
Co, Cu, Ni, and Ca Sorption by a Mixed Suspension of Smectite and Hydrrous Manganese Dioxide

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Abstract: The sorption properties of Co, Cu, Ni, and Ca were studied in a mixed mineral suspension of synthetic MnO₂ and Wyoming montmorillonite. The distribution of the sorbed cations between the two solid phases was measured by indirect chemical fractionation with acidified NH₂OH-HCl and by direct X-ray spectroscopic analysis of mineral particles using electron microscopy. Electron microscope and NH₂OH-HCl measurements of the quantity of Co sorbed on MnO₂ agreed within 6%. Seventy-seven, 67, and 69% of the total Co, Cu, and Ni sorbed by the mixed mineral suspension was found on the manganese oxide. The opposite distribution was found for sorbed Ca with 28% on the manganese oxide and 72% on the montmorillonite particles. The observed differences in metal sorption by these minerals are related to the cation-sorption mechanisms of manganese oxide and montmorillonite.

Key Words: Adsorption • Analytical transmission electron microscopy • Birnessite • Cation exchange • Manganese oxide • Montmorillonite • Transition metals

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