Calzirtite

\( \text{Ca}_2\text{Zr}_5\text{Ti}_2\text{O}_{16} \)

Crystal Data: Tetragonal. \( \text{Point Group: } 4/m 2/m 2/m \). Single crystals exhibit a prismatic dipyramidal habit; commonly in complex pseudotrapezohedral trillings, outwardly similar to garnet crystals, or with deep re-entrants, to 5 mm. Twinning: Cyclic, on an unknown law.


Optical Properties: Transparent. Color: Light brown, dark brown to nearly black, light green to brownish green, reddish brown in thin fragments; light gray in reflected light, internal reflections reddish brown; variegated brown in thin section. Streak: Brown. Luster: Semimetallic to adamantine, greasy on fractures.

Optical Class: Uniaxial (+). \( \omega = 2.19–2.27 \quad \epsilon = 2.26–2.36 \) Anisotropism: Pronounced.

Cell Data: Space Group: \( \text{I}_4_1/\text{acd} \). \( a = 15.094(2) \quad c = 10.043(2) \quad Z = 8 \)

X-ray Powder Pattern: Ozernyi massif, Russia. 2.945 (10), 1.801 (10), 1.537 (9), 1.170 (7), 2.552 (6), 0.9807 (6), 0.8597 (6)

Chemistry: (1) (2) (3)

<table>
<thead>
<tr>
<th>Element</th>
<th>SiO₂</th>
<th>TiO₂</th>
<th>ZrO₂ + HfO₂</th>
<th>RE + ThO₂</th>
<th>Nb₂O₅</th>
<th>Fe₂O₃</th>
<th>CaO</th>
<th>H₂O</th>
<th>P₂O₅</th>
<th>LOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>0.10</td>
<td>1.58</td>
<td>1.64</td>
<td>0.75</td>
<td>0.41</td>
<td>1.64</td>
<td>11.26</td>
<td>12.22</td>
<td>0.05</td>
<td>0.17</td>
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<tr>
<td>(2)</td>
<td>16.04</td>
<td>17.62</td>
<td>17.99</td>
<td></td>
<td>16.04</td>
<td>12.63</td>
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<tr>
<td>(3)</td>
<td>70.56</td>
<td>66.09</td>
<td>69.38</td>
<td></td>
<td>0.15</td>
<td></td>
<td></td>
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<tr>
<td>Total</td>
<td>100.18</td>
<td>99.91</td>
<td>100.00</td>
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</table>

(1) Ozernyi massif, Russia; corresponds to \( \text{Ca}_{1.81}\text{Zr}_{5.16}\text{Ti}_2\text{O}_{16} \). (2) Kugda massif, Russia; \( \text{Fe}_2\text{O}_3 \) includes \( \text{FeO} \), \( \text{ZrO}_2 \) includes \( \text{HfO}_2 \); corresponds to \( \text{(Ca}_{1.82}\text{Ce}_{0.02})\Sigma=1.84\text{(Zr}_{4.75}\text{Ti}_{0.28})\Sigma=5.07\text{(Ti}_{1.69}\text{Nb}_{0.11}\text{Si}_{0.11}\text{Fe}_{0.09})\Sigma=2.00\text{O}_{16.00} \). (3) \( \text{Ca}_2\text{Zr}_5\text{Ti}_2\text{O}_{16} \).

Occurrence: A characteristic accessory mineral in alkalic and ultramafic complexes associated with carbonatites; typically found in residual soils and alluvium.

Association: Forsterite, pyroxene, calcite, magnetite, phlogopite, niobian perovskite, apatite, rutile, anatase, baddeleyite, zirconolite.

Distribution: In Russia, from the Ozernyi massif, near Lake Gornoye, Aldan, Sakha; in the Gulf ultrabasic pluton, and the Kugda, Magan, and Odiklina massifs, between the Mazeun and Kotui rivers, far northern Siberia; in the Tazheranskiy alkalic massif, west of Lake Baikal, eastern Siberia; and the Sebyayv pluton, Kola Peninsula. Found near Chiesa, Val Malenco, Lombardy, Italy. In the Kaiserstuhl, Baden-Württemberg, Germany. From the Jacupiranga carbonatite, São Paulo, Brazil. In the Bukusu carbonatite complex, southeastern Uganda.

Name: For CALcium and ZIRconium in its composition.

Type Material: A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 61743, 62363.