A Method for the Quantitative Estimation of Clay Minerals in North Pacific Deep-Sea Sediments

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Abstract: The addition of a 10% talc internal standard to North Pacific sediments allows the relative abundances of clay minerals to be determined both accurately and precisely by X-ray powder diffractometry. Linear programming can be used to generate factors for converting talc-normalized peak areas to weight percentages; hence, absolute clay-mineral abundances can be estimated. This procedure minimizes residuals (nondiffracting or poorly crystalline components), but its accuracy is untested. Even this procedure results in an average residual of almost 30% for North Pacific sediments; other peak-area to weight conversion schemes generate even larger values.

In general, there is no correlation between clay-mineral abundances estimated from talc-normalized peak areas and abundances derived from the assumption that the sum of smectite, illite, kaolinite, and chlorite is 100%. This accounts for the past difficulties in relating bulk-sediment chemistry to clay mineralogy.

Key Words: Clay Distribution • Clay Quantification • Deep-sea • Pacific • X-ray Methods