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# Polymerization of 2,6-Dimethylphenol on Smectite Surfaces

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**Abstract:** Air-dried samples of homoionic Na-, Ca-, Al-, and Fe-smectite were equilibrated with 2,6-dimethylphenol vapor for 24 hr. Infrared spectra of the complexes formed indicated that a portion of the sorbed phenol was transformed into quinone-type compounds. Both sorption and transformation were greatly influenced by the nature of the exchangeable cation and followed the order Fe  $\gg$  Al > Ca > Na. Changes in the electron spin resonance spectra of the clays following interaction with the phenol followed the same order, indicating that these reactions are enhanced by a transition metal cation, such as Fe<sup>3+</sup>, on the exchange complex. The reaction products from the clay complexes were extracted with methanol and identified using ultraviolet/visible spectrophotometry, high-pressure liquid chromatography (HPLC), and mass spectrometry. The extracts contained mixtures of products including the parent phenol, di-, tri-, and tetramers of the phenol, as well as quinone and quinone dimers. The identities of these compounds were further confirmed by the coincidence of the retention times of HPLC peaks obtained from extracts of the clays with those from compounds produced by oxidation of 2,6-dimethylphenol with Ag<sup>2</sup>O.

**Key Words:** Adsorption • Electron spin resonance • Phenol • Polymerization • Quinone • Smectite

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