Jahnsite-(NaFeMg)  \[\text{NaFe}^{3+}\text{Mg}_2\text{Fe}^{3+2}(\text{PO}_4)_4(\text{OH})_2\cdot8\text{H}_2\text{O}\]

Crystal Data: Monoclinic. Point Group: 2/m. As six-sided pseudo-orthorhombic twinned prisms, to 1 mm, with shallow wedge-like terminations and striations parallel to [010], both as isolated twinned crystals and in subparallel to divergent intergrowths. Typical crystals have as many as five chemical zones from base to termination corresponding to jahnsite-(NaMnMg), jahnsite-(NaFeMg), jahnsite-(CaMnMg), jahnsite-(NaFeMg), and jahnsite-(CaMgMg). Twinning: Ubiquitous, both simple contact and polysynthetic by reflection on \{001\}.


Cell Data: Space Group: P2/a.  \(a = 15.0811(16)\)  \(b = 7.1403(8)\)  \(c = 9.8299(11)\)  \(β = 110.445(1)°\)  \(Z = 2\)

X-ray Powder Pattern: Tip Top mine, Custer County, South Dakota, USA. 9.218 (100), 2.819 (70), 4.884 (25), 3.537 (25), 2.973 (25), 2.854 (20), 1.933 (20)

Chemistry:

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
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<tbody>
<tr>
<td>Na₂O</td>
<td>2.82</td>
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<tr>
<td>CaO</td>
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<tr>
<td>MnO</td>
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<tr>
<td>MgO</td>
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<td>P₂O₅</td>
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<tr>
<td>H₂O</td>
<td>[21.58]</td>
<td>20.34</td>
</tr>
<tr>
<td>Total</td>
<td>98.61</td>
<td>100.00</td>
</tr>
</tbody>
</table>

(1) Tip Top mine, Custer County, South Dakota, USA; average of 3 electron microprobe analyses, H₂O calculated from the crystal structure and for charge balance; corresponding to \((\text{Na}_{0.72}\text{Ca}_{0.06}\text{Mn}^{2+}_{0.00}(\text{Fe}^{3+}_{0.07}\text{Mg}_{0.01})\text{Mg}_{2.00}\text{Fe}^{3+}_{2.00}(\text{PO}_4)_{2.77}\text{OH}_{0.23}\text{d(OH)}_2\cdot8\text{H}_2\text{O}\).

(2) \(\text{NaFe}^{3+}\text{Mg}^{2+2}(\text{PO}_4)_4(\text{OH})_2\cdot8\text{H}_2\text{O}\).


Occurrence: A late-stage hydrothermal decomposition product of triphylite in a complex granitic pegmatite.

Association: Heterosite, leucopherite, dufrénite, barbosalite, rockbridgeite, mitridatite, ushkovite.

Distribution: At the Tip Top mine, Custer County, South Dakota, USA.

Name: Root name, Jahnsite, indicates a member of the group with \(M_3 = \text{Fe}^{3+}\); suffixes indicate cations in \(X\), \(M_1\), and \(M_2\).

Type Material: Natural History Museum of Los Angeles County, Los Angeles, California, USA (58590, 58591, and 58592).

References: (1) Kampf, A.R., I.M. Steele, and T.A. Loomis (2008) Jahnsite-(NaFeMg), a new mineral from the Tip Top mine, Custer County, South Dakota: Description and crystal structure. Amer. Mineral., 93, 940-945.