

Ni/HZSM-5 催化剂的结构及其催化山梨醇水相加氢合成烷烃性能

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摘要 采用浸渍法制备了 Ni/HZSM-5 双功能催化剂, 考察了焙烧温度对催化剂结构及其催化山梨醇水相加氢合成 C₅~C₆ 烷烃性能的影响. 结果表明, 在金属中心和酸性载体的协同作用下, 通过山梨醇中 C-O 键加氢和异构化高选择性合成了 C₅~C₆ 烷烃. 经 500°C 焙烧的 Ni/HZSM-5 催化剂上山梨醇水相加氢的活性最高, 山梨醇转化率为 62.0%, 戊烷和己烷的总选择性为 76.4%, 其中异己烷选择性达 45.4%. 对催化剂进行 N₂ 物理吸附、X-射线衍射、NH₃ 程序升温脱附和 H₂ 程序升温还原等表征后发现, 经 500°C 焙烧催化剂的有效比表面积和孔体积均明显增大, HZSM-5 负载的硝酸镍分解成较小晶粒的 NiO, 表面酸量适中, 且 Ni 物种与载体相互作用较强, 较易被 H₂ 还原, Ni 还原度达 100%. 这是其催化活性最高的原因.

关键词: 镍 HZSM-5 分子筛 山梨醇 水相加氢 烷烃

Abstract: A bifunctional Ni/HZSM-5 catalyst was prepared by the conventional impregnation method. The effects of calcination temperature on the structure properties of the catalyst and its catalytic performance for aqueous phase hydrogenation of sorbitol were studied. The results showed that C₅~C₆ alkanes were effectively obtained by the hydrogenation of the C-O bond in sorbitol and the following isomerization due to the synergism of the metal center and acid support. Moreover, the catalyst calcined at 500 ° C exhibited a maximum value of 62.0% for sorbitol conversion and 76.4% of selectivity for pentane and hexane in comparison with other catalyst samples, wherein the isohexane selectivity was about 45.4%. The catalyst samples were characterized by N₂ physical adsorption, X-ray diffraction, NH₃ temperature-programmed desorption, and H₂ temperature-programmed reduction. It was found that the surface area and pore volume of the catalyst calcined at 500 ° C were obviously increased. Smaller grains of NiO can be formed from the decomposition of nickel nitrate on the surface of HZSM-5, which can provide with the appropriate amounts of acid and the interaction between the nickel species and acid support for easier hydrogen reduction with the Ni reducibility of 100%. All these factors are closely related to the highest catalytic performance of Ni/HZSM-5 catalyst for aqueous phase hydrogenation of sorbitol.

Keywords: nickel, HZSM-5 zeolite, sorbitol, aqueous phase hydrogenation, alkane

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- [1] 李秋荣 1,2, 武金宝 1, 郝吉明 2. 低温等离子体处理对 NiO/Al₂O₃ 吸附 NO_x 的促进作用[J]. 催化学报, 2011,32(4): 572-581
- [2] 赵景月, 邹秀晶, 汪学广, 刘合之, 李林, 鲁雄刚, 丁伟中. 低水碳比条件下 Ni/CeO₂/Al₂O₃ 催化剂上液化石油气的预重整[J]. 催化学报, 2011,32(3): 456-462
- [3] 袁建超, 王学虎, 刘玉凤, 梅铜简. 含吸电子基团配体的 α-二亚胺-Ni(II) 上乙烯聚合反应性能[J]. 催化学报, 2011,32(3): 490-494
- [4] 陈雪莹, 乔明华, 贺鹤勇. 载体对负载型 Ni-B 催化剂催化 2-乙基蒽醌加氢制 H₂O₂ 反应性能的影响[J]. 催化学报, 2011,32(2): 325-332
- [5] 胡诗婧, 龙华丽, 徐艳, 尚书勇, 印永祥. 冷等离子体喷射流对甲烷二氧化碳重整用 Ni/Al₂O₃ 催化剂的还原机制[J]. 催化学报, 2011,32(2): 340-344
- [6] 刘欣梅, 高晓, 李翔. 用于 CH₄/CO₂ 重整反应 Ni/ZrO₂-Al₂O₃ 催化剂的结构和抗积炭性能[J]. 催化学报, 2011,32(1): 149-154
- [7] 李海涛, 陈昊然, 张因, 高春光, 赵永祥. 炭包覆氧化铝负载镍催化剂的制备和表征及其催化加氢性能[J]. 催化学报, 2011,32(1): 111-117
- [8] 蒋新, 董克增, 王海华, 王挺. 吸附相反应技术制备双金属 Ag-Ni 催化剂用于硝基苯液相加氢[J]. 催化学报, 2010,31(9): 1151-1156

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- [9] 张微^{1,2}, 葛庆杰¹, 徐恒泳¹. 阶跃升温分解法对非负载型镍催化甲烷分解活性的影响[J]. 催化学报, 2010,31(9): 1162-1166
- [10] 郭建忠¹, 侯昭胤², 郑小明². 流化床中 CH₄/C₃H₈ 自热重整制合成气[J]. 催化学报, 2010,31(9): 1115-1121