ACTA CHEMICA SCANDINAVICA 26 (1972) 829–860

Short Communications

On the Crystal Structure of Ditellurium Pentoxide, Te_2O_5

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Single crystals of Te_2O_5 suitable for X-ray investigation have been prepared by hydrothermal synthesis. A total number of 2278 independent reflections were collected with a Philips PAILRED diffractometer, using Mo$K\alpha$ radiation.

Te_2O_5 belongs to the space group $P2_1$ and there are two formula units in the unit cell. The cell dimensions, as determined from Weissenberg photographs, are:

$a = 5.37$, $b = 4.68$, $c = 7.94$ Å and $\beta = 104.8°$.

The atomic positions were determined from Patterson and electron density summations, and the structure was refined to an R value of 0.040.

The investigation has shown that Te_2O_5 contains both tellurium(IV) and tellurium (VI). The Te – O coordination distances are given in Table 1. Te(VI) is octahedrally surrounded by oxygen atoms, as in $Te(OH)_6$,[1] and Te(IV) has a four-fold coordination similar to that in tellurite (β-TeO_2)[2] and paratellurite (α-TeO_2).[3] The TeO_6 octahedra are connected to form two-dimensional layers running through the structure. In these layers each tellurium atom is connected to four others *via* oxygen bridges. The composition of the sheets is $[Te(VI)O_4]_n^{2n-}$. Between these layers $[Te(IV)O]_n^{2n+}$ are running parallel to the b-axis. The terminal oxygen atoms in the Te(VI) octahedra are also bonded to Te(IV), thus giving a three-dimensional bonding system. The thermal stability of this compound has been studied.[4]

A full description of this investigation will be published in the near future. Single crystal X-ray investigations on the related compounds $TeO_2(OH)$ and Te_4O_9 are in progress.

Table 1. Coordination distances in Te_2O_5.

a. Te(VI)		b. Te(IV)	
Te_1-O_1	1.93 Å	Te_2-O_1	1.93 Å
Te_1-O_2	1.94	Te_2-O_4	2.07
Te_1-O_2'	1.97	Te_2-O_5	1.89
Te_1-O_3	1.90	Te_2-O_5'	2.08
Te_1-O_3'	1.93		
Te_1-O_4	1.85		

The authors wish to thank Professors M. Maurin and G. Lundgren for encouraging this work. They are also indebted to Ing. E. Andersson for valuable assistance and to Dr. S. Jagner for revising the English text. Financial support has been obtained from the *Swedish Natural Science Research Council* (Contract No. 2318).

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Received January 28, 1972.