

Oxotellurate(IV) der Lanthanide:

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The present work is the first comprehensive account of the knowledge acquired from single crystals of the isotopic series $M_2\text{Te}_4\text{O}_{11}$ ($M = \text{La} - \text{Nd}, \text{Sm} - \text{Yb}$). In the crystal structure, the M^{3+} cation is coordinated by eight oxygen atoms in the shape of a distorted square antiprism. Out of these polyhedra a mesh-like $[\text{M}_2\text{O}_{16}]^{14-}$ layer parallel to the (001) plane is built *via* three common edges. The $[\text{Te}_4\text{O}_{11}]^{6-}$ double layers in turn build two tellurium-oxygen chains crosswise to each other. The construction of the tellurium-oxygen partial structure is, however, only possible taking the secondary Te–O contacts into consideration. In most oxotellurates(IV), three oxygen atoms are covalently bound to the Te atoms ($d(\text{Te}-\text{O}) \approx 180 - 200$ pm; ψ^1 tetrahedron). Another oxygen atom is found in the near vicinity at a distance of 230 to 280 pm. The significance of such secondary interactions for the stability of the crystal structures was recognized recently in theoretical as well as experimental investigations. All oxygen atoms with distances smaller than 280 pm are counted to the secondary coordination sphere. This limit may seem somewhat arbitrary but it accounts very well for the Te–O partial structure. The coordination sphere for the tellurium center is a ψ^1 trigonal bipyramid including the stereochemically active electron pair (“*lone pair*”). A description of the crystal structure is also possible without this partial structure, however in the $[\text{TeO}_{3+1}]^{4-}$ polyhedra above and below the meshes of $[\text{M}_2\text{O}_{10}]^{14-}$ layers are linked *via* $\text{Te}_2\text{--O}_6\text{--Te}_2$ contacts only.

Key words: Oxotellurates(IV), Lanthanides, Crystal Structures