
Gallium and Chromium Substitution for Aluminum in Synthesized Beidellite

Kerstin B. Brandt and Ronald A. Kydd

Department of Chemistry, University of Calgary, 2500 University Dr. N.W., Calgary, Alberta, Canada T2N 1N4

Abstract: The hydrothermal synthesis of Mg-beidellite in which limited amounts of Ga and Cr are clearly shown to be incorporated into nonexchangeable positions in the clay layer framework is reported for the first time. Elemental analyses indicate that, up to at least 15 mole percent, Ga can replace Al virtually completely; Cr incorporation is more difficult. It appears that the Ga that is incorporated into the beidellite is located primarily in the octahedral sheet. Pillaring of the synthesized beidellite by replacing the Mg^{2+} with large $AlO_4Al_{12}(OH)_{24}(H_2O)_{27}^{7+}$ ions showed that approximately 5.5 meq Al^{3+} was required per g of beidellite to achieve complete pillaring. This amount is very similar to that required for montmorillonite, and suggests that the cation exchange capacity (CEC) of the beidellite is about 98 meq/g.

Key Words: Beidellite Synthesis • Chromium • Gallium • Isomorphous Substitution

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