Ramazzoite \([\text{Mg}_8\text{Cu}_{12}(\text{PO}_4)(\text{CO}_3)_4(\text{OH})_{24}(\text{H}_2\text{O})_{20})[(\text{H}_2\text{SO}_4)_3(\text{H}_2\text{O})_{36}]]\)

**Crystal Data:** Cubic.  
**Point Group:** 4 3m.  
As cubes to 0.15 mm on edge.  
**Twinning:** Merohedral indicated by the structure refinement.

**Physical Properties:**  
**Cleavage:** Perfect on \{100\}.  
**Fracture:** Conchoidal.  
**Tenacity:** Very brittle.  
Hardness = 2.5  
D(meas.) = 1.98  
D(calc.) = 1.962  
Soluble with mild effervescence in dilute HCl.

**Optical Properties:**  
**Color:** Blue to greenish blue.  
**Streak:** Pale blue.  
**Luster:** Vitreous to oily.  
**Optical Class:** Isotropic.  
\(n = 1.491(1)\)

**Cell Data:**  
**Space Group:** P4 3m.  
\(a = 13.3887(10)\)  
Z = 1

**X-ray Powder Pattern:** Monte Ramazzo mine, near Genova, Liguria, Italy.  
13.37 (100), 9.43 (24), 4.043 (11), 3.252 (9), 2.857 (9), 4.224 (8), 2.730 (5)

**Chemistry:**

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
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<tbody>
<tr>
<td>MgO</td>
<td>22.61</td>
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<td>CuO</td>
<td>30.30</td>
<td>22.43</td>
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<td>P2O5</td>
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<td>SO3</td>
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<td>8.52</td>
<td>8.01</td>
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<td>CO2</td>
<td>[6.21]</td>
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<td>5.87</td>
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<tr>
<td>H2O</td>
<td>[43.60]</td>
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<tr>
<td>Total</td>
<td>99.99</td>
<td>100.00</td>
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</tr>
</tbody>
</table>

(1) Monte Ramazzo mine, Liguria, Italy; average of 5 electron microprobe analyses supplemented by Raman spectroscopy; H2O calculated based on 36 H2O in the interstitial unit to approximate the measured density, CO2 calculated from structure; corresponds to \([\text{Mg}_{8.00}\text{Cu}_{8.00}\text{Mg}_{3.78}(\text{PO}_4)(\text{CO}_3)_4(\text{OH})_{24}(\text{H}_2\text{O})_{20}][(\text{H}_2\text{SO}_4)_3(\text{H}_2\text{O})_{36}]\).  
(2) Do.; normalized.  
(3) [Mg8Cu12(PO4)(CO3)4(OH)24(H2O)20][(H2SO4)3(H2O)36].

**Occurrence:** A late-stage, secondary mineral hosted in serpentinite in contact with basalt dikes and pillow lavas. Likely crystallized from a low-temperature, aqueous solution.

**Association:** Magnetite, chloraritinite, chrysotile, dypingite, goethite, lepidocrocite, nesquehonite, an unidentified Mg sulfate-carbonate.

**Distribution:** From the Monte Ramazzo mine, near Genova, Liguria, Italy.

**Name:** For the locality, the Monte Ramazzo mine.

**Type Material:** Natural History Museum of Los Angeles County, Los Angeles, California, USA. (66691 and 66692).

**References:**  