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铋钒钼复合氧化物催化剂结构与丙烷选择氧化催化性能

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摘要 用X射线衍射（XRD）、激光拉曼光谱（LRS）、程序升温还原（TPR）和微型反应测试等手段研究了Bi-V-Mo-O复合氧化物催化剂组成、结构与丙烷选择性氧化催化性能。结果表明不同组成的Bi-V-Mo-O复合氧化物催化剂可形成白钨矿型晶体结 构，丙烷选择氧化催化性能与催化剂组成和结构密切相关。Mo组分的引入使催化剂的丙烷安全氧化催化性能受到抑制，丙烯醛选择性增加且在Mo/（V+Mo）原子比为 0.45时达极大值。Mo含量进一步增加，催化剂的丙烯选择性增加而丙烯醛选择性下 降。LRS和TPR结果表明，不同组成的Bi-V-Mo-O复合氧化物催化剂的丙烷选择氧化 催化性能与催化剂的金属氧物种性质相关联。

关键词 氧化铋 氧化钒 氧化钼 丙烷 丙烯醛 氧化 X射线衍射分析 程序生温还原

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The Structure and Catalytic Properties of Bi-V-Mo-O Composite Oxide Catalysts for Selective Oxidation of Propane

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Abstract The structure and catalytic properties of Bi-V-Mo-O composite oxide catalysts with different composition for selective oxidation of propane have been studied by using X-ray diffraction (XRD), laser Raman spectroscopy (LRS), temperature-programmed reduction (TPR) and microreactor tests. It has been shown that Bi-V-Mo-O composite oxides formed scheelite-type structure, and the composition and structure of catalysts exert great influences on the catalytic properties for selective oxidation of propane. Increasing Mo content in the composite oxide catalysts, complete oxidation of propane can be suppressed, while the selectivity to acrolein increased to a maximum at Mo/(V+Mo) atomic ratio = 0.45. Further increasing the Mo content results in the remarkable decrease of acrolein selectivity. It has been suggested that the catalytic selectivity is correlated to the reactivity of oxygen ions species in the composite oxides.

Key words BISMUTH OXIDE VANADIUM OXIDE MOLYBDENUM OXIDE PROPANE PROPENAL OXIDATION XRD TPD

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