

Catalytic Performance of AI-MCM-48 Molecular Sieves for Isopropylation of Phenol with Isopropyl Acetate

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摘要 AI-MCM-48 molecular sieves (Si/Al molar ratios = 25, 50, 75, and 100) were synthesized hydrothermally using cetyltrimethylammonium bromide as the structure directing template. The orderly arrangement of mesopores was evident from the low angle X-ray diffraction patterns and transmission electron microscopy images. The catalytic performance of the materials was evaluated in the vapor phase isopropylation of phenol with isopropyl acetate. Phenol conversion decreased with the increase in the Si/Al ratio of the catalysts. The major reaction product was 4-isopropyl phenol with 78% selectivity. The delocalization of phenolic oxygen electron pair over the aromatic ring promoted para-selective alkylation. Such delocalization could be aided by the hydrophilic surface of the molecular sieves. Although an ester was used as the alkylating agent, phenyl isopropyl ether was not formed in the reaction.

关键词: AI-MCM-48 alkylation phenol isopropyl acetate 4-isopropyl phenol

Abstract: AI-MCM-48 molecular sieves (Si/Al molar ratios = 25, 50, 75, and 100) were synthesized hydrothermally using cetyltrimethylammonium bromide as the structure directing template. The orderly arrangement of mesopores was evident from the low angle X-ray diffraction patterns and transmission electron microscopy images. The catalytic performance of the materials was evaluated in the vapor phase isopropylation of phenol with isopropyl acetate. Phenol conversion decreased with the increase in the Si/Al ratio of the catalysts. The major reaction product was 4-isopropyl phenol with 78% selectivity. The delocalization of phenolic oxygen electron pair over the aromatic ring promoted para-selective alkylation. Such delocalization could be aided by the hydrophilic surface of the molecular sieves. Although an ester was used as the alkylating agent, phenyl isopropyl ether was not formed in the reaction.

Keywords: AI-MCM-48, alkylation, phenol, isopropyl acetate, 4-isopropyl phenol

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