THE AMERICAN MINERALOGIST, VOL. 50, JULY-AUGUST, 1965

KAOLINITE MACROCRYSTALS FROM NEAR WOODSTOWN, N. J.

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INTRODUCTION

Immediately beneath the Alloway clay of Salem County, New Jersey a quite consistent kaolinite horizon is found. It is up to ten feet thick, covers a substantial area and is unique in several aspects. Ries and Kummel (1904) described this material as a white, micaceous talc-like clay. It is occasionally pure white, but locally stained by ferric iron oxide. The texture is open and, when dry it is light and almost fluffy. Upon washing, a substantial part is retained on a 200 mesh screen in the form of the colorless, transparent, thin platelets, in appearance very much like muscovite. The largest platelets are 65 mesh (0.2 mm), but most of them are between 100 and 200 mesh in size. Only a little quartz occurs in the sand-size fraction, together with some limonitic aggregates and occasional graphite platelets. The silt-size material contains quartz in addition to some limonite, and the clay-fraction is fairly plastic and of a yellowish color.

These colorless platelets, which form the bulk of the sand-size material were identified as kaolinite by DTA and x-ray diffraction; a micrograph in transmitted light is given in Fig. 1.

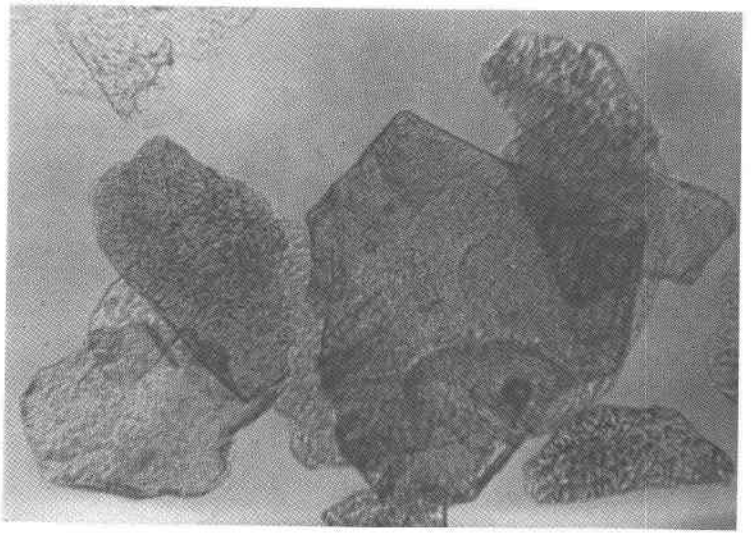

FIG. 1. Sand-size kaolinite platelets (×185).

The coarse kaolinite layer was found in seven auger holes near the surface. No actual outcrops were seen, probably because the material is prone to rapid erosion. The few wells drilled in recent years down the dip report a white talc-like layer which may be related to the kaolinite layer.

Composition

A characteristic size distribution shows a double mode for kaolinite with maxima at 15.0 and approximately 0.5 microns, and a single mode for quartz at 45 microns. The finest fraction is composed of kaolinite plus approximately 25% amorphous hydrous aluminum silicates (allophane ?) and 5% hydrous iron oxides.

Diffraction peaks of the 001 and 002 reflections were measured on some single kaolinite platelets. Good crystals have the 001 reflection at 7.16 Å; those platelets showing substructure in Laue patterns have double peaks at 7.19 and 7.09 Å for the 001 line and at 3.58 and 3.54 Å for the 002 reflection. The large basal reflections suggest nacrite-type spacing (Bailey, 1963), but other lines are not in agreement.

Chemical composition of the purified kaolinite is as follows: SiO_2—43.8%; Al_2O_3—39.1%; Fe_2O_3—0.90%; K_2O—0.40%; Na_2O—0.18%; L.I.—15. 25%; Total—99.63%. The alkalies are due to distinct grains of feldspar and muscovite inclusions; most of the iron oxide is in the form of iron oxide stains.

DTA thermograms of the purified fraction have the single deshydroxilation endotherm at 600° C. and the sharp narrow exotherm at 980° C. characteristic of well-developed kaolinite.

References

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THE AMERICAN MINERALOGIST, VOL. 50, JULY-AUGUST, 1965

SYNTHESIS OF A NEW MICA, $KMg_{2.5}[Si_4O_{10}]D(OH)_2$[1]

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In the course of a more extensive experimental study on phlogopite solid solubility, a mica intermediate between the dioctahedral and trioctahedral mica series was synthesized in the pure system K_2O-MgO-SiO_2-H_2O. Standard hydrothermal techniques were employed using start-

[1] Research supported by Deutsche Forschungsgemeinschaft, Bad Godesberg, Germany.