
Orienting Internal Standard Method for Clay Mineral X-ray Analysis

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Abstract: Use of a platy internal standard that will orient to the same degree as clay minerals preserves the relative diffraction intensities between the basal reflections from the platy components, regardless of degree of orientation. The method is illustrated with basic zinc chloride and pyrophyllite as the internal standards for quantitative clay mineral analysis in the systems kaolinite-1M_d illite and 2M₁ muscovite-montmorillonite. Illite does not orient to the same degree as kaolinite at high illite concentrations.

In such non-linear systems empirical working curves are more reliable than fixed ratios of the scattering powers of the clay minerals present. Random interstratification of 10/15.4 Å layers causes a minimum in 001/001 peak height at about 33% of the 15.4 Å component. Peak width varies in a similar but inverse pattern, so that the integrated intensity increases in a smooth curve from muscovite to montmorillonite. The major error in application of this quantitative method arises from uncertainty as to the correct allocation of peak areas in cases of overlap of the mixed-layer peak with those of discrete 10 Å and 14 Å clays also present.

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