QUANTITATIVE ANALYSIS OF CLAY MINERALS

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ABSTRACT

EXAMPLES are given of the varying morphological habits of kaolinite and illite in sedimentary deposits and soils. Some of the plates may even have a thickness of too few unit cells to permit detection by X-ray analysis.

Different nomenclatures and modes of identification have created difficulties in the classification of the clay minerals, in particular for the illite- and chlorite-related minerals. The same mineral may be known in the literature under different names and as belonging to different mineral groups.

Quantitative analysis of clay minerals from rock deposits and soils by X-ray, thermal, and infrared analysis is treated. Examples are given of the large variability in the quantitative determinations. They are caused mainly by varying degrees of order in the arrangement and the composition of the clay mineral components. Other errors arise from the presence of an amorphous (Beilby) layer on the surfaces of the particles. Clay minerals from soils, as compared to those from hydrothermal deposits, give poor patterns of small intensity. Quantitative analysis of soil clay minerals is further hindered because specific characteristics for a certain mineral may be masked by those of other minerals that occur in the same soil type.

The C.E.C. capacity method is not suited for quantitative analysis because C.E.C. of clay minerals is directly related to their specific surface, moisture absorption capacity, or heat of immersion and not to the kind of clay mineral. Amorphous Fe, Al, Si matter in soils has a smaller C.E.C. per unit of surface than for the artificial cation exchangers.

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