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## Reactivity of Anisoles on Clay and Pillared Clay Surfaces

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**Abstract:** Pillared bentonites were found to be efficient catalysts for the O-methyl bond cleavage of anisoles (e.g., *m*-methylanisole, guaiacol, and creosol) under very mild, static conditions (150°C, a few hours, inert atmosphere). The O-methyl bond cleavage led to phenolic products. Gas chromatography-mass spectrometry and solid-state  $^{13}\text{C}$  nuclear magnetic resonance (NMR) techniques used to probe  $^{13}\text{C}$ -labeled anisoles revealed that dealkylation and transalkylation reactions occurred to a large extent, and that conversion was efficient at >95% after two days. Ortho- and para-isomers were observed exclusively, without any evidence of meta-substitution. Volatile products were determined by mass spectrometry to be  $^{13}\text{CH}_3\text{OH}$  and  $(^{13}\text{CH}_3)_2\text{O}$ . Magic-angle spinning  $^{13}\text{C}$  NMR experiments showed that the molecules were fairly mobile in the clay micropores prior to catalysis. After catalysis, cross-polarization NMR showed that molecular motion had decreased markedly. Ultraviolet-visible spectroscopy of the colored complexes suggested some quinone formation. The trend of clay reactivity was found to be: pillared bentonite > acid-washed montmorillonite > untreated bentonite > pillared fluorhectorite > untreated fluorhectorite.

**Key Words:** Anisoles • Bentonite • Catalysis • Fluorhectorite • Montmorillonite • Nuclear magnetic resonance • Pillared clay • Quinones

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