

**Hingganite-(Y)****(Y, Yb, Er)BeSiO<sub>4</sub>(OH)**

**Crystal Data:** Monoclinic. Point Group:  $2/m$ . Stout prismatic crystals, to 1.5 mm, may be in fanlike to sheaflike aggregates; typically granular.

**Physical Properties:** Hardness = [5-5.5] VHN = 415-467 D(meas.) = 4.42-4.57  
D(calc.) = 4.45 Cleavage: None detected.

**Optical Properties:** Transparent. Color: Milky white, light yellow, light green, light blue; colorless in transmitted light. Luster: Vitreous.

*Optical Class.* Biaxial (+). *Orientation:*  $Y = b$ ;  $Z \wedge c = 6^\circ-13^\circ$ ;  $Z \wedge a = 14^\circ$ .

*Dispersion:*  $r < v$ ; strong.  $\alpha = 1.744-1.748$   $\beta = 1.753-1.765$   $\gamma = 1.765-1.783$   
 $2V(\text{meas.}) = 80^\circ$

**Cell Data:** Space Group:  $P2_1/c$ .  $a = 4.790$   $b = 7.545$   $c = 9.989$   $\beta = 91^\circ$   $Z = 4$

**X-ray Powder Pattern:** Heilungkiang Province, China.

3.148 (10), 2.685 (10), 2.569 (6), 4.790 (5), 3.462 (5), 1.985 (5), 1.880 (5)

Chemistry:	(1)	(2)	(1)	(2)	(1)	(2)
SiO <sub>2</sub>	25.20	26.43	Yb <sub>2</sub> O <sub>3</sub>	17.02	BeO	10.41 10.50
TiO <sub>2</sub>	0.10		RE <sub>2</sub> O <sub>3</sub>	12.39	MgO	0.09
Al <sub>2</sub> O <sub>3</sub>	1.70	0.10	Fe <sub>2</sub> O <sub>3</sub>	1.63	CaO	0.96 2.38
Y <sub>2</sub> O <sub>3</sub>	26.11	24.83	FeO	0.89	(K;Na) <sub>2</sub> O	1.17
Ce <sub>2</sub> O <sub>3</sub>	28.47		PbO	0.38	H <sub>2</sub> O	2.94 [3.92]
					Total	100.05 [99.55]

(1) Greater Khingan Range, China; corresponds to  $(Y_{0.33}Ce_{0.21}La_{0.16}Nd_{0.10}RE_{0.13})_{\Sigma=0.93}$   
 $[(K;Na)_{0.07}Fe^{3+}_{0.05}Ca_{0.04}Fe^{2+}_{0.03}]_{\Sigma=0.19}(Be_{1.00}Al_{0.08})_{\Sigma=1.08}Si_{1.02}O_{4.38}(OH)_{0.80}$ . (2) Kola Peninsula, Russia;  
 by electron microprobe, H<sub>2</sub>O by difference, RE<sub>2</sub>O<sub>3</sub> = Tb<sub>2</sub>O<sub>3</sub> 0.33%, Dy<sub>2</sub>O<sub>3</sub> 2.13%, Ho<sub>2</sub>O<sub>3</sub> 0.21%,  
 Er<sub>2</sub>O<sub>3</sub> 6.47%, Tm<sub>2</sub>O<sub>3</sub> 1.38%, Lu<sub>2</sub>O<sub>3</sub> 1.87%. (3) Heilungkiang Province, China, by XRF and wet  
 chemical analysis, analytical results not available; stated to correspond to  
 $(Y_{0.33}Ce_{0.19}Nd_{0.10}La_{0.05}RE_{0.20}Fe^{3+}_{0.05}Fe^{2+}_{0.03}Na_{0.03})_{\Sigma=0.98}(Be_{0.97}Al_{0.03})_{\Sigma=1.00}(Si_{0.98}Al_{0.05})_{\Sigma=1.03}$   
 $O_{4.00}[(OH)_{0.77}O_{0.23}]_{\Sigma=1.00}$ .

**Mineral Group:** Gadolinite group.

**Occurrence:** In a RE, Be-bearing granophyre (Greater Khingan Range, China); in  
 "amazonite"-rich pegmatite in a differentiated alkalic massif (Kola Peninsula, Russia).

**Association:** Hingganite-(Ce), quartz, potassium feldspar, albite, zinnwaldite, cassiterite, stokesite,  
 fluorite, chlorite, titanite (Tahara area, Japan); aegirine, zircon, quartz (Mt. Malosa, Malawi).

**Distribution:** From an unspecified locality in the Greater Khingan Range, Heilungkiang  
 Province, China. In the Trimouns talc deposit, six km northeast of Luzenac, Ariège, France.  
 From the [Keivy massif,] Kola Peninsula, and at Tastyg, Tuva, Russia. In the Iwaguro Sekizai  
 quarry, Tahara area, Gifu Prefecture, Japan. On North Sugarloaf Mountain, Bethlehem, Grafton Co.,  
 New Hampshire, USA. On Mt. Malosa, Zomba district, Malawi.

**Name:** Presumably for the occurrence in the Greater Khingan (Hinggan) Range, China, and  
 predominance of yttrium.

**Type Material:** Geology Bureau, Chinese Academy of Geological Sciences, Beijing, China.

**References:** (1) Xiaoshi Ding, Ge Bai, Zhongxian Yuan, and Luren Sun (1981) Yttroceberysite, a  
 new Ce-Be-rich silicate. Geol. Rev. China, 27, 459-465 (in Chinese with English abs.). (2) (1988)  
 Amer. Mineral., 73, 442 (abs. ref. 1). (3) Xiaoshi Ding, Ge Bai, Zhongxian Yuan, and Jinding Liu  
 (1984) Hingganite [(Y, Ce)BeSiO<sub>5</sub>(OH)]. new data. Yanshi Kuangwu Ji Ceshi, 3(1), 46-48 (in  
 Chinese). (4) (1987) Chem. Abs., 106, 70456 (abs. ref. 3). (5) Lulu Ximen and Peng Zhizhong  
 (1985) Crystal structure of xinganite. Acta Mineral. Sinica, 5, 289-293 (in Chinese with English  
 Mineralogical Society of America Handbook of Mineralogy Revised 2/14/2013

abs.). (6) (1988) *Amer. Mineral.*, 73, 441-442 (abs. ref. 5). (7) (1988) *Amer. Mineral.*, 73, 935 (errata). (8) Voloshin, A.V., Y.A. Pakhomovskii, Y.P. Men'shikov, A.S. Povarennykh, E.N. Matvinenko, and O.V. Yakubovich (1983) Hingganite-(Yb), a new mineral from amazonite pegmatites of the Kola Peninsula. *Doklady Acad. Nauk SSSR*, 270, 1188-1192 (in Russian). (9) (1984) *Amer. Mineral.*, 69, 811 (abs. ref. 8). (10) Petersen, O.V. and M. Grossmann (1994) Some pegmatite minerals from the Zomba district, Malawi. *Mineral. Record*, 24, 29-35, 38. (11) Miyawaki, R., I. Nakai, K. Nagashima, A. Okamoto, and T. Isobe (1987) The first occurrences of hingganite, hellandite and wodginite in Japan. *Kobutsugaku Zasshi*, 18(1), 17-30 (in Japanese). (12) (1990) *Amer. Mineral.*, 75, 432 (abs. ref. 11). (13) Miyawaki, R., S. Matsubara, K. Yokoyama, and A. Okamoto (2007) Hingannite-(Ce) and hingannite-(Y) from Tahara, Hirukawa-mura, Gifu Prefecture, Japan. The description on a new mineral species of the Ce-analogue of hingannite-(Y) with a refinement of the crystal structure of hingannite-(Y). *J. Mineral. Petrol. Sciences*, 102, 1-7. (14) (2008) *Amer. Mineral.*, 93, 1688 (abs. ref. 13).