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X-RAY DIFFRACTION DATA FOR TAENIOLITE

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Since no listing of the x -ray pattern of taeniolite could be found in the literature or ASTM x -ray powder data file, the writer obtained some natural occurring taeniolite to secure a reference pattern. The taeniolite sample was supplied by Dr. C. S. Ross, U. S. Geological Survey and represents a portion of the original collection of taeniolite from Magnet Cove, Arkansas, described by Miser and Stevens (1938).

As in all micas, taeniolite has basal cleavage, and preferred orientation is to be expected. To obtain as random orientation as possible, a procedure described by Brindley and Kurtossy (1962) was employed to prepare the sample. The sample preparation is as follows: powdered Lakeside 70C cement is added to the powdered mica in the proportion 1 part cement to 5 parts mica. The mixture is ground for approximately 7 minutes. Dioxane is added to dissolve the cement while heating the mixture on a hot water bath. Mixing is continued with a spatula during dissolution and eventual drying of the mass. When the mixture is completely dried, it is ground to a very fine powder. This sample preparation procedure resulted in considerable improvement of intensities of the non-(001) planes. An x -ray diffraction pattern was obtained before and after the sample was treated in the above manner. Both patterns are given in Table 1. The diffraction patterns were obtained on a high-angle Norelco diffractometer with a Geiger counter as the sensing device and an automatic strip chart recorder as the recording instrument. Instrumental settings were: divergence and scatter slits 1 degree; receiving slit 0.006 inches, time constant, 4; multiplier, 1; scale factor, 8; filtered $CuK\alpha$ radiation. The diffraction patterns are found in Table 1.

The lattice constants for taeniolite are given by Yamzin *et al.* (1955) and appear below

$$a = 5.27 \text{ \AA}, \quad b = 9.13 \text{ \AA}, \quad c = 10.25 \text{ \AA}, \quad \text{angle } \beta = 100^\circ \pm 15'$$

The ideal chemical formula for taeniolite is $KMg_2LiSi_4O_{10}F_2$ and is classified as a tetrasilic mica after the classification system of Stevens (1946); that is, no aluminum substitution for silicon occurs in the tetrahedral position. Yamzin and coworkers (1955) determined that taeniolite has the phlogopite structure and is a single layered mica. The diffraction pattern of taeniolite was thus indexed by comparison to an indexed pattern of fluor-phlogopite.¹ The reflections with superscript ones in Table 1

¹ ASTM X-Ray Powder Data File, Card No. 10-494.

coincide with dickite reflections, and since there is a minor amount of dickite in the sample, the intensities of these reflections may be in slight error.

TABLE 1. X-RAY POWDER DIFFRACTION DATA FOR TAENIOLITE

As Received		After Special Sample Preparation		
d_{obs}	I/I ₁	d_{obs}	I/I ₁	hkl
10.05	65	10.04	74	001
5.00	50	5.01	44	002
4.51	1	4.48 ¹	7	020
		3.87	7	111
3.58	1	3.60 ¹	17	$\bar{1}12$
3.34	100	3.34	100	003
3.12	4	3.12	26	112
2.88	4	2.88	25	11 $\bar{3}$
2.68	3	2.68	12	023
		2.60	12	13 $\bar{1}$
2.577	1	2.575	13	200
2.50	6	2.50 ¹	9	004
2.39	1	2.398	17	201, 132
		2.25	2	22 $\bar{1}$
		2.23	2	220
2.146	1	2.145	11	202, 13 $\bar{3}$
2.00	55	1.999	35	005
		1.977 ¹	4	134
1.658	4	1.655 ¹	17	135, 006
1.523	2	1.521	7	33 $\bar{1}$
		1.507	5	060
1.490	1	1.491 ¹	3	116
1.428	5	1.423	4	007
1.35	4	1.350	11	136, 207
1.30	2	1.30	6	117, 206

¹ Intensity may be influenced by the presence of dickite.

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