American Mineralogist, Volume 58, page 552, 1973

Crystal Data and Formula for Hydrous Tin(II) Oxide: A Note

R. Alan Howie, and Wolf Moser

Department of Chemistry, University of Aberdeen, Meston Walk, Aberdeen, Scotland

We read, with great interest, the report of Organ and Mandarino (1971) of the 'natural' occurrence of hydrous tin(II) oxide as the mineral hydroromarchite. However, we wish to point out that the crystal data of Donaldson (1961) have been superseded by data from single crystal measurements on rather better crystals (Howie and Moser, 1968). The primitive tetragonal unit-cell dimensions are $a = 7.98(1)$ and $c = 9.17(1)$ Å (refined from X-ray powder diffraction data), and the space group (from systematic absences), is *P4/mnc* or *P4nc*.

The solution of the structure in the centrosymmetric space group *P4/mnc* demands octahedral clusters of tin atoms, each cluster circumscribed by a cube of crystallographically equivalent oxygen atoms. The structural units (Sn_6O_8—two per unit-cell) are hydrogen bonded to one another (O—O between units 2.80 Å) so that the structural formula must be $Sn_6O_4(OH)_4$, corresponding to an analytical formula $3SnO \cdot H_2O$. The compound should, therefore, be regarded as an oxy-hydroxide. The discrepancy between this formula and that determined by conventional analytical techniques ($3SnO \cdot H_2O$ and $5SnO \cdot 2H_2O$ respectively) is accounted for by the presence (verified by infrared spectroscopy) of chemi-sorbed water in the micro-crystalline samples usually submitted to analysis. A more detailed report of the structure determination is in course of preparation.

Comparison of the tetragonal and triclinic unit-cell volumes shows that Donaldson's triclinic cell is non-primitive. It is not possible to determine unambiguously the orientation of the triclinic cell with respect to the primitive tetragonal cell, possibly because of small errors in the triclinic cell dimensions.

References

Donaldson, J. D. (1961) Crystalline hydrous tin(II) oxide. *Acta Crystallogr.* **14,** 65.

Howie, R. A., and W. Moser (1968) Structure of tin(II) "hydroxide" and lead(II) "hydroxide." *Nature,* **219** 372–373.

Organ, R. M., and J. A. Mandarino (1971) Romarchite and hydroromarchite, two new stannous minerals. (abstr.) *Can. Mineral.* **10,** 916.

Manuscript received, October 31, 1972; accepted for publication, January 2, 1973.