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# Dickite and Kaolinite in Pennsylvanian Limestones of Southeastern Kansas

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**Abstract:** Dickite and kaolinite are polymorphs of  $\text{Al}_4(\text{Si}_4\text{O}_{10})(\text{OH})_8$ . Dickite traditionally is regarded as hydrothermal, based on field and laboratory evidence. Dickite and kaolinite occur in cavities in phylloid algal limestones, in interstices of biocalcarenes and sandstones, and along joints, fractures, and stylolites, in Pennsylvanian rocks exposed throughout 9600 square miles of southeastern Kansas. The stratigraphic interval of approximately 1100 ft extends from the Fort Scott Limestone (Desmoinesian) through the Lecompton Limestone (Virgilian). The best crystallized dickites are found in porous algal limestones as pockets of glistening white powder composed of well developed pseudo-hexagonal plates up to 40  $\mu$  across. Very well crystallized kaolinites occur similarly, except the crystals are much smaller. Less well crystallized dickites and *b*-axis disordered kaolinites occur in less porous rocks. Variations in crystal size and morphological development are genetically significant.

Dickite-kaolinite distribution is related to: (1) stratigraphic alternation of limestones and impervious shales; (2) gentle, westward regional dip; (3) thick, mound-like buildups of highly porous algal limestones, miles in length and width; (4) igneous intrusions (early Tertiary?) in Woodson and Wilson counties. Dickite is confined to an elliptical area 125 miles long northeast-southwest, extending 60 miles eastward from the intrusions. Dickite is associated preferentially with porous algal mounds. Kaolinite occurs in less porous rocks within the dickite area, and also is abundant well beyond. Heated groundwaters, possibly mixed with magmatic waters, moved readily up-dip and along strike outward from the intrusions through the conduit-like algal mounds; dickite was deposited from such solutions. Where water movement was restricted or where water had travelled tens of miles from the intrusions, water temperature fell below the limit for dickite crystallization, and kaolinite precipitated instead. Kansas dickite, unlike most other reported dickites, formed in rocks that were neither deeply buried nor extensively altered hydrothermally.

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