

# Minasragrite

# V<sup>4+</sup>O(SO<sub>4</sub>)•5H<sub>2</sub>O

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**Crystal Data:** Monoclinic. *Point Group:* 2/m. Minute equant crystals showing {001}, {110}, {011}, { $\bar{1}01$ }, { $\bar{1}11$ }; in spherulites and granular masses in delicate efflorescences.

**Physical Properties:** Hardness = n.d. D(meas.) = 2.03(10) D(calc.) = 2.06 Easily soluble in cold H<sub>2</sub>O.

**Optical Properties:** Semitransparent. *Color:* Vivid cobalt-blue to pale aquamarine-blue; blue in transmitted light. *Luster:* Vitreous.

*Optical Class:* Biaxial (-). *Pleochroism:* X = deep blue; Y = blue; Z = colorless. *Orientation:* X = b; Z  $\wedge$  c = small. *Absorption:* X > Y > Z.  $\alpha = 1.513(2)$   $\beta = 1.536(2)$   $\gamma = 1.545(2)$  2V(meas.) = Medium large.

**Cell Data:** *Space Group:* P2<sub>1</sub>/a. a = 12.902(4) b = 9.716(5) c = 6.976(2)  $\beta = 110.90(3)^\circ$  Z = 4

**X-ray Powder Pattern:** Minasragra, Peru.

5.135 (100), 3.907 (70), 5.431 (60), 3.826 (35), 3.658 (24), 6.049 (20), 3.509 (17)

**Chemistry:**

	(1)	(2)
SO <sub>3</sub>	32.0	31.64
V <sub>2</sub> O <sub>5</sub>	3.0	
V <sub>2</sub> O <sub>4</sub>	29.8	32.77
H <sub>2</sub> O	34.5	35.59
insol.	0.6	
Total	99.9	100.00

(1) Minasragra, Peru; corresponding to V<sub>1.00</sub>O(SO<sub>4</sub>)<sub>1.02</sub>•4.89H<sub>2</sub>O. (2) VO(SO<sub>4</sub>)•5H<sub>2</sub>O.

**Polymorphism & Series:** Dimorphous with orthominasragrite.

**Occurrence:** An alteration product of patronite in a rich deposit of vanadian materials in fissures that cut red shales and that were probably filled by a remobilized asphaltite deposit (Minasragra, Peru); in a silicified tree, formed as an oxidation product of pyrite reacting with vanadium-rich organic material (Temple Mountain district, Utah, USA).

**Association:** Patronite, melanterite, morenosite, dwornikite, retgersite, szomolnokite, potassium alum, gypsum (Minasragra, Peru); orthominasragrite, pyrite, sulfur, iron sulfates (Temple Mountain district, Utah, USA).

**Distribution:** From Minasragra, 46 km from Cerro de Pasco, Peru. At the North Mesa mine group, Temple Mountain district, Emery County, Utah, USA.

**Name:** For its occurrence at Minasragra, Peru.

**Type Material:** National Museum of Natural History, Washington, D.C., USA, 87515.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 437-438. (2) Smith, M.L. and J. Marinenko (1973) A reexamination of minasragrite. *Amer. Mineral.*, 58, 531-534. (3) Ballhausen, C.J., B.F. Djurinskij, and K.J. Watson (1968) The polarized absorption spectra of three crystalline polymorphs of VOSO<sub>4</sub>•5H<sub>2</sub>O. *J. Amer. Chem. Soc.* 90, 3305-3309. (4) Tachez, M., F. Théobald, K.J. Watson, and R. Mercier (1979) Redétermination de la structure du sulfate de vanadyle pentahydraté VOSO<sub>4</sub>•5H<sub>2</sub>O. *Acta Cryst.*, 35, 1545-1550 (in French with English abs.).