Manganese-shadlunite $(Mn, Pb, Cd)(Cu, Fe)_8S_8$

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Crystal Data: Cubic. *Point Group:* $4/m\ \overline{3}\ 2/m$ (probable). As irregular grains, to 0.4 mm, and as veinlets, mostly in cubanite. *Twinning:* Polysynthetic twinning seen in polished section.

Physical Properties: Hardness = n.d. VHN = 195 (20 g load). D(meas.) = n.d. D(calc.) = 4.44

Optical Properties: Opaque. *Color:* In polished section, grayish yellow, darker than cubanite. *Luster:* Metallic. *Pleochroism:* Weak. *Anisotropism:* Weak.
R: (400) — , (420) — , (440) 21.2, (460) 22.7, (480) 24.7, (500) 26.5, (520) 27.9, (540) 29.0, (560) 29.9, (580) 30.8, (600) 31.2, (620) 32.3, (640) 32.9, (660) 33.8, (680) 34.5, (700) 34.6

Cell Data: *Space Group:* $Fm3m$ (probable). $a = 10.73$ $Z = 4$

X-ray Powder Pattern: Oktyabr mine, Russia.
3.23 (100), 1.894 (90), 1.097 (40), 3.08 (30), 2.07 (30), 3.78 (20), 2.46 (20)

Chemistry:

	(1)	(2)
Mn	4.6	3.2
Pb	4.8	8.2
Cd	1.0	1.3
Cu	31.19	29.8
Fe	27.21	26.4
S	31.46	29.4
Total	100.26	98.3

(1) Oktyabr mine, Russia; by electron microprobe, corresponds to $(Mn_{0.68}Pb_{0.19}Cd_{0.07})_{\Sigma=0.94}(Cu_{4.00}Fe_{3.97})_{\Sigma=7.97}S_{8.00}$. (2) Majak mine, Russia; by electron microprobe, corresponds to $(Mn_{0.51}Pb_{0.34}Cd_{0.10})_{\Sigma=0.95}(Fe_{4.12}Cu_{4.09})_{\Sigma=8.21}S_{8.00}$.

Mineral Group: Pentlandite group.

Occurrence: In Cu–Ni sulfide ores (Noril'sk region, Russia).

Association: Cubanite.

Distribution: In Russia, from the Talnakh area, Noril'sk region, western Siberia, in the Oktyabr [TL] and Majak mines.

Name: For its manganese content and relation to shadlunite.

Type Material: A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia.

References: (1) Evstigneeva, T.L., A.D. Genkin, N.V. Troneva, A.A. Filimonova, and A.I. Tsepin (1973) Shadlunite, a new sulfide of copper, iron, lead, manganese, and cadmium from copper–nickel ores. Zap. Vses. Mineral. Obshch., 102, 63–74 (in Russian). (2) (1973) Amer. Mineral., 58, 1114 (abs. ref. 1).

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