

Pentahydroborite

CaB₂O(OH)₆·2H₂O

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Crystal Data: Triclinic. *Point Group:* $\bar{1}$. Anhedron granular.

Physical Properties: Hardness = 2.5 D(meas.) = 2.00–2.03 D(calc.) = 2.02 Fluoresces violet under LW UV.

Optical Properties: Transparent. *Color:* Colorless. *Luster:* Vitreous.
Optical Class: Biaxial (+). $\alpha = 1.530$ – 1.532 $\beta = 1.536$ – 1.539 $\gamma = 1.542$ – 1.546
 $2V(\text{meas.}) = 73^\circ$ – 79°

Cell Data: *Space Group:* $P\bar{1}$. $a = 7.845(4)$ $b = 6.525(5)$ $c = 8.124(5)$ $\alpha = 111.62(5)^\circ$
 $\beta = 111.19(4)^\circ$ $\gamma = 73.44(5)^\circ$ $Z = 2$

X-ray Powder Pattern: Novofrolovskoye deposit, Russia.
7.04 (10), 2.99 (9), 3.54 (8), 1.937 (8), 2.88 (6), 3.20 (5), 2.49 (5)

Chemistry:	(1)	(2)	(3)
SiO ₂	2.80		
B ₂ O ₃	28.35	32.09	32.27
Al ₂ O ₃	1.13		
Fe ₂ O ₃	1.87		
MgO	0.66		
CaO	27.27	25.71	25.99
H ₂ O ⁺	37.78		
H ₂ O		41.60	41.74
Total	99.86	99.40	100.00

(1) Novofrolovskoye deposit, Russia. (2) Fuka, Japan. (3) CaB₂O(OH)₆·2H₂O.

Occurrence: In boron-rich iron-ore skarns (Novofrolovskoye deposit, Russia); in a volcanogenic-sedimentary borate deposit (near the Studenitsa Cloister, Yugoslavia).

Association: Andradite–grossular, magnetite, szaibélyite (Novofrolovskoye deposit, Russia); colemanite, howlite, ulexite, studenitsite (near the Studenitsa Cloister, Yugoslavia).

Distribution: In Russia, from the Novofrolovskoye copper deposit, near Krasnoturinsk, Turinsk district, Northern Ural Mountains, and at the Solongo boron deposit, Buryatia, Siberia. From the Sayak-IV boron deposit, northeast Balkhash region, Kazakhstan. Found near the Studenitsa Cloister, 280 km south of Belgrade, Yugoslavia. In Japan, at Fuka, near Bicchu, Okayama Prefecture.

Name: For the composition, originally described as a hydrated borate with five molecules of water per formula unit.

Type Material: All-Union Research Institute of Mineral Resources, Moscow, Russia.

References: (1) Malinko, S.V. (1961) New boron minerals – uralborite and pentahydroborite. *Zap. Vses. Mineral. Obshch.*, 90, 673–681 (in Russian). (2) (1962) *Amer. Mineral.*, 47, 1482 (abs. ref. 1). (3) Lisitsyn, A.E., S.V. Malinko, and G.S. Rumyantsev (1965) New discoveries of frolovite and pentahydroborite. *Doklady Acad. Nauk SSSR*, 164, 171–173 (in Russian). (4) Kazanskaya, E.V., T.N. Chemodina, Y.K. Evorov-Tismenko, M.A. Simonov, and H.V. Belov (1977) Refinement of the crystal structure of pentahydroborite. *Kristallografiya (Sov. Phys. Crystal.)*, 22, 66–68 (in Russian). (5) Fujiwara, T., H. Okada, I. Nakai, K. Nagashima, M. Takada, K. Masutomi, and T. Isobe (1982) Pentahydroborite from Fuga [*sic*], *Okayama Prefecture. Geoscience Magazine*, 33, 11–20 (in Japanese). (6) (1985) *Mineral. Abs.*, 36, 207 (abs. ref. 5). (7) Pekov, I.V. (1998) *Minerals first discovered on the territory of the former Soviet Union. Ocean Pictures, Moscow*, 161–162.

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