Kesebolite-(Ce) $CeCa_2Mn(AsO_4)[SiO_3]_3$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. In euhedral prismatic crystals, to 3 mm with lengthwise striations.

Physical Properties: Cleavage: Fair on {100}. *Tenacity*: Brittle. *Fracture*: Irregular.
Hardness = 5-6 VHN = 711-974, 825 average (100 g load). D(meas.) = n.d. D(calc.) = 3.998(5)
Nonfluorescent.

Optical Properties: Translucent. *Color*: Dark grayish brown to grayish brown.
Streak: Light brown. *Luster*: Vitreous.
Optical Class: Biaxial (+). *n*(calc.) = 1.740 *Pleochroism*: Weak, brownish yellow shades.
R_1-R_2: (470) 7.61-7.82, (546) 7.47-7.68, (589) 7.37-7.55, (650) 7.38-7.56

Cell Data: *Space Group*: $P2_1/c$. a = 6.7382(3) b = 13.0368(6) c = 12.0958(6) β = 98.578(2)° Z = 4

X-ray Powder Pattern: Kesebol deposit, Åmål municipality, Västra Götaland, Sweden.
3.114 (100), 3.138 (84), 2.924 (84), 2.908 (63), 3.228 (58), 5.96 (54), 5.70 (42), 6.50 (22)

Chemistry:

	(1)	(2)		(1)	(2)
MgO	0.334		SrO	0.103	
SiO_2	29.10	28.06	Y_2O_3	0.243	
P_2O_5	0.639		La_2O_3	2.803	
SO_3	0.54		Ce_2O_3	18.171	25.55
CaO	17.90	17.46	Pr_2O_3	0.716	
V_2O_5	0.318		Nd_2O_3	2.756	
MnO	11.40	11.04	Sm_2O_3	0.240	
FeO	0.165		PbO	0.116	
ZnO	0.012		Bi_2O_3	0.019	
As_2O_5	14.74	17.89	ThO_2	0.061	.
			Total	100.38	100.00

(1) Kesebol deposit, Åmål municipality, Västra Götaland, Sweden; average EDS and ICP-MS analyses; corresponds to $(Ce_{0.70}La_{0.12}Nd_{0.09}Pr_{0.03}Sm_{0.01}Y_{0.01})_{\Sigma=0.96}(Ca_{2.01}Sr_{0.01})_{\Sigma=2.02}(Mn^{2+}_{1.01}Mg_{0.05}Fe^{2+}_{0.01})_{\Sigma=1.07}(Si_{3.05}As^{5+}_{0.81}P_{0.06}S^{6+}_{0.04}V^{5+}_{0.02})_{\Sigma=3.98}O_{13}$. (2) $CeCa_2Mn(AsO_4)[SiO_3]_3$.

Occurrence: In Mn deposits in fine-grained, brecciated, andradite skarn.

Association: Rhodonite, baryte, quartz, calcite, talc, andradite, rhodochrosite, K-feldspar, hematite, gasparite-(Ce), chernovite-(Y), ferriakasakaite-(Ce).

Distribution: From the Kesebol Mn-(Fe-Cu) deposit, Åmål municipality, Västra Götaland, Sweden.

Name: For the discovery locality, the *Kesebol* mine. The suffix indicates the dominant rare earth element.

Type Material: Department of Geosciences, Swedish Museum of Natural History, Stockholm, Sweden (GEO-NRM #20100343).

References: (1) Holtstam, D., L. Bindi, A. Karlsson, J. Langhof, T. Zack, P. Bonazzi, and A. Persson (2020) Kesebolite-(Ce), $CeCa_2Mn(AsO_4)[SiO_3]_3$, a new REE-bearing arsenosilicate mineral from the Kesebol mine, Åmål, Västra Götaland, Sweden. Minerals, 10(4), 385, 1-14.