Raadeite  

\[ \text{Mg}_7(\text{PO}_4)_2(\text{OH})_8 \]

**Crystal Data:** Monoclinic. *Point Group: \(2/\text{m}\).* As anhedral inclusions in holtedahlite to 150 \(\mu\)m, as veinlets a few tens of micrometers wide in althausite crystals, and in fibrous coronae on heneuite.

**Physical Properties:** *Cleavage:* None.  
*Tenacity:* n.d.  
*Fracture:* n.d.  
*Hardness:* n.d.  
*D(meas.):* n.d.  
*D(calc.):* 2.806

**Optical Properties:** Transparent.  
*Color:* Colorless.  
*Streak:* White.  
*Luster:* Pearly.  
*Optical Class:* Biaxial (-).  
\(\alpha = 1.5945(5)\)  
\(\beta = 1.6069(5)\)  
\(\gamma = 1.6088(5)\)  
*\(2V(\text{meas.):} 45.6(1)^\circ\)*  
*\(2V(\text{calc.):} 43^\circ\)*  
*Dispersion:* Strong, \(r > v\).  
*Orientation:* \(Y = b\).

**Cell Data:** *Space Group:* \(P2_1/\text{n}\).  
\(a = 5.250(1)\)  
\(b = 11.647(2)\)  
\(c = 9.655(2)\)  
*\(\beta = 95.94(1)^\circ\)*  
*Z = 2*

**X-ray Powder Pattern:** Tingelstadtjern, Modum district, southern Norway.  
2.905 (100), 3.521 (80), 2.199 (80), 2.794 (75), 4.436 (75), 3.145 (70), 3.087 (70)

**Chemistry:**

<table>
<thead>
<tr>
<th>Element</th>
<th>Formula</th>
<th>Weight</th>
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<tbody>
<tr>
<td>MgO</td>
<td>55.35</td>
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<tr>
<td>FeO</td>
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<tr>
<td>MnO</td>
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<tr>
<td>CaO</td>
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<td>P₂O₅</td>
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<tr>
<td>As₂O₅</td>
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<td>SO₃</td>
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<tr>
<td>SiO₂</td>
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<tr>
<td>H₂O</td>
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<tr>
<td><strong>Total</strong></td>
<td>98.99</td>
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</tbody>
</table>

(1) Tingelstadtjern, Modum district, southern Norway; average electron microprobe analysis supplemented by IR spectroscopy, H₂O calculated; corresponds to \((\text{Mg}_{6.78}\text{Fe}_{0.02}\text{Mn}_{0.02})_2\cdot 6.82\) \((\text{P}_{1.96}\text{As}_{0.02})_2\cdot 1.98\text{H}_{8.42}\text{O}_{16}\).

**Occurrence:** Late metamorphic, under relatively low pressure and temperature, in nodules rich in apatite and Mg phosphates within a serpentinite body.

**Association:** Apatite, althausite, magnesite, holtedahlite, phoshoellenbergerite.

**Distribution:** Near Tingelstadtjern, Modum district, southern Norway.

**Name:** Honors Dr. Gunnar Raade, Curator of Minerals, Natural History Museum, Oslo, Norway for his contribution to the mineralogy of Mg-phosphates.

**Type Material:** Natural History Museum, Paris, France (MNHN 201-1) and the Institute for Mineralogy, Ruhr University Bochum, Germany.

**References:**