Mayenite  

\[ \text{Ca}_{12}\text{Al}_{14}\text{O}_{33} \]

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**Crystal Data:**  
Cubic.  
**Point Group:** \( \overline{4}3m \) (synthetic).  
In rounded anhedral grains, to 60 \( \mu \)m.

**Physical Properties:**  
Hardness = n.d.  
\( D(\text{meas.}) = 2.85 \)  
\( D(\text{calc.}) = 2.67 \)  
Alters immediately to hydrated calcium aluminates on exposure to \( \text{H}_2\text{O} \).

**Optical Properties:**  
Transparent.  
**Color:** Colorless.  
**Optical Class:** Isotropic.  
\( n = 1.614-1.643 \)

**Cell Data:**  
**Space Group:** \( \overline{I}3d \) (synthetic).  
\( a = 11.97-12.02 \) \( Z = 2 \)

**X-ray Powder Pattern:**  
Near Mayen, Germany.  
2.69 (vs), 4.91 (s), 2.45 (ms), 3.00 (m), 2.19 (m), 1.95 (m), 1.66 (m)

**Chemistry:**

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \text{SiO}_2 )</td>
<td>0.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \text{Al}_2\text{O}_3 )</td>
<td>45.2</td>
<td>49.5</td>
<td>51.47</td>
</tr>
<tr>
<td>( \text{Fe}_2\text{O}_3 )</td>
<td>2.0</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>( \text{MnO} )</td>
<td>1.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \text{CaO} )</td>
<td>45.7</td>
<td>47.0</td>
<td>48.53</td>
</tr>
<tr>
<td>( \text{LOI} )</td>
<td>2.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>95.1</td>
<td>99.8</td>
<td>100.00</td>
</tr>
</tbody>
</table>

(1) Near Mayen, Germany; by semiquantitative spectroscopy.  
(2) Hatrurim Formation, Israel; by electron microprobe, corresponding to \((\text{Ca}_{11.7}\text{Mg}_{0.5})\Sigma=12.2(\text{Al}_{13.5}\text{Fe}_{0.25}\text{Si}_{0.10})\Sigma=13.85\text{O}_{33}\).  
(3) \( \text{Ca}_{12}\text{Al}_{14}\text{O}_{33} \).

**Occurrence:**  
In thermally metamorphosed limestone blocks included in volcanic rocks (near Mayen, Germany); common in high-temperature, thermally metamorphosed, impure limestones (Hatrurim Formation, Israel).

**Association:**  
Calcite, ettringite, wollastonite, larnite, brownmillerite, gehlenite, diopside, pyrrhotite, grossular, spinel, afluillite, jeinite, portlandite, jasmondite (near Mayen, Germany); mellilite, wollastonite, kalsilite, brownmillerite, corundum (Klöch, Austria); spurrite, larnite, grossite, brownmillerite (Hatrurim Formation, Israel).

**Distribution:**  
From the Ettringer-Bellerberg volcano, near Mayen, Eifel district, Germany.  
Found at Klöch, Styria, Austria. In the Hatrurim Formation, Israel. From Kopeysk, Chelyabinsk coal basin, Southern Ural Mountains, Russia.

**Name:**  
For Mayen, Germany, near where the mineral was first described.

**Type Material:**  
Mineral Museum, University of Cologne, Cologne, Germany, M5026/86;  

**References:**  

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