

催化、动力学与反应器

铁改性HMS催化氧化苯甲醇合成苯甲醛

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摘要

以十二胺为模板在中性条件下合成了Fe-HMS介孔分子筛,研究了不同硅铁比Fe-HMS对苯甲醇催化氧化反应的影响。利用XRD、BET、SEM和H₂-TPR等方法对合成的催化剂进行了表征。考察了Fe-HMS对苯甲醇氧化反应的影响。结果表明, Fe³⁺ 离子进入了分子筛骨架, Fe-HMS分子筛具有均一的蠕虫状介孔结构。焙烧后的Fe-HMS中Fe³⁺ 主要以Fe₂O₃形式存在于骨架中。对苯甲醇液相选择性氧化反应, Fe-HMS分子筛的催化活性高于Fe-SiO₂。在85℃、Si/Fe摩尔比为25:1、醇/双氧水摩尔比为1:2、催化剂含量为4%、反应时间4 h条件下, 苯甲醇的转化率和苯甲醛的选择性分别为65.1%和74.6%。

关键词

[铁](#) [HMS](#) [催化氧化](#) [苯甲醇](#) [苯甲醛](#)

分类号

Catalytic oxidation of benzyl alcohol to benzyl aldehyde with Fe-HMS

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Abstract

The iron-incorporated hexagonal mesoporous silica (HMS) material Fe-HMS was synthesized at ambient temperature by using dodecylamine as the template agent, and was characterized by XRD,BET, SEM, H₂-TPR and N₂ adsorption measurements.Its catalytic performance for oxidation of benzyl alcohol with H₂O₂ to benzyl aldehyde was investigated.The effects of reaction conditions were examined.The results showed that Fe³⁺ ions were incorporated into the framework of HMS, and Fe-HMS had a uniform mesoporous structure.Most of the Fe³⁺ ions (Fe₂O₃) of calcined Fe-HMS remained in the tetrahedral coordinated framework.Fe-HMS exhibited superior catalytic performance in the selective oxidation of benzyl alcohol compared to the common silica-supported material by the same method. At molar ratio of Si to Fe 25:1, molar ratio of benzyl alcohol to H₂O₂ 1:2, catalyst content 4%(mass), reaction time 85℃ and reaction time 4 h, the conversions of benzyl alcohol and the selectivity for benzyl aldehyde reached 65.1% and 74.6%, respectively.

Key words

[Fe](#) [HMS](#) [catalytic oxidation](#) [benzyl alcohol](#) [benzyl aldehyde](#)

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