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THE UNIT CELL OF TARBUTTITE, $Zn_2(PO_4)(OH)$, AND PARADAMITE, $Zn_2(AsO_4)(OH)$

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The mineral tarbuttite was investigated by Richmond (1938) who detailed the morphology and unit cell of the mineral. Switzer (1956) described the new mineral paradamite, the triclinic dimorphous form of

TABLE 1. UNIT CELL DATA FOR TARBUTTITE AND PARADAMITE

	1	2	3
a^*	.1298	.1811	.1769
b^*	.0814	.1630	.1589
c^*	.1301 A^{-1}	.1855 $Å^{-1}$	.1834 $Å^{-1}$
α^*	89°51′	77°45′	75°52′
ρ^*	88°27′	89°35′	88°51′
γ^*	72°14′	77°38′	76°55′
a	8.097	5.657	5.807
b	12.91	6.432	6.666
c	7.688 Å	5.521 Å	5.627 Å
α	89°34′	102°27′	104°15′
β	91°35′	87°42′	87°52′
γ	107°47′	102°34′	103°12′
V	765 $Å^3$	191.5 $Å^3$	204 $Å^3$
ρ_m	4.12	4.14_0	4.52_0 (4.55#)
ρ_c	4.21	4.21	4.67
Z	8	2	2
Axial ratio	.6272:1:.5955	.8797:1:.8584	.8711:1:.8441
Space group	$B\bar{1}$	$P\bar{1}$	$P\bar{1}$

1. Tarbuttite, Broken Hill, N. Rhodesia. Richmond (1938).
2. Tarbuttite, Broken Hill, N. Rhodesia. This paper.
3. Paradamite, Mapimi, Mexico. This paper.

All unit cell measurements for this paper are considered accurate to ±.005 Å and angles to ±5′.

Switzer (1956) determination.

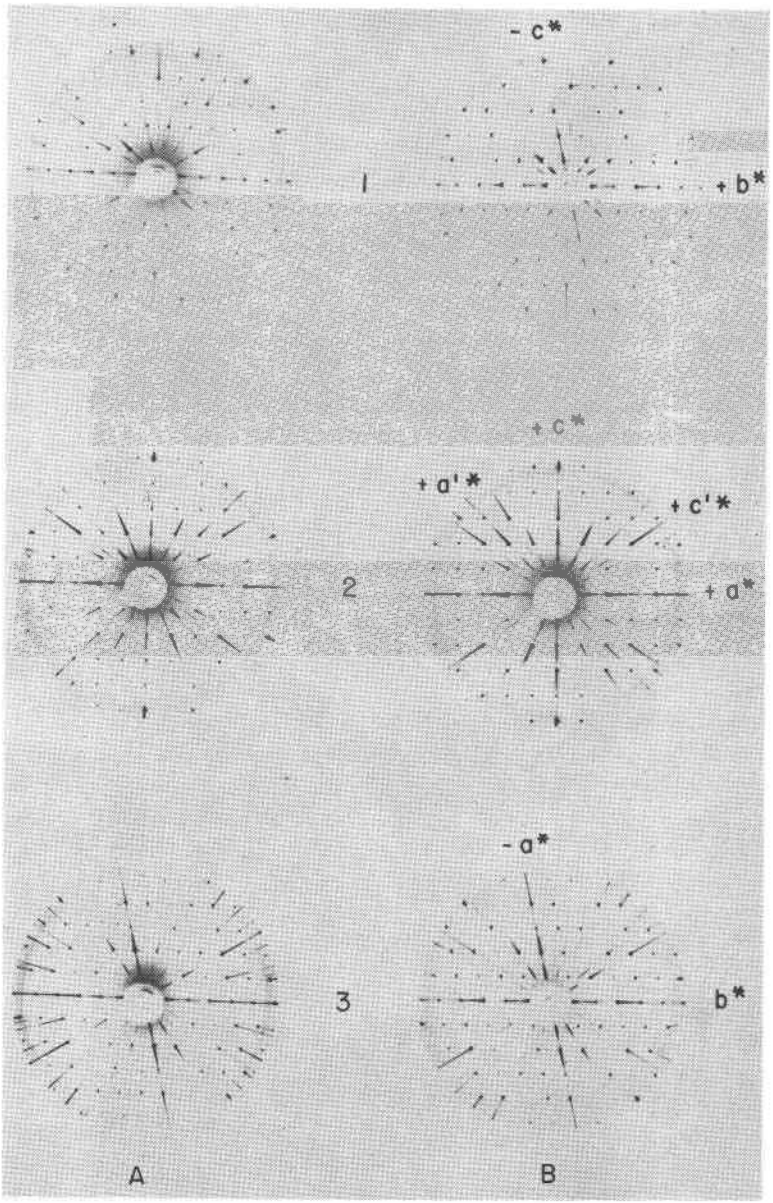

FIG. 1. Comparison of zero level precession photographs of paradamite (A) and tarbuttite (B). Richmond's axes are indicated by primes.

adamite. As part of an investigation of zinc minerals the author examined paradamite crystals provided by Dr. Switzer. Precession photographs of paradamite provided several possibilities for a choice of unit cell. Because of the perfect {010} cleavage one axis was fixed leaving two to be chosen. These two were fixed on the basis of their prominence on precission photographs, short repeat distances and reasonable interaxial angles.

Switzer also published powder data for paradamite and tarbuttite. The data appear quite similar but a check of Richmond's unit cell for tarbuttite showed only an approximate doubling of the *b*-axis with respect to paradamite as a similarity between the unit cells of the two minerals. It was decided to reinvestigate the unit cell of tarbuttite in light of the similarity of the powder data in an attempt to establish similar unit cells for the two minerals. Precession photographs for tarbuttite and paradamite are reproduced and compared in Fig. 1. It can be seen that the two cells are quite similar both as to unit cell size and to intensity distribution and it can be concluded that the two minerals are isostructural. The unit cell data for the two minerals are compared in Table 1.

Richmond's unit cell actually is the better of the two when compared with the morphology of tarbuttite crystals (Richmond, 1938, Fig. 2), the three principal pinacoids all lying in major morphological zones. Yet the reciprocal axes do not produce major zones on precession photographs as noted on Figure 1-B2. Moreoever, Richmond's cell is not primitive as stated in Palache *et al.* (1951, page 469) but rather B-centered. New calculations of the unit cell formula produce the value $Z=2$ rather than $Z=8$. The present unit cell has one-fourth the volume of the centered cell. The transformation matrix for the two cells, present to Richmond's is $\bar{1}01/010/101$.

References

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