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含MFI结构单元的介孔Ti-HMS-1的合成、表征及催化氧化性能

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摘要 采用TS-1前驱体作硅源和钛源, 以十二胺为模板剂, 在中性和室温条件下合成了介孔含钛分子筛Ti-HMS-1. 采用XRD、TEM、低温N_2吸附、FT-IR和UV-Vis等方法对合成的分子筛进行了表征; 以苯乙烯的催化氧化反应为模型反应, 考察了合成的Ti-HMS-1的催化氧化性能. 结果表明, Ti-HMS-1具有“worm-like”介孔结构, 但长程有序度较低, 孔壁部分含有MFI的次级结构单元, 在373K沸水中水煮50h后, Ti-HMS-1仍能较好地保持原有的介孔结构, 表明Ti-HMS-1具有较高的水热稳定性. 进入分子筛骨架的钛原子为催化剂的活性中心, 对于苯乙烯氧化反应, 具有较高的催化活性, 对产物的选择性与Ti-HMS接近.

关键词 Ti-HMS-1分子筛 合成 表征 苯乙烯氧化

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Synthesis, Characterization and Catalytic Oxidation Properties of Mesoporous Ti-HMS-1 Containing MFI Structure Unites

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Abstract Ti-incorporated Ti-HMS-1 mesoporous molecular sieve was synthesized at ambient temperature by the assembly of TS-1 precursors using dodecylamine (DDA) surfactant as template agent, and characterized by XRD, TEM, nitrogen adsorption, FT-IR, UV-Vis diffuse reflectance. The results show that Ti-HMS-1 prepared consists of the mesoporous structure with ''worm-like'' holes and MFI structure unites, and the Ti atoms are incorporated into the framework. After treated in the boiling water at 373K for 50h, Ti-HMS-1 remains most of the mesoporous structures, which indicates Ti-HMS-1 has higher hydrothermal stability as compared with Ti-HMS. For the oxidation of styrene using H_2O_2 as oxidant, the catalytic performance of Ti-HMS-1 is higher obviously than that of Ti-HMS or TS-1. The selectivity of Ti-HMS-1 to products is similar to that of Ti-HMS.

Key words Ti-HMS-1 molecular sieve synthesis characterization oxidation of styrene

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