Electron-Optical Study of Smectites*

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Abstract: The combined use of electron microscopy and of selected area diffraction (SAD) has been applied to the study of montmorillonites from Wyoming and from Camp-Berteaux, of nontronite, and of hectorite. The study shows that only the elementary layers of the Wyoming montmorillonite and of the nontronite are single two-dimensional crystals. The elementary layers of the montmorillonite from Camp-Berteaux are formed by edge-to-edge associations of very small elements with mutual orientations of about 60 ° or multiples of 60 ° . The layers of hectorite are formed by edge-to-edge association of laths with fluctuations of orientation of the order of 10 ° rotation around adjoining edges. The SAD patterns of Wyoming montmorillonite show that the single layer plane symmetry group of this mineral is *c*1*m*1; nontronite layers belong to the symmetry group *c*2*mm*. The study of thick particles shows that in turbostratic smectites the layers are stacked with mutual rotations around the perpendicular to their plane. This mode of stacking explains the absence of *hkl* reflections. High resolution diffraction (HRD) patterns obtained with sample inclined to the electron beam show that only the structure of hectorite approaches the ideal model; nontronite and montmorillonite exhibit appreciable distortions with respect to the ideal model. HRD diagrams provide precise information for the refinement of the crystal structures of smectites.

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