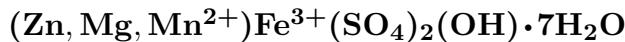


# Zincobotryogen



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**Crystal Data:** Monoclinic. *Point Group:* 2/m. Prismatic crystals, to a few mm, showing {010}, {101}, {120}, {110}, minor {111}, {101}, singly and in conical radiating aggregates.

**Physical Properties:** Hardness = ~2.5 D(meas.) = 2.19–2.20 D(calc.) = [2.24]

**Optical Properties:** Transparent to translucent. *Color:* Bright red-orange to chestnut-brown. *Luster:* Vitreous to greasy.

*Optical Class:* Biaxial (+). *Pleochroism:* Strong. *Orientation:* Negative elongation, parallel extinction. *Dispersion:*  $r > v$ .  $\alpha = 1.542$   $\beta = 1.551$   $\gamma = 1.587$   $2V(\text{meas.}) = \text{n.d.}$   $2V(\text{calc.}) = 54^\circ$

**Cell Data:** *Space Group:* P2<sub>1</sub>/n.  $a = 10.488\text{--}10.51$   $b = 17.819\text{--}17.85$   $c = 7.14\text{--}7.185$   $\beta = 100^\circ 00'\text{--}100^\circ 50'$   $Z = 4$

**X-ray Powder Pattern:** Synthetic.

8.963 (100), 5.163 (75), 3.027 (61), 6.354 (58), 4.095 (53), 2.762 (52), 3.219 (51)

## Chemistry:

	(1)	(2)
SO <sub>3</sub>	36.03	36.1
Al <sub>2</sub> O <sub>3</sub>	0.01	
Fe <sub>2</sub> O <sub>3</sub>	18.34	18.4
FeO	0.85	1.2
MnO	1.75	3.6
ZnO	11.77	7.7
MgO	2.50	1.6
Na <sub>2</sub> O	0.05	
K <sub>2</sub> O	0.00	
H <sub>2</sub> O <sup>+</sup>	29.13	30.9
H <sub>2</sub> O <sup>-</sup>	0.22	
Total	100.65	99.5

(1) Xitieshan mine, China; corresponds to  $(Zn_{0.64}Mg_{0.27}Mn_{0.11}Fe_{0.05})_{\Sigma=1.07}Fe_{1.00}^{3+}(SO_4)_{1.96}(OH)_{1.00} \cdot 6.61H_2O$ . (2) Rammelsberg mine, Germany; corresponds to  $(Zn_{0.47}Mn_{0.25}^{2+}Mg_{0.20}Fe_{0.08})_{\Sigma=1.00}Fe^{3+}(SO_4)_2(OH) \cdot 7H_2O$ .

**Occurrence:** A rare secondary mineral formed in the oxidation zone, typically in an arid climate.

**Association:** Pickeringite, chaidamuite, coquimbite, copiapite, butlerite, pyrite (Xitieshan mine, China); zincian melanterite (Rammelsberg mine, Germany).

**Distribution:** From an undisclosed Pb-Zn deposit [Xitieshan mine, south of Mt. Qilianshan, Chaidamu], Qinghai Province, China. At the Rammelsberg mine, near Goslar, Harz Mountains, Germany. In the USA, from Bisbee, Cochise Co., Arizona; in Colorado, from the Prompt Pay and Running Lode mines, Central City district, Gilpin Co., in the Summitville mine, Rio Grande Co., and at the Bonanza mine, Bonanza district, Saguache Co.

**Name:** For its dominant content of zinc and relation to botryogen.

**Type Material:** n.d.

**References:** (1) Tu Kwang-chih, Li Hsi-lin, Hsieh Hsien-deh, and Yin Shu-sen (1964) Zincobotryogen and zincocopiapite, two new varieties of sulphate minerals. *Acta Geologica Sinica*, 44(1), 99–101. (in Chinese with English abs.). (2) (1964) Amer. Mineral., 49, 1776 (abs. ref. 1). (3) Zemann, J. (1961) Über den Botryogen vom Rammelsberg. *Fortschr. Mineral.*, 39, 84 (in German). (4) (1983) NBS Mono. 25, 20, 67.