

The Crystal Structure of Barium Telluropentathionate Trihydrate

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Barium salts of telluropentathionic acid have been described by Foss and Tjomsland.¹ A monoclinic dihydrate was isolated by crystallization from aqueous acetone, a triclinic dihydrate by crystallization from aqueous methanol, and a monoclinic trihydrate by crystallization from water. A determination of the crystal structure of the monoclinic dihydrate,² and isomorphism of the triclinic dihydrate with triclinic barium pentathionate dihydrate,³ show that in the two dihydrates the S—S—Te—S—S chain has the *cis* form; the terminal sulphur atoms are located on the same side of the plane through the three middle atoms.

In crystals of barium telluropentathionate trihydrate, the telluropentathionate ion has now been found to have the *trans* form, the sulphonate groups being located on opposite sides of the plane through the three middle atoms. The *trans* form of the telluropentathionate ion also occurs in the crystals of ammonium telluropentathionate⁴ and of rubidium telluropentathionate hemitrihydrate.⁵ The present salt is so far the only barium pentathionate, selenopentathionate, or telluropentathionate in which the *trans* form has been found.⁶

Barium telluropentathionate trihydrate, BaTe(S₅O₃)₃·3H₂O, crystallizes in the monoclinic space group *P*2₁/*c* (No. 14) with four formula units per unit cell,¹ and with unit cell dimensions (redetermined), *a* = 11.183(5) Å, *b* = 5.258(3) Å, *c* = 21.345(10) Å, β = 106.91(5)°. The crystal structure was solved by two-dimensional Patterson and Fourier methods using the *h*0*l* and 0*kl* reflections. Full-matrix least squares refinement based on 1106 independent, observed *h*0*l*, *h*1*l*, *h*2*l*, and 0*kl* reflections resulted in

a reliability index, *R*, of 0.106. The intensities were estimated visually from integrated Weissenberg photographs taken with CuKα radiation, and corrected for absorption and eventually for secondary extinction.

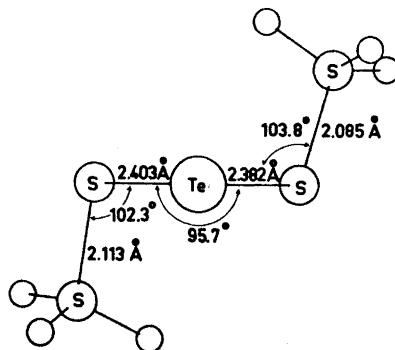


Fig. 1. The *trans* form of the telluropentathionate ion in BaTe(S₅O₃)₃·3H₂O as seen along an approximate twofold axis.

Fig. 1 gives a view of the telluropentathionate ion with principal bond lengths and angles. The calculated standard deviations of the bond lengths and angles given are 0.012–0.014 Å and 0.4–0.6°, respectively. The dihedral angles, STeS/TeSS, are 89° and 99°.

Further details of the structure will be published later.

1. Foss, O. and Tjomsland, O. *Acta Chem. Scand.* **10** (1956) 416.
2. Foss, O. and Tjomsland, O. *Acta Chem. Scand.* **12** (1958) 52.
3. Foss, O. and Tjomsland, O. *Acta Chem. Scand.* **10** (1956) 288.
4. Foss, O. and Larssen, P. A. *Acta Chem. Scand.* **8** (1954) 1042.
5. Marøy, K. *Acta Chem. Scand.* **23** (1969) 338.
6. Foss, O. *Advan. Inorg. Chem. Radiochem.* **2** (1960) 237.

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