
Illite “ Crystallinity” Revisited

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Abstract: The Kübler Index (KI) is defined as the full width at half-maximum height (FWHM) of the 10- Å X-ray diffraction peak of illite-smectite interstratified (I-S) clay minerals. The only parameters controlling the Kübler Index are assumed to be the mean number of layers (N) in the coherent scattering domains (CSD), the variance of the distribution of the number of layers of the CSD, the mean percentage of smectite layers in I-S (%S), and the probability of layer stacking (Reichweite).

The Kübler-Index measurements on air-dried (KIAD) and ethylene-glycolated (KIEG) samples were compared to N and %S using the NEWMOD computer program to simulate X-ray diffraction patterns. Charts of KIAD *versus* KIEG corrected for instrumental broadening were made and isolines were mapped for constant N and %S. Isolines allow a direct and rapid determination of N and %S from KI measurements.

The method allows quantification of the metamorphic anchizone limits by considering mean thickness of fundamental particles in MacEwan crystallites. The transition from diagenesis to the anchizone and from the anchizone to the epizone of low-grade metamorphism corresponds to thicknesses of 20- and 70-layer fundamental particles, respectively.

Key Words: Anchizone • Coherent Diffracting Domain Thickness • Expandable Layer • Fundamental Particles • Illite “ Crystallinity” • Illite-Smectite Interstratification

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