

**Crystal Data:** Monoclinic. *Point Group:* 2/m. As a single untruncated 1.2 mm crystal, prismatic along [100].

**Physical Properties:** *Cleavage:* Good on {001}. *Tenacity:* Brittle. *Fracture:* Splintery. Hardness = ~4 D(meas.) = 2.61(4) D(calc.) = 2.632

**Optical Properties:** Translucent. *Color:* Reddish orange. *Streak:* Pale orange. *Luster:* Vitreous. *Optical Class:* Biaxial (-).  $\alpha = 1.582(2)$   $\beta = 1.586(2)$   $\gamma = 1.613(2)$   $2V(\text{calc.}) = 74.5^\circ$  *Pleochroism:* Distinct, X = pale gray, Y = orange-pink, Z = beige. *Absorption:*  $X < Z < Y$ .

**Cell Data:** *Space Group:* P2/a.  $a = 15.0357(18)$   $b = 6.9408(5)$   $c = 9.9431(9)$   $\beta = 110.827(8)^\circ$   $Z = 2$

**X-ray Powder Pattern:** Iron Monarch quarry, Iron Knob, South Australia, Australia. 9.244 (100), 5.619 (32), 2.759 (30), 3.501 (22), 4.839 (20), 2.566 (17), 4.111 (16)

<b>Chemistry:</b>	(1)
Na <sub>2</sub> O	0.11
K <sub>2</sub> O	0.04
CaO	3.03
MgO	10.97
MnO	[14.11]
Mn <sub>2</sub> O <sub>3</sub>	[1.81]
Al <sub>2</sub> O <sub>3</sub>	12.10
P <sub>2</sub> O <sub>5</sub>	37.13
<u>H<sub>2</sub>O</u>	<u>21.15</u>
Total	100.45

(1) Iron Monarch quarry, Iron Knob, South Australia, Australia; average electron microprobe analysis, H<sub>2</sub>O from structure analysis, total manganese apportioned so that M(1) sites are occupied by Mn, the M(2) site by Mg and Mn, and the M(3) sites by Al and Mn<sup>3+</sup>; corresponds to  $(\text{Mn}^{2+}_{0.60}\text{Ca}_{0.41}\text{Na}_{0.03}\text{K}_{0.01})_{\Sigma=1.05}(\text{Mn}^{2+}_{0.92}\text{Mg}_{0.08})_{\Sigma=1.00}\text{Mg}_{2.00}(\text{Al}_{1.82}\text{Mn}^{3+}_{0.18})_{\Sigma=2.00}(\text{PO}_4)_{4.00}(\text{OH})_{2.06} \cdot 7.95\text{H}_2\text{O}$ .

**Mineral Group:** Jahnsite group, whiteite subgroup; Al > Fe<sup>3+</sup> in the M(3) structural site.

**Occurrence:** From a Mn-rich, carbonate-rich zone, in a deeply weathered, Precambrian sedimentary iron ore deposit (Monarch quarry), likely as a late-stage, low-temperature hydrothermal phase.

**Association:** Hematite, hausmannite, baryte, Mn-rich calcite, rhodochrosite.

**Distribution:** At the Iron Monarch quarry, Iron Knob, South Australia, Australia. From the Jocão pegmatite, and the Sapucaia mine, Minas Gerais, Brazil.

**Name:** Root name, *whiteite*, indicates a member of the group with M(3) = Al<sup>3+</sup>; the suffix indicates sequentially the dominant atom in the X, M(1), and M(2) structural positions.

**Type Material:** South Australian Museum, Adelaide, South Australia, Australia (G32398).

**References:** (1) Elliott, P. and A.C. Willis (2019) Whiteite-(MnMnMg), a new jahnsite-group mineral from Iron Monarch, South Australia: description and crystal structure. *Can. Mineral.*, 57(2), 215-223. (2) (2021) *Amer. Mineral.*, 106, 1364 (abs. ref. 1). (3) Moore, P.B. and J. Ito (1978) I. Whiteite, a new species, and a proposed nomenclature for the jahnsite-whiteite complex series. II. New data on xanthoxenite. III. Salmonsite discredited. *Mineral. Mag.*, 42, 309-323. (4) (1979) *Amer. Mineral.*, 64, 465-466 (abs. ref. 3).