$K_{2.5}Na_{7.5}Ba_6Ca_2Ti_6Mn_6Si_{36}B_{12}O_{119}F_4$	*hP*212	(175) *P*6/*m* – $l^{13}k^5j^3$gdca

$(Na,K,□)_{10}Ba_6(Ca,Y,R)_2(Mn,Fe,Zn)_6(Ti,Nb)_6Si_{36}B_{12}O_{119.5}(OH,F)_{5.5}$ [1], tienshanite

Structural features: Branched 6-rings formed by eighteen vertex-linked SiO_4 tetrahedra are interconnected via $Ti(O,OH,F)_6$ and $(Ti,Nb)(O,OH,F)_6$ octahedra and rings of edge-linked $(Mn,Fe,Ti,Zn)O_5$ square pyramids on one side and units of two vertex-linked BO_4 tetrahedra on the other side to form a 3D-framework; K, Na, (Na,K) and (Ca,Y) in the layers containing the O atoms belonging to two BO_4 tetrahedra; Ba and additional F in the (Ti,Nb,Mn,Fe,Zn) layers.

Cooper M.A. et al. (1998) [1]

$B_{12}Ba_6Ca_{1.5}F_{3.75}Fe_{0.72}H_{1.75}K_{2.25}Mn_{4.53}Na_{7.09}Nb_{1.8}O_{121.25}Si_{36}Ti_{4.63}Y_{0.5}Zn_{0.32}$

a = 1.6785, c = 1.0454 nm, c/a = 0.623, V = 2.5507 nm^3, Z = 1

site	Wyck.	sym.	*x*	*y*	*z*	occ.	atomic environment
O1	12*l*	1	0.0681	0.1785	0.1569		non-colinear Si_2
O2	12*l*	1	0.0902	0.415	0.1619		non-colinear Si_2
O3	12*l*	1	0.1536	0.5147	0.3733		single atom Si
Si4	12*l*	1	0.1792	0.5046	0.22784		tetrahedron O_4
O5	12*l*	1	0.1877	0.0272	0.3713		non-coplanar triangle $SiMn_2$
Si6	12*l*	1	0.19159	0.02836	0.2198		tetrahedron O_4
O7	12*l*	1	0.2079	0.5953	0.1424		non-colinear BSi
O8	12*l*	1	0.289	0.0445	0.1619		non-colinear Si_2
Si9	12*l*	1	0.36326	0.01531	0.21365		tetrahedron O_4
O10	12*l*	1	0.3718	0.0205	0.3668		single atom Si
O11	12*l*	1	0.4598	0.077	0.1418		non-colinear BSi
O12	12*l*	1	0.485	0.2201	0.2269		non-colinear BSi
B13	12*l*	1	0.5125	0.1763	0.1272		tetrahedron O_4
M14	6*k*	*m*..	0.0596	0.4342	$^1/_2$	0.833	
Ti15	6*k*	*m*..	0.0708	0.41959	$^1/_2$	0.167	
M16	6*k*	*m*..	0.0848	0.22088	$^1/_2$		square pyramid O_5
M17	6*k*	*m*..	0.1311	0.3586	$^1/_2$		single atom Ti
Ba18	6*k*	*m*..	0.50676	0.18579	$^1/_2$		single atom F
Na19	6*j*	*m*..	0.018	0.5	0	0.5	
M20	6*j*	*m*..	0.1544	0.3419	0	0.89	monocapped trigonal prism O_7
O21	6*j*	*m*..	0.5011	0.208	0		non-colinear B_2
M22	3*g*	2/*m*..	$^1/_2$	0	$^1/_2$		colinear Ti_2
F23	2*d*	-6..	$^1/_3$	$^2/_3$	$^1/_2$		coplanar triangle Ba_3
M24	2*c*	-6..	$^1/_3$	$^2/_3$	0		tricapped trigonal prism O_9
K25	1*a*	6/*m*..	0	0	0		hexagonal prism O_{12}

M14 = 0.64Ti + 0.36Nb; M16 = 0.755Mn + 0.12Fe + 0.072Ti + 0.053Zn; M17 = 0.834O + 0.083F + 0.083OH; M20 = 0.766Na + 0.234K; M22 = 0.416F + 0.416OH + 0.168O; M24 = 0.75Ca + 0.25Y

Transformation from published data: *y*,*x*,-*z*; origin shift 0 0 $^1/_2$

Experimental: single crystal, diffractometer, X-rays, R = 0.022

Remarks: $KNa_3(Na,K,□)_6Ba_6(Ca,Y,R)_2(Mn,Fe,Zn,Ti,)_6(Ti,Nb)_6Si_{36}B_{12}O_{114}[O_{5.5}(OH,F)_{3.5}]F_2$. Natural specimen from Dara-i-Pioz, Tajikistan. Composition $(Si_{36.19}B_{12}Ti_{4.17}Nb_{1.77}Ta_{0.03})(Mn_{4.50}Fe_{0.72}Zn_{0.32}Ti_{0.42})$_ $(Ba_{6.00}Ca_{1.45}Y_{0.37}K_{2.24}Na_{7.08})(F_{3.61}OH_{1.89})$ from electron microprobe analysis. Partial occupation of site M24 by rare-earth elements (published 0.75Ca + 0.20Y + 0.05R) is ignored here. Short interatomic distances for partly occupied site(s). Hydrogen atoms are not taken into consideration for Pearson symbol, Wyckoff sequence and atomic environments. The basic structure without site splitting was reported in [2].

References: [1] Cooper M.A., Hawthorne F.C., Grew E.S. (1998), Can. Mineral. 36, 1305-1310. [2] Malinovskii I.A., Pobedimskaya E.A., Belov N.V. (1977), Dokl. Akad. Nauk SSSR 236, 863-865.