A SECOND OCCURRENCE OF THE MINERAL SINHALITE ($2MgO \cdot Al_2O_3 \cdot B_2O_3$)*

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ABSTRACT

The undetermined *mineral B* occurring with serendibite in Warren County, New York, is identified with the recently described new mineral sinhalite from Ceylon.

In their paper on serendibite from Warren County, New York, Larsen and Schaller (1932) described two associated undetermined minerals, which they referred to as *mineral A* and *mineral B*. The recently described new mineral sinhalite ($2MgO \cdot Al_2O_3 \cdot B_2O_3$) from Ceylon (Claringbull and Hey, 1952) recalled to one of us these two undetermined minerals from New York State and suggested the possibility of *mineral B* being sinhalite. A comparison of the properties of these two minerals shows their identity, thus giving a second occurrence for sinhalite.

The type of occurrence and mineral association of serendibite from the two localities are the same: essentially a contact metamorphosed limestone. Serendibite from Ceylon occurs as thin layers in contact zones between limestone and a granulite (composed mainly of quartz and feldspar); but it is more common where blue spinel, apatite, scapolite, and plagioclase are present in addition to abundant diopside. It would be interesting to examine the serendibite material from Ceylon to see if any sinhalite occurs with it as it does with the New York serendibite. The serendibite from New York State likewise is in thin layers of a contact zone between limestone and an intrusive granite and is of hydrothermal contact-metamorphic origin. The associated sinhalite is of similar origin.

Mineral B, according to Larsen and Schaller (1932, p. 461), "... is closely associated with serendibite in the specimen that yielded the serendibite for analysis, but was not found in other specimens." In an unpublished notation, *mineral B* is referred to by Larsen as "white olivine"—a remarkably prophetic observation, made about 1920, as sinhalite may be considered as an olivine with boron proxying for silicon and one aluminum proxying for one magnesium, to balance the charges:

Olivine	$MgMgSiO_4$
Sinhalite	$AlMgBO_4$

The pertinent properties of *mineral B* from New York and of sinhalite from Ceylon follow:

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	Mineral B	*Sinhalite* (Average values)
Specific gravity	>3.20	3.48
Sign	Minus (−)	Minus (−)
2V	Rather large	55°–56°
α	1.665	1.668
β	1.692	1.698
γ	1.705	1.706
Birefringence	0.040	0.038

TABLE 1. X-RAY POWDER DIFFRACTION DATA FOR SINHALITE

Present Work Warren County, N. Y. Cu/Ni λ: K_α = 1.5418 Å, K_{α_1} = 1.54050 film 6350[1]		*Data of Claringbull and Hey* (1952) *Ceylon* Cu-K_α radiation (λ = 1.542 Å)			
		No. 18[2]		No. 5[2]	
d_{hkl} (Å)	I[3]	d (Å)	I	d (Å)	I
7.7	2	—	—	—	—
7.1	3	—	—	—	—
4.96	9	4.97	m	4.93	ms
3.99	7	4.00	mw	3.97	mw
3.74	6	3.77	w	3.73	vw
3.53	2	—	—	—	—
3.45	6	3.45	vw	3.43	vvw
3.27	8(?)	3.26	s	3.24	s
2.84	4	2.84	vvw	2.82	vvw
2.69	1	—	—	—	—
2.63	9	2.64	ms	2.62	s
2.47	6	2.47	vvw	2.46	vw
2.39	8	2.40	m	2.38	ms
2.32	7(?)	2.32	m	2.30	ms
2.27	4	2.27	vvw	—	—
2.15	10(?)	2.15	vs	2.14	vvs
1.929	5	1.94	vvw	1.93	vw
1.877	4	{1.876	vw	1.868	vw
1.804	3	{1.824	vvw	1.801	vvw
1.771	3(?)	1.785	vvw	1.764	vvw
1.740	2	—	—	—	—

[1] Pattern taken with 114.56-mm. camera using the Straumanis technique and ethyl cellulose rod-shaped mounts. Back reflection lines were obtained and film shrinkage was found to be negligible.

[2] Patterns were taken with 6-cm. camera.

[3] The question mark (?) after intensities of these sinhalite lines indicates that coincident diopside lines make the observed intensities questionable. Calibrated strips were used for intensity measurements. B, broad; VB, very broad.

TABLE 1—(*continued*)

Present Work Warren County, N. Y. Cu/Ni λ: K_α = 1.5418 Å, $K\alpha_1$ = 1.54050 film 6350[1]		*Data of Claringbull and Hey* (1952) *Ceylon* Cu-K_α radiation (λ = 1.542 Å) No. 18[2]		No. 5[2]	
d_{hkl} (Å)	I[3]	d (Å)	I	d (Å)	I
1.716	6	1.716	w	1.705	w
1.631	9(?)	1.632	s	1.621	vs
1.588	5	1.592	vvw }	1.576	vvwb
1.570	4(?)	1.568	vvw }		
1.540	5	1.541	w	1.534	w
1.523	6(?)	1.524	w	1.514	w
1.508	3(?)	—	—	—	—
1.427	7B(?)	1.427	m	1.420	ms
1.389	4	1.387	vvw	1.384	vw
1.368	1	—	—	1.360	vvw
1.346	6	1.347	vw	1.340	w
1.326	3(?)	1.324	vvw	1.320	vvw
1.307	1				
1.280	4				
1.249	6				
1.236	2				
1.187	3				
1.143	2				
1.135	3				
1.096	2B				
1.086	2				
1.081	3				
1.073	4(?)				
1.057	2				
1.045	3				
1.011	3B				
0.998	4B				
0.977	3B				
0.969	1				
0.952	1B				
0.935	3VB				
0.923	2B				
0.900 (α_1)	3				
0.8897	1				
0.8007 (α_1)	3VB				
0.8584	2				
0.8555 (α_1)	4				
0.8393	2				
0.8358 (α_1)?	3				
0.8244	2				
0.8215 (α_1)?	3				

Three x-ray powder diffraction patterns of *mineral B*, taken by and filed with the Geochemistry and Petrology Branch, U. S. Geological Survey, are as follows: Films 6350 and 7205 were taken from the same rod-shaped mount of material previously analyzed. This material contained the most admixed diopside, as indicated by the higher percentage of SiO_2. The x-ray diffraction data for sinhalite from New York State, shown in Table 1, were obtained from film 6350. Film 7205 is shown in

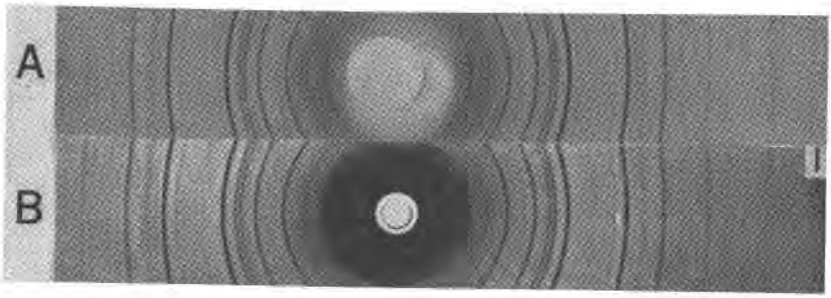

FIG. 1. X-ray diffraction patterns of sinhalite. *A*, sinhalite from Warren County, New York, film 7205 taken with a 57.3-mm. camera. Broken lines are attributed to diopside. *B*, sinhalite from Ceylon (reproduced from Fig. 1, plate 27, Claringbull and Hey, 1952). The print used in Fig. 1*A* was slightly enlarged to correspond with the reproduction in Fig. 1*B*.

Fig. 1. Another film, number 6336 (not shown in this report), was taken of a second sample, which had the least SiO_2. The x-ray powder diffraction pattern (film 7205) of *mineral B* is identical with that given for sinhalite from Ceylon (Fig. 1, plate 27, Claringbull and Hey, 1952), as shown in Fig. 1. X-ray diffraction data for sinhalite are shown in Table 1.

The only remaining material of the analyzed samples of *mineral B* was the exceedingly minute quantity clinging to the sides of the small glass sample tubes. Most of the obvious, colored impurities (greenish serendibite, blue spinel) were removed by hand picking before the samples were x-rayed. The samples were too small to permit removal of all the associated minerals, particularly of diopside, the most abundant mineral. This purified material was then x-rayed; the resulting pattern is shown in Fig. 1*A*. The broken lines shown in Fig. 1*A* are due to the presence of admixed diopside. As all the samples were used for the powder diffraction patterns, there is now no more of the analyzed material available.

The very poor, partial analyses of *mineral B*, made on a small quantity of material, are of value only in indicating that the mineral is not a silicate, and in indicating the presence of much Al_2O_3 and MgO. Boron was not tested for and it is not known how much the presence of boron affected the values for Al_2O_3 and MgO given in the old analyses. The samples analyzed contained as impurities diopside, serendibite, spinel, and possibly other minerals. Attempts to interpret the old analyses given for *mineral B* on the basis of assigning the silica to associated minerals were futile.

The undetermined *mineral A*, associated with *mineral B*, remains unidentified.

References

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