Mangazeite $Al_2(SO_4)(OH)_4 \cdot 3H_2O$

Crystal Data: Triclinic. *Point Group*: 1 or $\bar{1}$. As fine acicular crystals, to 0.04 mm; in radial aggregates.

Physical Properties: *Cleavage*: None observed. *Fracture*: n.d. *Tenacity*: n.d.
Hardness = 1-2 D(meas.) = n.d. D(calc.) = 2.15

Optical Properties: Transparent. *Color*: Colorless; aggregates white with pale yellow domains.
Streak: Colorless. *Luster*: Vitreous.
Optical Class: Biaxial. α = 1.525(9) β = n.d. γ = 1.545(9) 2V = n.d.

Cell Data: *Space Group*: *P*1 or $P\bar{1}$. a = 8.286(5) b = 9.385(5) c = 11.35(1)
α = 96.1(1)° β = 98.9(1)° γ = 96.6(1)° Z = 4

X-ray Powder Pattern: Mangazeya deposit, eastern Yakutia, Russia.
4.258 (100), 7.59 (49), 4.060 (48), 7.16 (46), 3.912 (43), 8.14 (19), 4.520 (13)

Chemistry:

	(1)	(2)
Al_2O_3	36.28	37.47
SO_3	28.81	29.42
H_2O^+	34.35	33.11
Total	99.44	100.00

(1) Mangazeya deposit, West Verkhoyansk, eastern Yakutia, Russia; average of 5 wet chemical analyses, IR confirms OH, SO_4 and H_2O, corresponding to $Al_{1.99}(SO_4)_{1.01}(OH)_{3.94} \cdot 3.37H_2O$.
(2) $Al_2(SO_4)(OH)_4 \cdot 3H_2O$.

Occurrence: A secondary mineral along the margins of quartz-arsenopyrite veins in the weathering zone of an intensively sericitized and pyritized granodiorite.

Association: Gypsum, chlorite.

Distribution: Mangazeya polymetallic-silver deposit, West Verkhoyansk, eastern Yakutia (Sakha Republic), Russia.

Name: For Mangazeya Creek, eastern Yakutsk (Sakha Republic), Russia, near the first described locality.

Type Material: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow (catalog no. 3291/1).

References: (1) Gamyanin, G.N., Yu.Ya. Zhdanov, N.V. Zayakina, V.V. Gamyanina, and V.S. Suknev (2006) Mangazeite, $Al_2(SO_4)(OH)_4 \cdot 3H_2O$, a new mineral. Zap. Ross. Mineral. Obshch., 135(4), 20–23 (in Russian, English abstract), Geol. Ore Deposits, 49, 514–517 (2007; in English)
(2) (2010) Amer. Mineral., 95, 1599 (abs. ref. 1).