Caryinite \((\text{Na}, \text{Pb})(\text{Ca}, \text{Na})(\text{Ca}, \text{Mn}^{2+})(\text{Mn}^{2+}, \text{Mg})_2(\text{AsO}_4)_3\)

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**Crystal Data:** Monoclinic. **Point Group:** 2/m. As cleavable masses; fine-grained massive, in veins to 10 cm.

**Physical Properties:** Cleavage: On \{110\} and \{010\}, distinct. Hardness = 4

D(meas.) = 4.29  D(calc.) = [4.45]

**Optical Properties:** Subtranslucent. Color: Nut-brown to yellowish brown; in transmitted light, pale yellow-brown. Luster: Greasy.

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

\(\alpha = 1.776(5)\)  \(\beta = 1.780(5)\)  \(\gamma = 1.805(5)\)  \(2\nu(\text{meas.}) = 41(3)^\circ\)

**Cell Data:** Space Group: I\(_2\)/a. \(a = 6.855(2)\)  \(b = 13.147(3)\)  \(c = 11.479(4)\)

\(\beta = 98.97(2)^\circ\)  \(Z = 4\)

**X-ray Powder Pattern:** Långban, Sweden.

\(2.868\ (10), 2.849\ (10), 2.686\ (5), 3.03\ (3), 3.29\ (2), 3.14\ (2), 2.903\ (2)\)

**Chemistry:**

<table>
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<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
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<th>(3)</th>
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<tbody>
<tr>
<td>(\text{P}_2\text{O}_5)</td>
<td>0.19</td>
<td>0.8</td>
<td>0.95</td>
<td>(\text{MgO})</td>
<td>3.09</td>
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<tr>
<td>(\text{As}_2\text{O}_5)</td>
<td>49.78</td>
<td>47.8</td>
<td>48.84</td>
<td>(\text{CaO})</td>
<td>12.12</td>
<td>10.8</td>
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<tr>
<td>(\text{V}_2\text{O}_5)</td>
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<td>(\text{BaO})</td>
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<tr>
<td>(\text{SiO}_2)</td>
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<td>(\text{Na}_2\text{O})</td>
<td>5.16</td>
<td>4.18</td>
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<td>(\text{FeO})</td>
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<td>0.5</td>
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<td>(\text{MnO})</td>
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<td>(\text{Cl})</td>
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<tr>
<td>(\text{PbO})</td>
<td>9.21</td>
<td>11.5</td>
<td>12.73</td>
<td>(\text{H}_2\text{O})</td>
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</tbody>
</table>

Total 100.89  98.6  99.81

(1) Långban, Sweden; \(\text{SiO}_2\) determined separately and thought to be in berzelite. (2) Do.; by electron microprobe, total Fe as FeO, Mn as MnO, Na determined by flame photometry. (3) Do.; by electron microprobe, average of two analyses, total Fe as FeO, Mn as MnO; cations apportioned by structure refinement, corresponding to \((\text{Na}_{0.61}\text{Pb}_{0.39})\Sigma=1.00(\text{Ca}_{0.56}\text{Na}_{0.43}\text{Ba}_{0.01})\Sigma=1.00(\text{Ca}_{0.74}\text{Mn}_{0.26})\Sigma=1.00(\text{Mn}_{1.45}\text{Mg}_{0.54}\text{Fe}_{0.01})\Sigma=2.00(\text{AsO}_4)_{2.89}(\text{PO}_4)_{0.09}\)

(VO)\(_{1.02}\)\(_\Sigma=3.06\).

**Mineral Group:** Alluaudite group.

**Occurrence:** In veinlets in skarn in a metamorphosed Fe–Mn orebody.

**Association:** Berzelite, adelite, hedyphane, hausmannite, rhodonite, diopside, calcite.

**Distribution:** At Långban, Värmland, Sweden.

**Name:** From the Greek for nut-brown, for its common color.

**Type Material:** Swedish Museum of National History, Stockholm, Sweden, 221444.