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**CANADA**

**DEPARTMENT OF MINES AND TECHNICAL SURVEYS**

**OTTAWA**

**MINES BRANCH INVESTIGATION REPORT IR 62-33**

**THE X-RAY IDENTIFICATION  
OF AUROSTIBITE FROM SOUTH AFRICA**

by

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**MINERAL SCIENCES DIVISION**

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SUMMARY OF RESULTS

Results of X-ray powder diffraction analyses of a sample submitted by Professor H.V. Eales of Rhodes University indicate that the sample is aurostibite.

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## INTRODUCTION

Early in 1961 Professor H.V. Eales of Rhodes University in Grahamstown, South Africa, sent to the Mines Branch an X-ray film containing a diffraction pattern suspected of being that of the mineral "aurostibite". He asked that the film be compared with the data in the files of our X-ray laboratory in order to establish whether or not the pattern was indeed that of aurostibite. Measurements and calculations were made on the basis of the data supplied with the film. However, although they did not differ greatly, they were not similar enough to support the identification of the pattern as being that of aurostibite. With the matter still in doubt, it was suggested to Professor Eales that he send his original X-ray mount so that a pattern obtained on the X-ray apparatus at the Mines Branch might be compared with patterns of the type material made on the same equipment. Dr. Eales concurred, and the mount was received on November 15, 1961. It proved to be exceedingly small, and consisted of a tiny rubber pellet which contained a minute amount of the powdered material. The work done with this tiny sample is the subject of the present report.

## METHOD OF PROCEDURE

Cameras of two different sizes were used to produce the powder patterns. One camera is 57.3 millimetres, the other 114.6 millimetres in diameter. Both cobalt radiation ( $\lambda$  1.77 Å) and copper radiation ( $\lambda$  1.540 Å) were used, each with an appropriate filter. The best results were obtained with copper radiation on the 114.6 mm diameter camera at an exposure time of 12 hours. The film obtained under these conditions (No. 610937) accompanies this report.

All measurements were made by the Straumanis method, and while a correction was made for the shrinkage factor, it was too small to have a significant effect on the values. Cell-edge determinations were made on all of the measurable lines, the calculations being based on the values in the ASTM index (Card 8-460).

RESULTS

Calculations based on the patterns made on the equipment in Ottawa are very closely in accord with those made on the standard aurostibite films in the film library of this laboratory.

TABLE 1

X-Ray Powder Diffraction Data

Film No. 610937    Camera Diameter 114.6 mm

I	d(A)	hkl	a <sup>o</sup>
5	6.320		
8	5.000		
5	4.256		
3	3.847	111	6.663
2	3.405		
5	3.328	200	6.656
2	3.050		
6	2.981	210	6.665
1	2.846		
1	2.794		
5	2.772	211	6.667
8	2.349	220	6.643
2	2.136		
9	2.007	311	6.656
4	1.918	222	6.644
3	1.846	230	6.655
6	1.775	321	6.641
1	1.523	331	6.638
2	1.485	420	6.641
1	1.452	421	6.653
$\frac{1}{2}$	1.431		
1	1.417	332	6.646
4	1.3588	422	6.652
7	1.279	511	6.645
2	1.235	432	6.650
1	1.216	521	6.660
5	1.176	440	6.660
1	1.125	531	6.655
1	1.1090	600	6.654

(Continued)

TABLE 1 (Concluded)

Film No. 610937 Camera Diameter 114.6 mm

I	d(A)	hkl	a <sup>o</sup>
1	1.0978	610	6.670
1	1.0149	533	6.655
1	1.0030	622	6.653
1	0.9927	630	6.659
1	0.9224	640	6.651
1	0.91459	641	6.658
1	0.9060	721	6.657
1	0.8896	642	6.657
5	0.8670	731	6.659
1	0.8527	650	6.659
1	0.8453	732	6.655
1	0.8324	800	6.659
1	0.8074	820	6.658
1	0.8017	821	6.658
1	0.7959	653	6.658
2	0.7847		

Average = 6.65 A

Table 1 shows the presence of a few extra lines in the aurostibite from South Africa; these were not identified. It was noted that the first three lines of aurostibite were more intense than expected. This is probably due to an amorphous halo caused by the mounting medium, accentuated by the extremely small size of the sample and the relatively long exposure time.

#### CONCLUSION

It is concluded that the mineral "aurostibite" is present in the mounted specimen furnished by Professor Eales. The extra lines are doubtless due to contamination by some other mineral, or minerals, but the sample is too minute to allow identification of these without the expenditure of an unwarranted amount of time.

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