
Interlayer Water and Swelling Properties of Natural and Homoionic Corrensite

Maria Franca Brigatti¹ and Luciano Poppi²

¹ Istituto di Mineralogia e Petrologia dell'Università Via S. Eufemia 19, 41100 Modena, Italy

² Istituto di Mineralogia e Petrografia dell'Università Piazza di Porta S. Donato 1, 40100 Bologna, Italy

Abstract: A corrensite-like mineral, from near Borgotaro, Parma (Taro Valley, Italy), was studied by X-ray powder diffraction (XRD) and thermal analysis at different temperatures and water vapor pressures in the natural state and after exchange with ten different cations. In the natural state the mineral is characterized by a basal reflection at ~ 29 Å shifting to ~ 24 Å on heating and to ~ 32 Å by glycerol treatment. The dehydration features of the homoionic minerals show that the stability of the complex of water, compensating cation, and silicate framework depends on the electrostatic energy of the water dipole in the cation field, similarly to smectite.

XRD of the exchanged mineral shows a basal reflection of ~ 58 Å particularly in the NH_4^- , Rb-, and Ba-exchanged states. This value suggests a structure characterized by a regular sequence of silicate layers with different layer charge, that generally results in a c periodicity of ~ 29 Å, but which shifts to ~ 58 Å, and perhaps higher values, because of small differences in the compensating cation layers.

Key Words: Chlorite • Corrensite • Dehydration • Exchange cations • Smectite • Water • X-ray powder diffraction

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