR)和程序升温还原(H_2-TPR)对Mo/γ-Al_2O_3和Co-Mo/γ-Al_2O_3加氢催化剂进行表征,并对催化剂进行了加氢脱硫(HDS)活性评价。实验结果表明,在Co-Mo/γ-Al_2O_3催化剂表面存在三个吸附位;在Mo/γ-Al_2O_3催化剂中加入助剂钴对钼吸附位起到显著的改性作用,并且引入新的活性中心,提高了催化剂的催化活性;随着钼含量的增加,活性中心数目逐渐增多;用CO-NO共吸附原位红外光谱研究了Co-Mo/γ-Al_2O_3催化剂表面活性中心的信息,证明不同的Mo中心分别吸附CO和NO,并将它们区分开来,解决了不同活性中心的光谱互相重叠的问题。

关键词: Co-Mo/&gamma -Al_2O_3催化剂 原位红外光谱 探针分子 活性中心

Abstract: The active sites of reduced Mo/γ-Al_2O_3 and Co-Mo/γ-Al_2O_3 hydrotreating catalysts were studied by *in-situ* FT-IR using CO and NO as probe molecules; the results were correlated with their activity in hydrodesulfurization (HDS) and behavior in temperature programmed reduction (H_2-TPR). The results indicate that there exist three main adsorption sites on the surface of Co-Mo/γ-Al_2O_3 catalysts. The addition of cobalt to Mo/γ-Al_2O_3 is able to modify Mo sites and to introduce active Co sites; an increase of the molybdenum content may also increase the number of active sites and improve the catalytic activity of Co-Mo/γ-Al_2O_3. FT-IR spectra of CO and NO co-adsorption is able to distinguish the spectra overlapping of different active sites, which reveals that CO and NO are actually adsorbed on different Mo active sites.

Key words: Co-Mo/&gamma -Al_2O_3 catalysts *in-situ* FT-IR probe molecules active sites

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通讯作者: 凌凤香, Tel: 024-56389578, E-mail: lingfengxiang.fshy@sinopec.com。　E-mail: lingfengxiang.fshy@sinopec.com

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