Thermal Behavior and Decomposition of Intercalated Kaolinite

Magda Gábor[1], Mária Tóth[2], János Kristóf[3] and Gábor Komáromi-Hiller[1]

[1] Institute of Inorganic and Analytical Chemistry, L. Eötvös University, P.O. Box 32, H-1518 Budapest, Hungary
[2] Research Laboratory of Geochemistry of the Hungarian Academy of Sciences, Budapest, Hungary
[3] Department of Analytical Chemistry, University of Veszprém, H-8201 Veszprém, P.O. Box 158, Hungary

Abstract: Intercalation complexes of a Hungarian kaolinite were prepared with hydrazine and potassium acetate. The thermal behavior and decomposition of the kaolinite-potassium acetate complex was studied by simultaneous TA-EGA, XRD, and FTIR methods. The intercalation complex is stable up to 300 ° C, and decomposition takes place in two stages after melting of potassium acetate intercalated in the interlayer spaces. Dehydroxylation occurred, in the presence of a molten phase, at a lower temperature than for the pure kaolinite. FTIR studies revealed that there is a sequence of dehydroxylation for the various OH groups of intercalated kaolinite. The reaction mechanism was followed up to 1000 ° C via identification of the gaseous and solid decomposition products formed: H_2O, CO_2, CO, C_3H_6O, intercalated phases with basal spacings of 14.1 Å, 11.5 Å, and 8.5 Å as well as elemental carbon, $K_4H_2(CO_3)_3 \cdot 1.5H_2O$, $K_2CO_3 \cdot 1.5H_2O$, and $KAlSiO_4$.

Key Words: Infrared spectroscopy • Intercalation • Kaolinite • Thermal Analysis • X-ray powder diffraction

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