
Interrelated Features of Structure and Stacking of Kaolin Mineral Layers

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Abstract: Layer stackings in the ideal and real kaolinite structures are considered in terms of layer orientations $i = 1, 2, \dots, 6$, intra- and interlayer displacements of adjacent O- and T-sheets, \mathbf{s}_i and \mathbf{t}_k , distortions of these displacements δ_1 and δ_2 , deviations of unit cell parameters $\eta_i = b_i^2/a_i^2 - 3$, $\varepsilon_i = \gamma_i - \pi/2$, and normal projections \mathbf{c}_n of the axis vector \mathbf{c} on the ab plane.

The ideal monoclinic angle of dickite ($\mathbf{c}_{nx} = -1/3$) and the deviation $\alpha - \pi/2 \neq 0$ for kaolinite are explained by combinations of the δ_1 and δ_2 values in the sequence of symbols \mathbf{s}_i and \mathbf{t}_k defining the corresponding structures. Twenty stacking variants in the 3 successive layers of the kaolinite structure are derived, incorporating layer orientations of the same parity, displacements $\mathbf{t}_{+,-} = [0, \pm 1/3]$ and reflection operations in planes normal to the axis b_3 . Two deformation mechanisms are proposed for the accommodation of successive layer unit cells adjusting either angular or linear parameters at the agreement of either linear or angular parameters corresponding.

Key Words: Dickite • Halloysite • Kaolinite • Polytypism • Stacking faults

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