
Preparation of Montmorillonite-Nylon Complexes and Their Thermal Properties

Chuzo Kato, Kazuyuki Kuroda and Masahiro Misawa

Department of Applied Chemistry, School of Science and Engineering Waseda University, Shinjuku-ku, Tokyo, Japan 160

Abstract: Montmorillonite-aminocaproic acid complexes (monomer complexes) were prepared by the intercalation of 6-aminocaproic acid to various homoionic (Na^+ , Ca^{2+} , Mg^{2+} , Co^{2+} , and Cu^{2+}) montmorillonites. Infrared spectra of the monomer complexes indicated that the interaction between the exchangeable cations and the 6-aminocaproic acid increased in the following order: Na-, Ca-, and Mg- < Co- < Cu-montmorillonite-aminocaproic acid complex. Montmorillonite-nylon complexes (polymer complexes) were prepared by thermal treatment of the monomer complexes, which was confirmed by X-ray powder diffraction and infrared spectroscopy the results of which indicated the condensation of 6-aminocaproic acid in the interlayer space.

Thermal degradation of montmorillonite-nylon complexes was studied by thermogravimetry. It was found that the thermal stability of the polymer complexes increased in the following order: Cu- < Co- < Na- < Mg- < Ca-montmorillonite-nylon complex.

It was suggested that the difference in thermal stability depended upon the length of the polymer chain which might be influenced by the interaction between the exchangeable cations and the 6-aminocaproic acid. The activation energy for the thermal degradation of each montmorillonite-nylon complex was obtained, and the value for Cu-montmorillonite-nylon complex was smaller than that for the other cation-exchanged montmorillonite-nylon complexes.

Key Words: Aminocaproic Acid • Intercalation • Montmorillonite • Nylon • Polymer

Clays and Clay Minerals; April 1979 v. 27; no. 2; p. 129-136; DOI: [10.1346/CCMN.1979.0270209](https://doi.org/10.1346/CCMN.1979.0270209)

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