
Infrared Studies of Ni-Bearing Clay Minerals of the Kerolite-Pimelite Series

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Abstract: Two kerolite and one garnierite samples were subjected to progressive heat treatments prior to their examination by infrared spectroscopy (IR) in the 1200– 600-cm⁻¹ and 3800– 3000-cm⁻¹ regions. The heat treatment of the garnierite (a mixture of nepouite and pimelite) selectively dehydroxylated the nepouite thus allowing an examination to be made of the OH-vibration bands due to the pimelite. Both the relative intensities of the 710– 670-cm⁻¹ doublet and of the different OH-stretching bands indicated the Ni content of this pimelite to be about 70%. The heat treatments did not modify the 1200– 600-cm⁻¹ region of the spectra of kerolites but caused a noticeable sharpening in the OH-stretching region. The relative intensities of the structural OH-stretching bands of dehydrated kerolites showed that they differ from Ni-talcs of similar composition in the distribution of Ni and Mg in the octahedral sites. These cations are randomly distributed in Ni-talc but are mainly segregated into Mg and Ni domains in kerolite. Changes in sharpness, intensity, and position of the structural OH-stretching bands of the kerolites as temperature increases and dehydration progresses are similar to those undergone by Mg- or Li-saturated trioctahedral smectites. Also thermal analysis curves of these minerals show similarities with those of Mg- and Ni-saturated smectites, and suggest that in kerolites too, the hydration water is associated with interlayer (though non-exchangeable) Ni and/or Mg cations.

Key Words: Dehydroxylation • Garnierite • Infrared spectroscopy • Kerolite • Nickel • Pimelite

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