
Oxidation of Phenol in Acidic Aqueous Suspensions of Manganese Oxides

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Abstract: Phenol (benzenol) oxidation by three synthetic manganese oxides (buserite, manganite, and feitknechtite) has been studied in aerated, aqueous, acidified suspensions. The rate of reaction was pH dependent. Oxidation was greatly enhanced below pH 4, when diphenoquinone and p-benzoquinone were identified as the first products. Initial reaction rate was correlated with standard reduction potential (E°) of the oxides following the order: feitknechtite > manganite > buserite. A more gradual process of phenol oxidation after the initial reaction was influenced by electrochemical properties of the solution. High soluble manganese activity and increase in pH adversely affected reaction rates. Thus, the reactivity of the oxides was related to their stability and possibly the ability to readsorb Mn(II), following the order: buserite > manganite > feitknechtite. The results indicate that thermodynamic and electrochemical data for oxides and phenols are useful in predicting under which conditions phenols can be oxidized by a given system.

Key Words: Buserite • Feitknechtite • Manganese oxide • Manganite • Oxidation • Phenol • Quinones • Reduction potential

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