Crystal Structure of B-Type $Tm_2Si_2O_7$ ($\equiv Tm_4[Si_3O_{10}][SiO_4]$)

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Single crystals of B-type thulium oxodisilicate $Tm_2Si_2O_7$ were obtained by the reaction of Tm, S and RbCl with the wall of a silica tube in an attempt to synthesize ternary alkali-metal thulium sulfides (*e.g.* $Rb_3Tm_7S_{12}$). It crystallizes triclinically in space group $P\bar{1}$ ($a = 655.91(5)$, $b = 659.04(5)$, $c = 1195.32(9)$ pm, $\alpha = 94.361(8)$, $\beta = 91.102(8)$, $\gamma = 92.005(8)^\circ$), with four formula units of $Tm_2Si_2O_7$ per unit cell. Instead of pyro-anionic $[Si_2O_7]^{6-}$ groups the title compound contains both *ortho*-silicate tetrahedra $[SiO_4]^{4-}$ and *catena*-trisilicate units $[Si_3O_{10}]^{8-}$. Therefore the formula $Tm_4[Si_3O_{10}][SiO_4]$ ($Z = 2$) appears more adequate. The four crystallographically independent Tm^{3+} cations show coordination numbers from six to eight with distorted octahedral, bicapped trigonal prismatic and square antiprismatic oxygen coordination spheres.

Key words: Lanthanides, Thulium, Oxosilicates, Crystal Structure