# Sulfidisch derivatisierte Oxodisilicate der schweren Lanthanide vom Formeltyp $M_4S_3[Si_2O_7]$ (M = Gd - Tm)

Sulfide Derivatized Oxodisilicates of the Heavy Lanthanides with the Formula $M_4S_3[Si_2O_7]$ (M = Gd - Tm)

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*Herrn Professor Albrecht Mewis zum 60. Geburtstag gewidmet*

Z. Naturforsch. **57 b,** 1427–1432 (2002); eingegangen am 29. August 2002

Lanthanides, Sulfide Silicates, Crystal Structures

The sulfide derivatized oxodisilicates $M_4S_3[Si_2O_7]$ of the heavy lanthanides (M = Gd - Tm) have been synthesized by reaction of M, $M_2O_3$, S, and $SiO_2$ using $MCl_3$ as flux in evacuated silica tubes at 850 °C for 7 d. The title compounds crystallize tetragonally in the space group $I4_1/amd$ with 8 formula units per unit cell. Their crystal structure contains isolated $[Si_2O_7]^{6-}$ pyroanions of two vertex-sharing $[SiO_4]$ tetrahedra in eclipsed conformation with Si-O-Si bridging angles of about 130°. The two crystallographically independent lanthanide cations ($M^{3+}$) both reside in tricapped trigonal prismatic environments of chalcogen ligands. In the case of M1 five $S^{2-}$ and three *plus* one $O^{2-}$ anions (CN = 8 + 1), for M2 three $S^{2-}$ and six $O^{2-}$ anions (CN = 9) fill the coordination spheres. Two of the three different sulfide anions are surrounded by four $M^{3+}$ cations forming a seesaw (S2) and a square (S3), respectively. The third one (S1) is coordinated by six lanthanide cations in the form of a distorted octahedron. The whole structure is basically built up of cationic lanthanide silicate layers which are threaded by sulfide anions.