TRIGONAL PARAGONITE FROM CAMPBELL AND FRANKLIN COUNTIES, VIRGINIA

RICHARD V. DIETRICH, *Virginia Polytechnic Institute, Blacksburg, Virginia.*

Trigonal paragonite, which, to the writer's knowledge, has never been reported to occur at any locality, has been found to occur with kyanite at two localities on the western part of the Piedmont of Virginia. The identity of the mica from these localities was determined in the early stages of an investigation of the mineralogy and chemistry of mica-kyanite associations. This investigation, which is being carried on currently, was initiated because it was noted that, in Virginia, white mica(s) are typically associated with light blue or nearly white kyanite(s), green mica(s) are associated with darker blue kyanite(s), etc.

The paragonite occurs in central Campbell County and in southeastern Franklin County. At the Campbell County locality, which is located approximately five miles west of Rustburg and nearly 7.5 miles south of the city limits of Lynchburg, the paragonite occurs in a vein that consists of an irregular outer zone composed chiefly of light blue to nearly white kyanite and a central zone consisting of paragonite plus minor amounts of quartz. The vein is in a garnetiferous biotite-muscovite gneiss-schist indicated on the Geologic Map of Virginia (Stose, 1928) to be Wissahickon. The paragonite occurs as thin films along cleavage planes of the kyanite of the outer zone and as rosettes, up to one inch in diameter, in the central zone of the vein. At the Franklin County locality, which is located about 8.6 miles south-southeast of Rocky Mount and 4.3 miles east of Sydnorsville, the paragonite occurs intimately associated with light blue kyanite and muscovite in a quartz vein which also is in a mica gneiss-schist indicated on the Geologic Map of Virginia (*ibid.*) to be Wissahickon. The mixture constitutes pseudomorphs, prisms up to $2\times2\times7$ inches in size, after andalusite.

The properties are essentially the same for each of the paragonites. They may be listed as follows: white to silvery white; pearly to subvitreous; transparent; perfect basal cleavage; H.—$2\frac{1}{2}$; S.G. 2.86; colorless in transmitting light; uniaxial (−) with some grains exhibiting a slight biaxiality but in all cases with $2V<5°$; n_ω—1.598 (Campbell County material) and 1.599 (Franklin County material); n_ϵ—1.564 (Campbell) and 1.565 (Franklin); Na−4.05 per cent and K—1.34 to 1.40 per cent for the Campbell County paragonite, determination by flame photometer; differential thermal analysis curves derived from heating −50 mesh material are essentially equal in form to the curve given for muscovite by Grim (1953, p. 197) but with the endothermic peak at 820° C.;

x-ray analyses, using both a General Electric *XRD*-3 diffraction unit with a No. 1 spectrogoniometer and a Westinghouse unit with a 114.6 mm. Phillips camera setup (CuKα radiation with a nickel filter was employed with both setups and, in addition, CoKα radiation with an iron filter was employed with the XRD-3 unit) indicate that the material has the 3-layer trigonal structure and that it has *d* values as listed (Table 1).

TABLE 1. *X*-RAY POWDER DATA FOR TRIGONAL PARAGONITE

d(Å)	*I*	*d*(Å)	*I*
9.604	VS	2.125	W
5.336	M	1.980	W
4.818	VS	1.932	VS
4.425	VW	1.819	W
4.267	W	1.770	W
3.948	VW	1.671	W
3.573	W	1.612	Md
3.218	VS	1.541	W
3.046	M	1.476	Md
2.820	M	1.379	M
2.627	VW	1.312	W
2.540	VW	1.259	Md
2.428	Sd	1.229	VW
2.348	Wd	1.205	W
2.285	W		

In order to determine the *d* values for the major peaks with greatest accuracy, the *XRD*-3 unit was used with a scanning rate of 1°/5 min. The 114.59 mm. camera was used in order to corroborate the systematic classification; the patterns obtained by using this latter setup were compared with patterns given for the different polymorphic forms of mica by Levinson (1955), Heinrich and Levinson (1955), and Grim *et al.* (1951).

As is apparent from the *x*-ray data, the distance between layers in the paragonite is shorter than that between layers in muscovite. The actual range of values obtained for the paragonite is 9.60 Å to 9.66 Å (003) as compared to 9.98 Å (002) for muscovite. This difference is of the order of magnitude that would be expected from considerations concerning the atomic radius of Na^+(.98 Å) versus that of K^+(1.33 Å).

It is perhaps of interest that the andalusite pseudomorphs were composed of approximately five per cent paragonite, five per cent muscovite (monoclinic), and 90 per cent kyanite. These percentages were determined by grinding the material of the pseudomorphs to −100–+200 mesh, separating the micas from the kyanite by a sink-float method employing acetylene tetrabromide (G. 3.00), weighing both the sink (mainly kyanite) and the float (mainly mica) fractions, and counting under a petrographic microscope grains of muscovite and paragonite of the float fraction.

Determinations of sodium and potassium by flame photometer were made in the laboratories of the VPI Agronomy Department by J. E. Akers. *X*-ray and differential thermal analyses were made in the laboratories of the VPI Physics and Agronomy departments which are, respectively, under the direction of Webster Richardson and C. I. Rich. J. J. Glass of the U. S. G. S. checked part of the optical data. B. W. Nelson of the VPI Department of Geological Sciences discussed certain aspects of the investigation with the writer. All these contributions to the investigation are acknowledged gratefully.

References

Grim, R. E., Bradley, W. F., and Brown, G. (1951), The mica clay minerals: *X*-ray identification and crystal structures of clay minerals: Chapter V, pp. 138–172, *Mineralogical Society of Great Britain.*

Grim, R. E. (1953), Clay Mineralogy: McGraw-Hill, New York, 384 p.

Heinrich, E. W., and Levinson, A. A. (1955), Studies in the mica group; *X*-ray data on roscoelite and barium-muscovite: *Am. Jour. Sci.*, **253,** 39–43.

Levinson, A. A. (1955), Studies in the mica group: polymorphism among illites and hydrous micas: *Am. Mineral.*, **40,** 41–49.

Stose, G. W. (1928), supervisor of preparation, Geologic map of Virginia: Virginia Geological Surv., map.

A MODIFIED SAMPLE HOLDER FOR THE NORELCO ROTATING SPECIMEN DEVICE

J. L. McAtee, Jr., *Baroid Division, National Lead Company, P. O. Box 1675, Houston, Texas.*

Many powdered materials tend to become oriented when mounting them in the various *x*-ray sample holders. Among the more easily oriented materials are the clay minerals. It has been found necessary therefore to be extremely careful in the preparation of the powdered clay sample for *x*-ray diffraction examination. To minimize orientation, the sample must not be pressed into the specimen holder from the side that will be exposed to the *x*-ray beam. In order to obtain satisfactory conditions for clay samples with the Norelco low angle rotation specimen holder it was necessary to modify the holder so that orientation effects were minimized.