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Investigating dicarboxylic acid complexation on random stacked birnessite

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Birnessite is of considerable interest due to the significant adsorptive and oxidative capacity it exhibits and catalytic properties that are important in the alteration of natural organic matter in soil systems. Numerous studies have been performed on synthetic birnessite; however, it is unclear if this material shows analogous reactivity to natural soil manganese materials. Random stacked birnessite (RSB) may represent a more realistic soil material due to a disordered structure and increased reactivity from the mixed valence states of constituent manganese. It is therefore of interest to investigate the adsorptive characteristics of RSB towards C_1 - C_6 dicarboxylic acids as a proxy for this important functional group in natural soil organic matter. To obtain detailed information about the interactions between organic acids and RSB at the molecular scale, and under aqueous conditions representative of natural soil solutions, ATR-FTIR spectroscopy was employed. To the authors' knowledge this represents the first such investigation using manganese dioxide as a substrate.

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