Diopside

(CaMgSi₂O₆)

Crystal Data: Monoclinic. Point Group: 2/m. As prismatic crystals with nearly square cross sections, to 50 cm; granular, columnar, lamellar massive. Twinning: Simple or multiple twins on {100} or {010}, common.

Physical Properties: Cleavage: Distinct on {110}, (110) \( \wedge (1\overline{1}0) \approx 87^\circ \); partings on {100} and probably {010}. Fracture: Uneven to conchoidal. Tenacity: Brittle. Hardness = 5.5–6.5

D(meas.) = 3.22–3.38  D(calc.) = 3.278


Optical Class: Biaxial (+). Orientation: \( Y = b; Z \wedge c = -38^\circ \) on {010}; \( X \wedge a = -22^\circ \).

Dispersion: \( r > v \), weak to moderate. \( \alpha = 1.664 \quad \beta = 1.672 \quad \gamma = 1.694 \quad 2V(meas.) = 59^\circ \)

Cell Data: Space Group: \( C2/c. \quad a = 9.746 \quad b = 8.899 \quad c = 5.251 \quad \beta = 105.63^\circ \quad Z = 4 \)


Chemistry:

<table>
<thead>
<tr>
<th>Chemical Formula</th>
<th>(1)</th>
<th>(2)</th>
<th>(1)</th>
<th>(2)</th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SiO₂</td>
<td>54.66</td>
<td>54.09</td>
<td>FeO</td>
<td>0.07</td>
<td>1.47</td>
<td>K₂O</td>
</tr>
<tr>
<td>TiO₂</td>
<td>0.28</td>
<td>MnO</td>
<td>0.02</td>
<td>0.09</td>
<td>H₂O⁺</td>
<td>0.22</td>
</tr>
<tr>
<td>Al₂O₃</td>
<td>0.07</td>
<td>MgO</td>
<td>18.78</td>
<td>16.96</td>
<td>H₂O⁻</td>
<td>0.08</td>
</tr>
<tr>
<td>Fe₂O₃</td>
<td>0.68</td>
<td>CaO</td>
<td>25.85</td>
<td>21.10</td>
<td>rem.</td>
<td>0.49</td>
</tr>
<tr>
<td>Cr₂O₃</td>
<td>2.03</td>
<td>Na₂O</td>
<td>1.37</td>
<td>Total 100.35</td>
<td>100.64</td>
<td></td>
</tr>
</tbody>
</table>

(1) Juva, Finland; corresponds to \( Ca_{1.00}(Mg_{0.01}Fe^{3+}_{0.02})_{\Sigma=1.03}Si_{1.96}O_{6} \). (2) Dutoitspan mine, Kimberley, Cape Province, South Africa; corresponds to \( (Ca_{0.82}Na_{0.05}Fe^{2+}_{0.04}Mg_{0.04}K_{0.01})_{\Sigma=0.96}Si_{1.96}Al_{0.03}Fe^{3+}_{0.02}Ti_{1.01})_{\Sigma=1.00}(Si_{1.96}Al_{0.04})_{\Sigma=2.00}O_{6} \).

Polymorphism & Series: Forms two series, with hedenbergite, and with johannsenite.

Mineral Group: Pyroxene group.

Occurrence: Typical of metamorphosed siliceous Ca, Mg-rich rocks of the pyroxene-hornfels or epidote-amphibolite facies; common in skarns, Ca, Mg-rich gneisses and schists, and some kimberlites and peridotites. Less common in alkaline olivine basalts and andesites.

Association: Calcite, forsterite, chondrodite, monticellite, clinohumite, scapolite, wollastonite, grossular, vesuvianite, tremolite, quartz.

Distribution: Selected localities for fine crystals follow: at Schwarzenstein, Zillertal, and near Prägraten, Tirol, Austria. From Al, Piedmont, and St. Marcel, Val d’Aosta, Italy. At Otokumpu, Finland. In Russia, at the Akhmatovsk deposit, near Zlatoust, Ural Mountains; large crystals in the Inagli massif, 30 km west of Aldan, Yakutia; and along the Slyudyanka River, near Lake Baikal, Siberia. In Canada, many localities; in Ontario, at Bird’s Creek, Eganville, Dog’s Lake, Littlefield, and Burgess; in Quebec, at Wakefield, Brompton Lake, near Magog, and in the Jeffrey mine, Asbestos. In the USA, at DeKalb, St. Lawrence Co., Natural Bridge, Jefferson Co., Sing Sing, near Ossining, Westchester Co., New York; and at Ducktown, Polk Co., Tennessee. At Ampandrandava and Andranodambo, Taolaiaro (Fort Dauphin), Madagascar. Large gemmy crystals from the Kunlun Mountains, Sinkiang Uighur Autonomous Region, China. From Tange-Achin, Kandahar Province, Afghanistan. Found near Jaipur, Rajasthan, India. At Khapalu and Chamachu, Pakistan.

Name: From the Greek for double and appearance, apparently for two possible orientations of the prism zone.