
Properties and Catalytic Activity of Acid-Modified Montmorillonite and Vermiculite

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Abstract: The acidic properties of acid-modified montmorillonite and vermiculite were determined by pyridine and ammonia adsorption to correlate with the alkylating and dehydrating activity of the activated samples. Treatment of the minerals with different concentrations of hydrochloric acid results in the variation of overall acidity and density of acidic sites. Infrared (IR) spectral and differential scanning calorimetric analyses have revealed the presence of Bronsted and Lewis acid sites on the activated samples. The catalytic activity towards the above reaction has been correlated to the acid strength and density of Lewis acid sites. Treatment of montmorillonite with hydrochloric acid in the range of 0.1 and 0.3 *M* and vermiculite with 0.2 to 0.3 *M* seemed to be suitable for the conversion of methanol into olefin-rich hydrocarbons. Acid-activated montmorillonite catalyzed the isopropylation of benzene to a maximum extent of 16%, whereas acid-activated vermiculite gave a maximum conversion of only 4%.

Key Words: Acidity • Benzene • Catalyst Characterization • Hydrocarbons • Isopropylation • Methanol Dehydration • Montmorillonite • Vermiculite

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