Phosphoellenbergerite

**Mg_{14}(PO_{4})_{6}(PO_{3}OH, CO_{3})_{2}(OH)_{6}**

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**Crystal Data:** Orthorhombic. **Point Group:** 2/m 2/m 2/m. As crystals, tabular on [010] to pseudo-octahedral, with prominent {010}, {100}, {001}, {021}, many other forms, to 1 cm. May be fibrous to massive.


D(meas.) = 3.10–3.29  D(calc.) = 3.32

**Optical Properties:** Transparent to translucent. Color: Pale green, olive-green, brownish green; reddish brown if oxidized. Luster: Vitreous to subresinous.

**Optical Class:** Biaxial (+). Orientation: X = a; Y = b; Z = c. Dispersion: r > v, distinct.

α = 1.663–1.672  β = 1.674–1.680  γ = 1.699–1.700  2V(meas.) = 66°–70°  2V(calc.) = 68°

**Cell Data:** Space Group: Pbna (synthetic).  a = 9.460(2)  b = 10.024(3)  c = 8.670(2)

Z = 4

**X-ray Powder Pattern:** Hagendorf, Germany; close to reddingite.

Hagendorf, Germany: average of two analyses; corresponds to \((\text{Fe}^{2+}_{2.15}\text{Mn}^{2+}_{0.80}\text{Ca}_{0.10})\Sigma=3.05(PO_{4})_{2}\cdot3.05\text{H}_{2}\text{O}.

**Chemistry:**

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P_{2}O_{5}</td>
<td>34.39</td>
<td>34.61</td>
</tr>
<tr>
<td>FeO</td>
<td>37.52</td>
<td>26.27</td>
</tr>
<tr>
<td>MnO</td>
<td>13.63</td>
<td>25.94</td>
</tr>
<tr>
<td>CaO</td>
<td>1.20</td>
<td></td>
</tr>
<tr>
<td>H_{2}O</td>
<td>13.32</td>
<td>13.18</td>
</tr>
<tr>
<td>Total</td>
<td>100.06</td>
<td>100.00</td>
</tr>
</tbody>
</table>

(1) Hagendorf, Germany, average of two analyses; corresponds to \((\text{Fe}^{2+}_{2.15}\text{Mn}^{2+}_{0.80}\text{Ca}_{0.10})\Sigma=3.05(PO_{4})_{2}\cdot3.05\text{H}_{2}\text{O}.

(2) \((\text{Fe},\text{Mn})_{3}(PO_{4})_{2}\cdot3\text{H}_{2}\text{O} with \text{Fe}:\text{Mn} = 1:1.

**Polymorphism & Series:** Forms a series with reddingite.

**Occurrence:** An alteration product of triphylite in zoned complex granite pegmatites.

**Association:** Ludlamite, vivianite, huréaulite, lithiophilite, siderite.

**Distribution:** Large crystals from Hagendorf, Bavaria, Germany. At the Manguaúde pegmatite, near Mesquitela, Portugal. In the USA, in the Palermo #1 mine, near North Groton, Grafton Co., New Hampshire; from the Dan Patch mine, 1.5 km west of Keystone, Pennington Co., and the Bull Moose and Tip Top mines, near Custer, Custer Co., South Dakota. At the Enó pegmatite mine, northeast of Galiléia, Minas Gerais, Brazil. From the El Criollo pegmatite, Cerro Blanco, Tanti district, 45 km west of Córdoba, Córdoba Province, Argentina.

**Name:** For PHOSPHORus and iron, FERRum, in the composition.

**Type Material:** National Museum of Natural History, Washington, D.C., USA, 150230.


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