**Ramsbeckite**

\[(\text{Cu, Zn})_{15}\text{(SO}_4\text{)}_{4}\text{(OH)}_{22}\cdot 6\text{H}_2\text{O}\]

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**Crystal Data:** Monoclinic, pseudohexagonal. *Point Group:* 2/m. Crystals are tabular with large {001}, also {210}, {110}, {100}, giving a slightly rounded rhombic outline, to 3 mm. *Twinning:* Observed, repeated, forming cylindrical aggregates.

**Physical Properties:**
- **Cleavage:** On {001}, perfect. **Fracture:** Conchoidal. **Tenacity:** Brittle. **Hardness:** 3.5

**Optical Properties:**
- **Color:** Green, blue-green. **Streak:** Pale green. **Luster:** Vitreous.
- **Optical Class:** Biaxial (−). **Pleochroism:** Weak; X = pale blue-green, emerald-green; Y = Z = blue-green, yellow-green. **Orientation:** Y = b; X ∩ c = 5°; Z ∩ a = 5°. **Absorption:** X > Y = Z.
- **α:** 1.624–1.669 **β:** 1.674–1.703 **γ:** 1.678–1.707 **2V(meas.) = 36°–38°** 2V(calc.) = 38.0°

**Chemistry:**

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SO\textsubscript{3}</td>
<td>17.4</td>
<td>17.6</td>
<td>17.51</td>
</tr>
<tr>
<td>CuO</td>
<td>44.5</td>
<td>43.8</td>
<td>43.49</td>
</tr>
<tr>
<td>ZnO</td>
<td>15.8</td>
<td>18.1</td>
<td>22.25</td>
</tr>
<tr>
<td>H\textsubscript{2}O</td>
<td>19.3</td>
<td>[20.5]</td>
<td>16.75</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>97.0</td>
<td>[100.0]</td>
<td>100.00</td>
</tr>
</tbody>
</table>

(1) Bastenberg mine, Ramsbeck, Germany; SO\textsubscript{4} by photometry, CuO, ZnO by AA, H\textsubscript{2}O by gas chromatography, (OH)
- computed for charge balance; corresponds to (Cu\textsubscript{0.36}Zn\textsubscript{3.58})\textsubscript{2}H\textsubscript{13.88}
- (SO\textsubscript{4})\textsubscript{4.06}(OH)\textsubscript{19.76} • 9.84H\textsubscript{2}O. (2) Ecton mine, Pennsylvania, USA; by electron microprobe, H\textsubscript{2}O by difference, (OH)
- computed for charge balance; corresponds to (Cu\textsubscript{10.03}Zn\textsubscript{4.05})\textsubscript{2}H\textsubscript{14.08}
- (SO\textsubscript{4})\textsubscript{4.06}(OH)\textsubscript{20.17} • 10.64H\textsubscript{2}O. (3) (Cu, Zn)\textsubscript{15}(SO\textsubscript{4})\textsubscript{4}(OH)\textsubscript{22} • 6H\textsubscript{2}O with Cu:Zn = 2:1.

**Occurrence:** Rarely formed by supergene oxidation in dump materials and slag.

**Association:** Chalcopyrite, linarite, brochantite, serpierite, schulenbergite, smithsonite, hydrozincite, connellite, chalcophyllite (Germany); linarite, anglesite, pyromorphite, posnjakite, serpierite (Ecton mine, Pennsylvania, USA).

**Distribution:** In Germany, from the Bastenberg mine, Ramsbeck, North Rhine-Westphalia; at the Rammelsberg mine, near Goslar, the Glücksrud mine, near Oberschulenberg, the Wildemann mine, and elsewhere in the Harz Mountains; from the Friedrichssegem mine, near Bad Ems, Rhineland-Palatinate; and in the Marie mine, near Wilnsdorf, Siegerland. From the Waterbank mine, and elsewhere in the Harz Mountains; from the Friedrichssegem mine, near Bad Ems, Rhineland-Palatinate; and in the Marie mine, near Wilnsdorf, Siegerland. From the Waterbank mine, Weitnau, Staffordshire, England. In Wales, at the Dyline mine, Machynlleth, Powys; in the Brynarian mine, Talybont, the Penrhwi mine, Ystumtuen, and the Frongoch mine, Dyfed. In the Veneziana mine, near Torrebelvicino, Veneto, Italy. From the Ecton mine, Audubon, Montgomery Co., Pennsylvania, USA.

**Name:** For Ramsbeck, Germany, near the location from which the species was first noted.

**Type Material:** University of Göttingen, Göttingen, Germany.

**References:**

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