PROCEEDINGS OF SOCIETIES

MINERALOGICAL SOCIETY (LONDON)

A meeting of the Society was held Thursday, November 25, 1948, in the apartments of the Geological Society of London, Burlington House, Piccadilly, W.1 (by kind permission). The following papers were presented:

(1) Baryte bearing nodules from the Middle Lias of the East Midlands.

By Dr. J. H. Taylor.

In parts of Leicestershire, Rutland and Northamptonshire the *margaritatus* zone of the Middle Lias contains a series of carbonate nodules. Some are of "cementstone" type, consisting largely of fine-grained calcite, others of "clay-ironstone" type, in which the carbonate is chalybite (containing approximately 80% $FeCO_3$). In their septarian cracks the nodules contain widespread baryte, calcite, blende and pyrite. The structure of the mineral infillings of these cracks is illustrated and their paragenesis discussed.

(2) X-ray studies of halloysite and metahalloysite. Part I. The structure of metahalloysite, a random layer structure.

By Dr. G. W. Brindley and Mr. K. Robinson.

The *x*-ray powder diagram of metahalloysite consists of basal reflections, 001, and two-dimensional diffraction bands, *hk*. No reflections of type *hkl* occur. The basal reflections indicate a layer spacing of 7.2Å. The two-dimensional bands are interpreted quantitatively by application of Warren's theory of diffraction by two-dimensional layer structures. The results show that the layer has the same structure and dimensions as the layers in other kaolin minerals, and that the linear dimensions of the crystalline sheets are of the order of 150–200Å. This appears to be the first quantitative study of such diffraction bands.

(3) X-ray studies of halloysite and metahalloysite. Part II. The transition of halloysite to metahalloysite in relation to relative humidity.

By Dr. G. W. Brindley and Mr. J. Goodyear.

Two methods are described of determining the interlayer water content of halloysite and metahalloysite: (*a*) a weighing method, (*b*) an *x*-ray method, involving the use of the Hendricks-Teller theory of reflections by statistical arrangements of kaolin and water sheets. It is shown that in atmospheres of controlled humidity the water content of both minerals is variable. In the driest atmospheres, the formula of metahalloysite approximates to $Al_2O_3 \cdot 2SiO_2 \cdot 2\frac{1}{2}H_2O$. The results are compared with published analyses.

(4) X-ray studies of halloysite and metahalloysite. Part III. The effect of temperature and pressure on the halloysite-metahalloysite transition.

By Dr. G. W. Brindley, Mr. K. Robinson and Mr. J. Goodyear.

The (001) spacing of metahalloysite produced at low temperatures or in dry atmospheres is of the order of 7.4–7.5Å. By heating to 450°C., this spacing is progressively reduced to 7.25Å, approximately the value for kaolinite. This is interpreted in terms of the expulsion of the residual water layers in the 7.5Å-metahalloysite. By application of pressures up to 75,000 lbs./sq. in., a large measure of dehydration of halloysite is obtained. Orientation of the crystallites is produced. Geological implications are considered.

(5) CRYSTALLISATION OF BASALTIC MAGMA AS RECORDED BY VARIATION OF CRYSTAL-SIZE IN DIKES.

By Dr. H. G. F. Winkler. (To be taken as read.)

Across a dike, curves representing the size variation of crystals which have crystallised in various temperature ranges, are given. A number of these diagrams constructed for different thicknesses of dikes are used for comparison with the graph showing the variation of crystal-sizes actually observed in nature. Measurements of the sizes of plagioclase, pyroxene and magnetite at various distances from the walls of the Cleveland dike (Great Ayton, Yorkshire) have been carried out. The three curves representing crystal-size at various distances are characteristically different and can be compared with the constructed diagrams and thus interpreted. The characteristic shape of the curves found in the dike is explained. Furthermore, it becomes possible to establish the temperature ranges in which the three minerals have crystallised in the magma. Taking into account the actual quantities of crystallised minerals a table is given showing the temperature ranges and the quantities of minerals crystallised in the magma during the cooling process. The results are in full accordance with physico-chemical and petrographical studies.

(Titles and abstracts submitted by G. F. Claringbull, General Secretary)