Badakhshanite-(Y) $Y_2Mn_4Al(Si_2B_7BeO_{24})$

Crystal Data: Orthorhombic. *Point Group*: 2/*m* 2/*m* 2/*m*. As columnar crystals to 400 μm, as inclusions in spessartine and tourmaline, and in blebs between garnet, tourmaline, and quartz. *Twinning*: Fine scale visible in thin section.

Physical Properties: *Cleavage*: None. *Tenacity*: Brittle. *Fracture*: Conchoidal. Hardness = 6.5-7 VHN = 784-1160, 947 average (100-200 g load). D(meas.) = > 4.27(2) D(calc.) = 4.41

Optical Properties: Transparent. *Color*: Yellow-brown. *Streak*: White. *Luster*: Vitreous. *Optical Class*: Biaxial (-). α = 1.805(2) β(calc.) = 1.827 γ = 1.835(3) 2V(meas.) = -60(10)° *Dispersion*: Weak, $r > v$. Straight extinction. Negative elongation. Nonpleochroic. Displays slight sector-growth zoning and ''hourglass'' textures.

Cell Data: *Space Group: Pnma*. a = 12.852(1) b = 4.5848(5) c = 12.8539(8) Z = 2

X-Ray Diffraction Pattern: Dorozhniy pegmatite, Gorno-Badakhshan Autonomous Region, Tajikistan.
3.042 (100), 2.637 (68), 2.533 (60), 9.07 (45), 4.59 (42), 4.07 (39), 1.828(36)

Chemistry:

	(1)	(2)		(1)	(2)
SiO_2	11.96	12.67	Lu_2O_3	2.32	
ThO_2	0.12		Y_2O_3	16.60	23.80
Sm_2O_3	0.17		Sc_2O_3	1.57	
Gd_2O_3	0.30		Al_2O_3	3.06	5.35
Tb_2O_3	0.10		B_2O_3	22.06	25.68
Dy_2O_3	0.73		FeO	0.94	
Ho_2O_3	0.19		MnO	23.33	29.87
Er_2O_3	1.34		CaO	0.58	
Tm_2O_3	0.54		BeO	2.84	2.63
Yb_2O_3	8.82		Total	97.57	100.00

(1) Dorozhniy pegmatite, Gorno-Badakhshan Autonomous Region, Tajikistan; average electron microprobe and FTIR spectroscopic analyses, Be, B by SIMS; corresponding to $(Y_{1.21}REE_{0.78}Th_{0.01})_{\Sigma=2}(Mn_{3.47}Y_{0.34}Ca_{0.11}Fe^{2+}_{0.08})_{\Sigma=4}(Al_{0.63}Sc_{0.24}Fe^{2+}_{0.06}\square_{0.07})_{\Sigma=1}[(Si_{2.10}B_{6.69}Be_{1.20})_{\Sigma=9.99}O_{24}]$, where *REE* = $(Yb_{0.47}Lu_{0.12}Dy_{0.04}Er_{0.07}Tm_{0.03}Ho_{0.01}Gd_{0.02}Sm_{0.01}Tb_{0.01})_{\Sigma=0.78}$. (2) $Y_2Mn_4Al(Si_2B_7BeO_{24})$.

Mineral Group: Beryl group.

Occurrence: In medium- to coarse-grained, non-graphic, miarolitic albite-microcline-quartz pegmatite veins cutting amphibolite and epidote-amphibolite facies slates and marbles.

Association: Smoky quartz, Sc-bearing spessartine, Sc-bearing tusionite, schorl.

Distribution: From the Dorozhniy (Road) pegmatite, Kukurt pegmatite field, 45 km east of Murghab, Eastern Pamir, Gorno-Badakhshan Autonomous Region, Tajikistan.

Name: For the region in which the studied material was collected. A suffix indicates the dominant rare earth element.

Type Material: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia (5235/1).

References: (1) Pautov, L.A., M.A. Mirakov, F. Cámara, E. Sokolova, F.C. Hawthorne, M.A. Schodibekov, and V.U. Karpenko (2020) Badakhshanite-(Y), $Y_2Mn_4Al(Si_2B_7BeO_{24})$, a new mineral species of the perettiite group from a granite miarolic pegmatite in Eastern Pamir, the Gorno Badakhshan Autonomous Oblast, Tajikistan. Can. Mineral., 58, 381-394.