**Gmelinite-Na**  

**Chemical Formula:** Na₄(Si₄Al₅)O₂₄·11H₂O

**Crystal Data:** Hexagonal. *Point Group:* 6/m 2/m 2/m. As euhedral crystals, pyramidal, tabular, or rhombohedral, striated || (001) or less commonly, || (001), to 4 cm. Rarely in radiating aggregates or granular. *Twinning:* Penetration twins on {1001}, common.

**Physical Properties:**  
- **Cleavage:** {100}*, distinct; parting on {001}.  
- **Fracture:** Uneven.  
- **Tenacity:** Brittle.  
- **Hardness:** 4.5  
- **D(meas.)** = 2.02-2.17  
- **D(calc.)** = 2.098  
- **Piezoelectric.**

**Optical Properties:**  
- Transparent to translucent, opaque.  
- **Color:** Colorless, white, reddish white, salmon-red, yellowish, greenish white; colorless in thin section.  
- **Luster:** Vitreous.  
- **Optical Class:** Uniaxial (-) or (+); may be anomalously biaxial.  
- **Optical Data:**  
  - $\alpha = 1.476-1.494$  
  - $\varepsilon = 1.474-1.480$

**Cell Data:**  
- **Space Group:** P6₃/mmc.  
- **a** = 13.75-13.80  
- **c** = 9.97-10.08  
- **Z** = 4

**X-ray Powder Pattern:** Montecchio Maggiore, Italy.  
4.106 (100), 11.908 (63), 2.978 (55), 2.690 (44), 3.227 (41), 7.68 (29), 5.026 (28)

**Chemistry:**

<table>
<thead>
<tr>
<th>Element</th>
<th>Formula</th>
<th>(1)</th>
<th>(2)</th>
<th>(1)</th>
<th>(2)</th>
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<tr>
<td>SiO₂</td>
<td>50.00</td>
<td>46.57</td>
<td>Na₂O</td>
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<tr>
<td>Al₂O₃</td>
<td>19.17</td>
<td>21.12</td>
<td>K₂O</td>
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<td>CaO</td>
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<td>7.04</td>
<td>H₂O</td>
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<td>SrO</td>
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<td>0.25</td>
<td>Total</td>
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</table>

(1) Montecchio Maggiore, Italy; by electron microprobe, corresponds to (Na₂.35Ca₀.52Sr₀.06K₀.02)₂·2.92Al₁.₇₆Si₃.₂₂O₇·11.₀₈H₂O.  
(2) South quarry, White Head, Co. Antrim, Ireland; by electron microprobe, corresponds to (Na₁.₄₂Ca₁.₂₆Sr₀.₀₆K₀.₀₂)₂·2.₇₈Al₄.₆₂Si₇.₈₁O₂₄·11.₄₃H₂O.

**Mineral Group:** Zeolite group.

**Occurrence:** Formed from sodium-rich fluids, in basalts and related igneous rocks, also pegmatites.

**Association:** Zeolites, calcite, aragonite, quartz.


**Name:** For Christian Gottlob Gmelin (1792-1860), mineralogist and chemist of Tübingen, Germany. The suffix indicates the dominance of Na as the extra-framework cation.

**References:**  