

Phase Formation and Thermal Stability in Cs, Ba-borosilicate systems

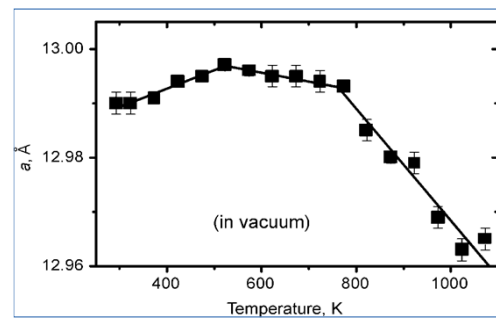
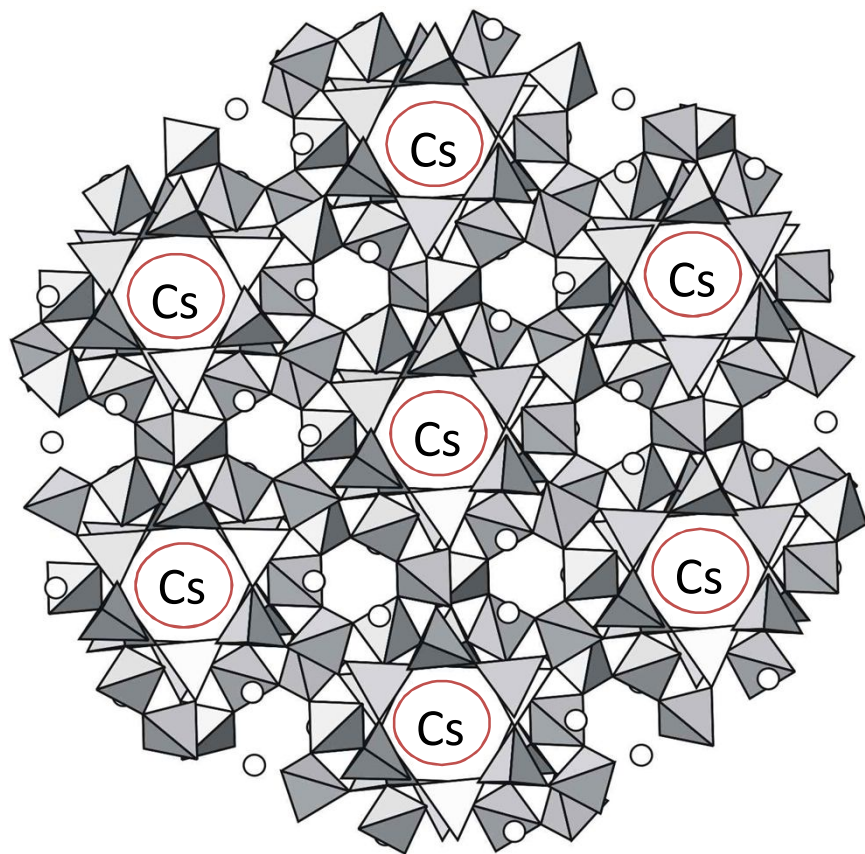


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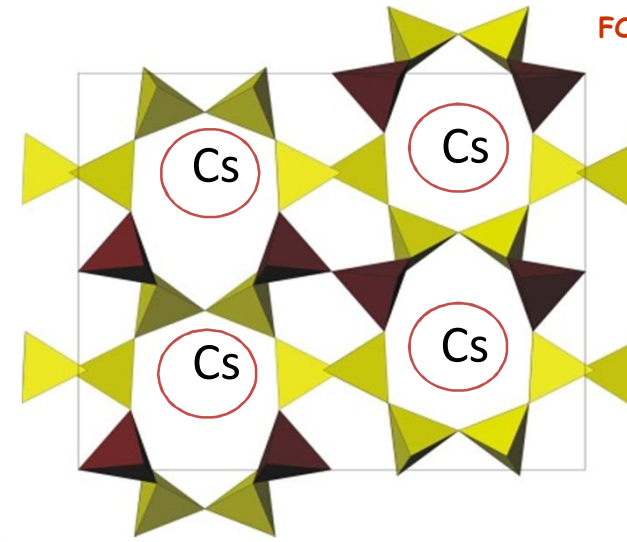
The formation, stability, melting or decomposition behavior is studied by XRD, HTXRD, DSC, TG for the compounds: CsBSi_2O_6 , $\text{CsBSi}_5\text{O}_{12}$, $\text{Ba}_3\text{B}_6\text{Si}_2\text{O}_{16}$, $\text{BaB}_2\text{Si}_2\text{O}_8$. Polycrystalline samples are prepared by solid state reaction and glass crystallization. Single crystals are grown from melt. Glasses are obtained over 1100 in Cs-, over 1300 in Ba- system. Short and long heatings are performed in the temperature range 600-1200 °C. Mixed Cs and Ba-probes are prepared based on CsBSi_2O_6 composition

Boropollucite CsBSi_2O_6 (1:1:4) ANA type [1]

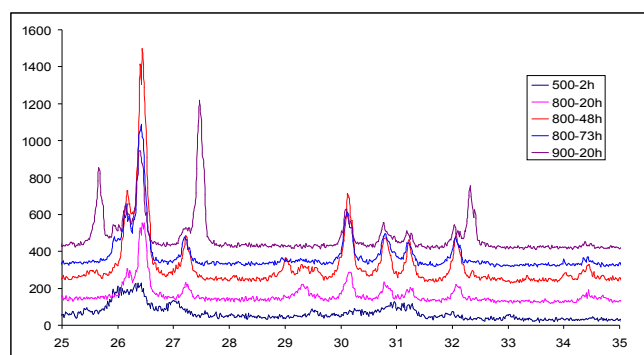
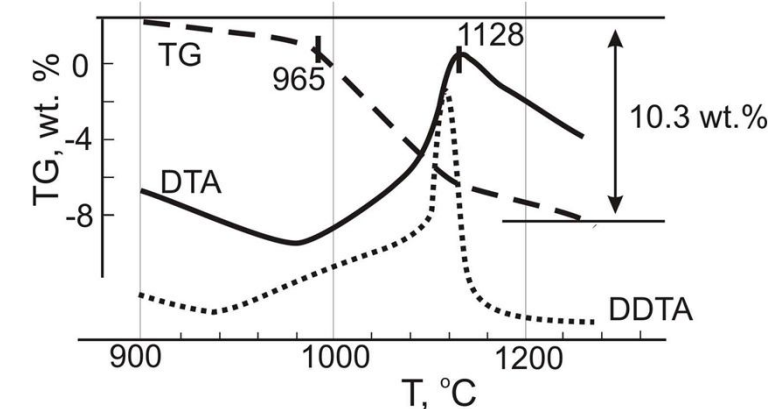
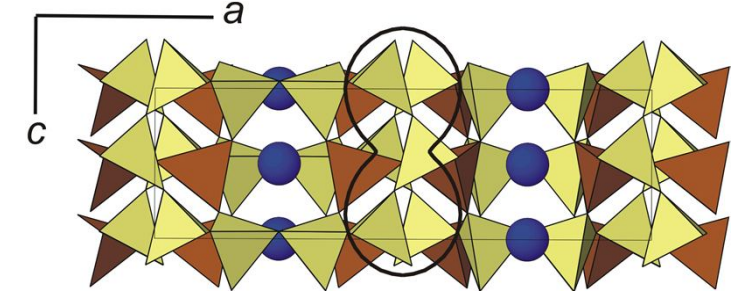
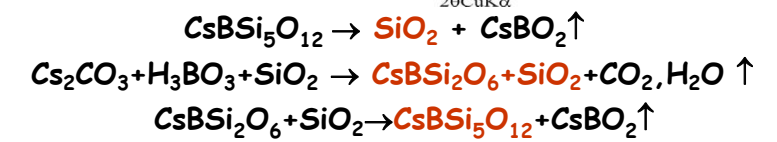
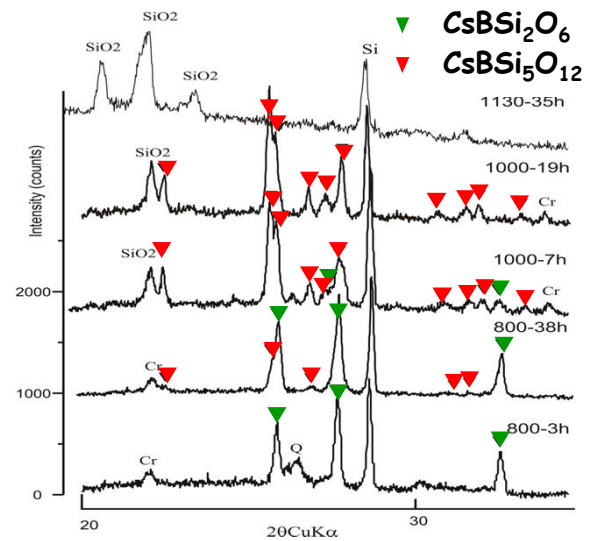


HT decomposition [1]
 $\text{CsBSi}_2\text{O}_6 \rightarrow \text{CsBSi}_5\text{O}_{12}$

$\text{CsBSi}_5\text{O}_{12}$ (1:1:10) CAS type [2,3]



FORMATION and THERMAL DECOMPOSITION [3]

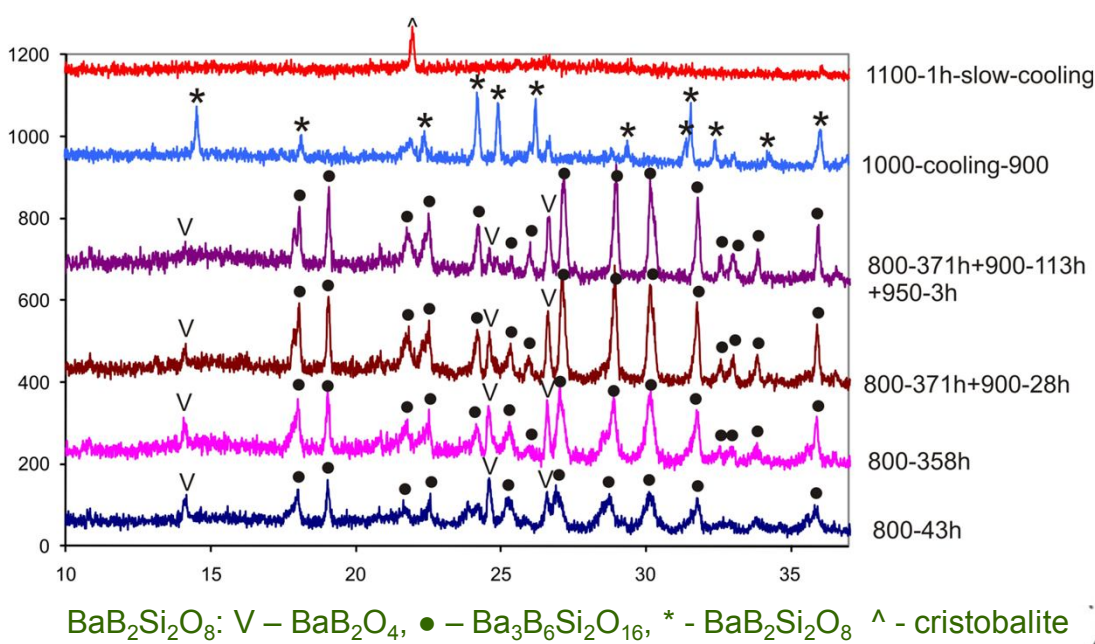


FORMATION of CsBSi_2O_6 from X low-T phase of (1:1:2) composition

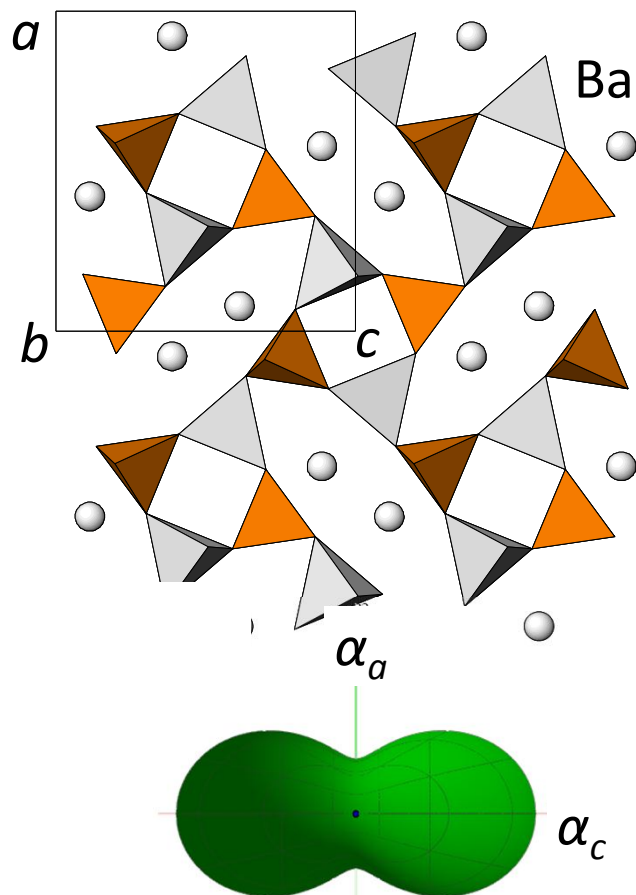
[1] Bubnova R.S., Stepanov N.K., Levin A.A., Filatov S.K., Paufler P. and Meyer D.C. *Solid State Sci.* 6 (2004) 629-637

[2] Krzhizhanovskaya M.G., Bubnova R.S., Depmeier W., Filatov S.K., Ugol'kov V.L. *Micro- & Mesoporous Materials* 116 (2008) 569-574
 [3] Bubnova R.S., Krzhizhanovskaya M.G., Filatov S.K., Ugol'kov V.L., Paufler P. Z. *Krist.* 222 (2007) 83-88

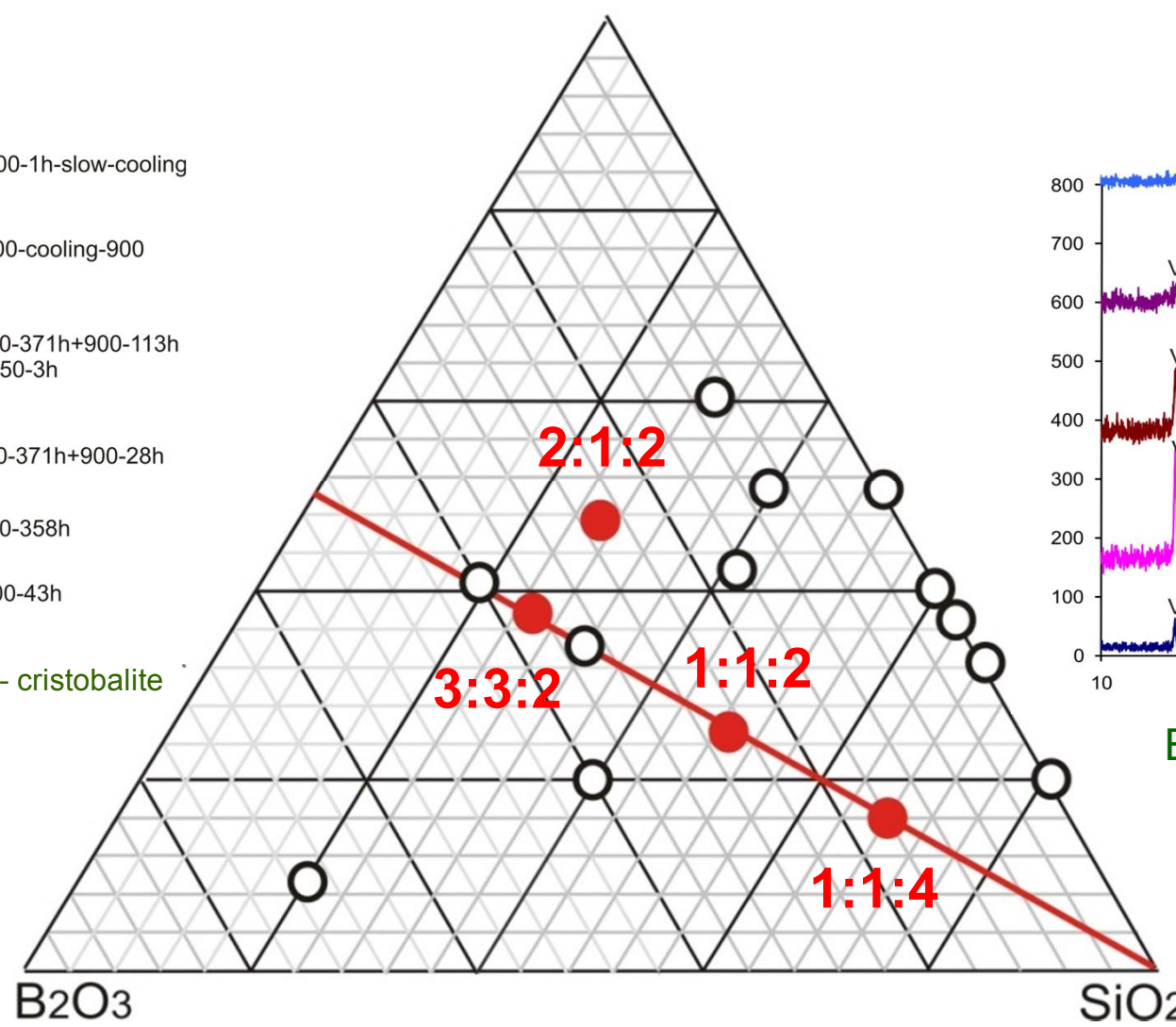
$\text{BaB}_2\text{Si}_2\text{O}_8$ (1:1:2)



$\text{BaB}_2\text{Si}_2\text{O}_8$: V - BaB_2O_4 , ● - $\text{Ba}_3\text{B}_6\text{Si}_2\text{O}_{16}$, * - $\text{BaB}_2\text{Si}_2\text{O}_8$ ^ - cristobalite



BaO

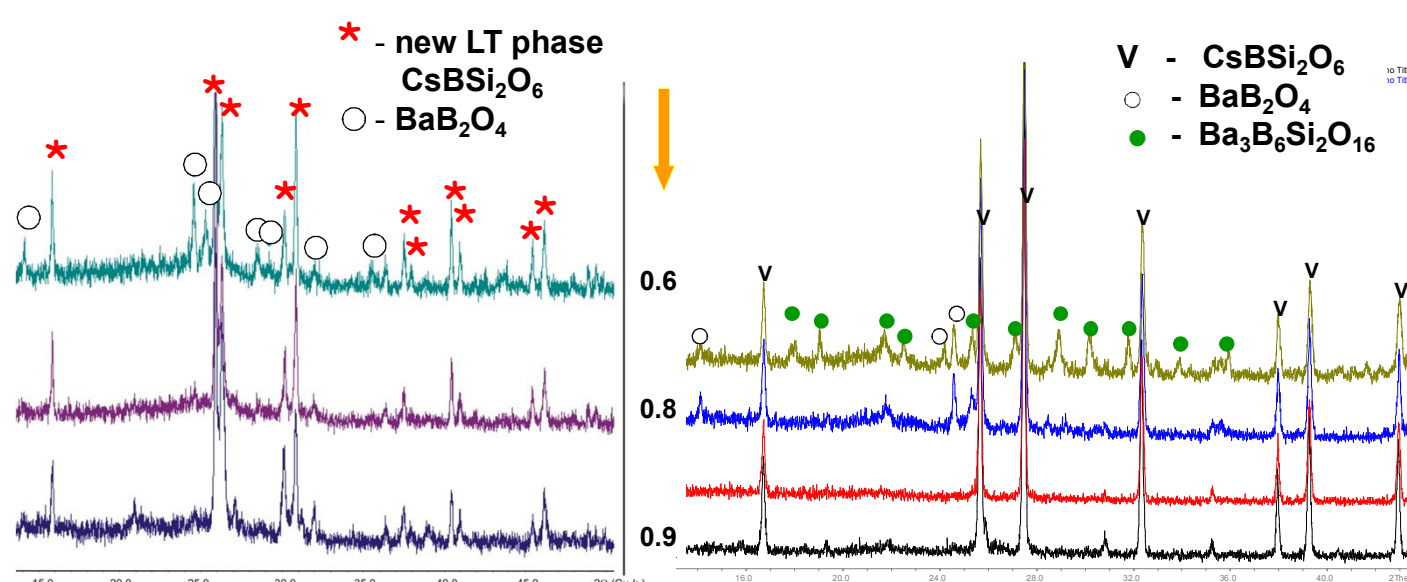


Mixed Cs and Ba-borosilicates



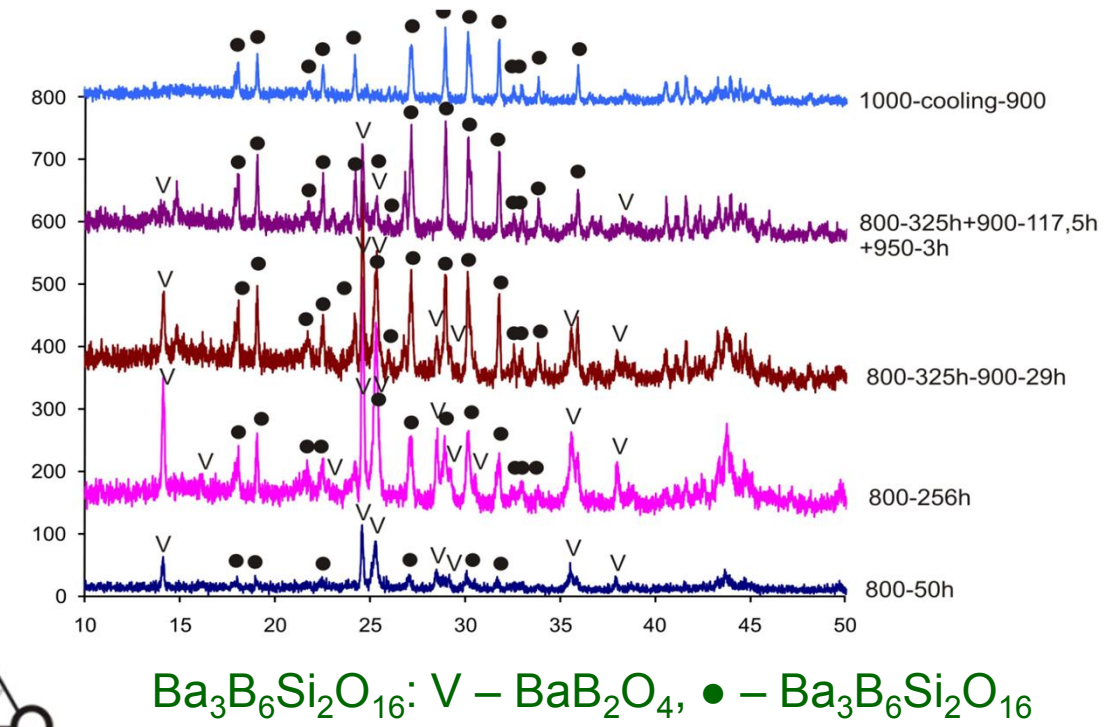
700/40h

800 °C/87 h



Ba^{2+} does not enter CsBSi_2O_6 boropollucite structure at 800 °C but stimulate the formation of a new low T polymorph CsBSi_2O_6

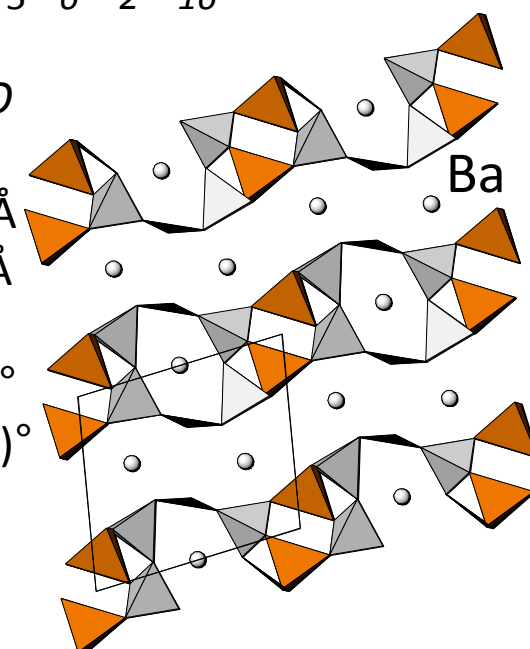
$\text{Ba}_3\text{B}_6\text{Si}_2\text{O}_{16}$ (3:3:2)



$\text{Ba}_3\text{B}_6\text{Si}_2\text{O}_{16}$: V - BaB_2O_4 , ● - $\text{Ba}_3\text{B}_6\text{Si}_2\text{O}_{16}$

Model of $\text{Ba}_3\text{B}_6\text{Si}_2\text{O}_{16}$ structure

P-1, Bruker DUO
 $a = 5.0382(8) \text{ \AA}$
 $b = 7.6574(12) \text{ \AA}$
 $c = 8.5262(14) \text{ \AA}$
 $\alpha = 77.677(5)^\circ$
 $\beta = 77.879(5)^\circ$
 $\gamma = 86.324(5)^\circ$
 $R = 7\%$



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