
Chemistry of Illite/Smectite and End-Member Illite

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Abstract: Chemical data from three different series of diagenetic illite/smectites (I/S), analyzed statistically by two regression techniques, indicate that the content of fixed-K per illite layer is not constant, but ranges from ~ 0.55 per $O_{10}(OH)_2$ for illite layers in randomly interstratified I/S ($R=0$; > 50% smectite layers) to ~ 1.0 per $O_{10}(OH)_2$ for illite layers formed in ordered I/S ($R>0$; <50% smectite layers). By extrapolation of the experimental data, the following chemical characteristics were obtained for end-member illite derived from the alteration of smectite in bentonite: average fixed-K per illite layer = 0.75 per $O_{10}(OH)_2$; total charge = about -0.8 ; cation-exchange capacity = 15 meq/100 g; surface area (EGME) = 150 m²/g.

Key Words: Bentonite • Chemical composition • Diagenesis • Illite • Illite/smectite • Smectite

Clays and Clay Minerals; August 1986 v. 34; no. 4; p. 368-378; DOI: [10.1346/CCMN.1986.0340403](https://doi.org/10.1346/CCMN.1986.0340403)

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