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# Complexes of Diethylenetriamine (DIEN) and Tetraethylenepentamine (Tetren) with Cu (II) and Ni (II) on Hectorite

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**Abstract:** The nature of the complexes in aqueous solutions of Cu(II) and Ni(II) with diethylenetriamine (dien) and tetraethylenepentamine tetren) is pH-dependent. At M(II):dien = 2 and M(II):tetren = 1, the main complexes are  $[M(\text{dien H})_2(\text{H}_2\text{O})_2]^{4+}$  and  $[M(\text{tetren H})(\text{H}_2\text{O})_2]^{3+}$ . In excess ligand (pH = 10.30), the majority species are  $[M(\text{dien})_2]^{2+}$  and  $[M(\text{tetren})(\text{H}_2\text{O})]^{2+}$ , and considerable amounts of monoprotonated amines are adsorbed. The surface of hectorite prefers the tetragonally distorted complexes in all cases studied. The complexes readily lose their axially coordinated water molecules to form planar complexes on the interlamellar surface. The planar Ni(II)-complexes are diamagnetic, showing that the surface is a very weak axial ligand. The divalent complexes  $[M(\text{dien})_2]^{2+}$  and  $[M(\text{tetren})(\text{H}_2\text{O})]^{2+}$  can also be partially transformed to the corresponding planar forms on the surface, especially in the case of  $[\text{Cu}(\text{dien})_2]^{2+}$ . The driving forces are thought to be the acid nature of the clay-adsorbed water and the gain in crystal field stabilization energy of the transition metal ions.

**Key Words:** Amines • Complexes • Hectorite • Spectroscopy • Thermal Stability • Transition Metals

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