Quantification Curves for XRD Analysis of Mixed-Layer 14 Å/10 Å Clay Minerals

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Abstract: Using theoretical profiles of diffracted X-ray intensity for interstratification between layers having d-spacings around 14.3 Å and 10.1 Å, a series of diagrams was derived from which the proportion of 14.3 Å layers (W_{14}) and the probability of passing from a 14.3 Å layer to a 10.1 Å layer ($P_{14/10}$) can be derived. W_{14} can be derived independently of $P_{14/10}$ using the angular distance between reflections situated at 18.2 ° and 25.4 ° 2θ (CuKα). Once W_{14} is determined, $P_{14/10}$ may be obtained using the angular width of the diffuse reflections between 27 ° and 34 ° 2θ. In this case, two different diagrams are proposed for $P_{14/10}$ determination because experimental X-ray patterns show either one or two diffuse reflections. Comparison of five experimental patterns with theoretical patterns calculated using W_{14} and $P_{14/10}$ obtained using these diagrams indicates that the method can be useful for determining W_{14} and $P_{14/10}$ in unknown samples. Moreover, the method described is independent of the Lorentz polarization factor and the layer type. The d-spacings associated with the two kinds of layers, however, should be similar (± 1%) to those for which the determinative diagrams were calculated.

Key Words: Biotite • Chlorite • Interstratification • Mixed-layer quantification • Vermiculite

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