Vanadio-oxy-chromium-dravite

NaV$_3$(Cr$_4$Mg$_2$)Si$_6$O$_{18}$(BO$_3$)$_3$(OH)$_3$O

**Crystal Data:** Hexagonal.  **Point Group:** 3m.  As terminated prismatic crystals, to 0.3 mm.

**Physical Properties:**  
- **Cleavage:** Poor/distinct on {0001}.  
- **Fracture:** Conchoidal.  
- **Tenacity:** Brittle.  
- **Hardness:** 7.5  
- **D(meas.):** n.d.  
- **D(calc.)** = 3.3

**Optical Properties:**  
- **Cleavage:** Poor/distinct on {0001}.  
- **Fracture:** Conchoidal.  
- **Tenacity:** Brittle.  
- **Hardness:** 7.5  
- **D(meas.):** n.d.  
- **D(calc.)** = 3.3

**Chemistry:**

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SiO$_2$</td>
<td>32.75</td>
<td>32.27</td>
<td>ZnO</td>
<td>bdl</td>
</tr>
<tr>
<td>TiO$_2$</td>
<td>bdl</td>
<td>0.07</td>
<td>CaO</td>
<td>bdl</td>
</tr>
<tr>
<td>B$_2$O$_3$</td>
<td>[9.56]</td>
<td>[9.40]</td>
<td>Na$_2$O</td>
<td>2.52</td>
</tr>
<tr>
<td>Al$_2$O$_3$</td>
<td>7.64</td>
<td>4.54</td>
<td>K$_2$O</td>
<td>0.24</td>
</tr>
<tr>
<td>Cr$_2$O$_3$</td>
<td>12.87</td>
<td>24.32</td>
<td>F</td>
<td>0.25</td>
</tr>
<tr>
<td>V$_2$O$_5$</td>
<td>24.36</td>
<td>14.88</td>
<td>H$_2$O</td>
<td>[2.40]</td>
</tr>
<tr>
<td>Fe$_2$O$_3$</td>
<td>[0.42]</td>
<td>[0.86]</td>
<td>–O = F$_2$</td>
<td>0.11</td>
</tr>
<tr>
<td>MgO</td>
<td>7.19</td>
<td>7.75</td>
<td>Total</td>
<td>100.10</td>
</tr>
</tbody>
</table>

(1) Peverel marble quarry, Sludyanka, Lake Baikal, Russia; average of 10 electron microprobe analyses supplemented by FTIR spectrometry, B$_2$O$_3$, H$_2$O and Fe$_2$O$_3$:FeO calculated; corresponds to $X$(Na$_{0.89}$K$_{0.06}$)$^{1/3}$(V$^{3+}$)$_{0.27}$Mg$_{0.17}$Fe$^{3+}$$^{0.04}$$^{1/3}$(Cr$^{3+}$)$_{1.85}$Al$_{1.59}$V$^{3+}$$^{0.78}$Mg$_{1.78}$$^{1/3}$[(Si$_{5.95}$Al$_{0.05}$)O$_{18}$$^{1/3}$(BO$_3$)$_{3}$$^{1/3}$](OH)$_{2.91}$(O$_{0.80}$F$_{0.14}$).

**Polymorphism & Series:** Complete solid-solution exists between the species oxy-chromium-dravite, vanadio-oxy-chromium-dravite, and oxy-vanadium-dravite.

**Mineral Group:** Tourmaline supergroup, alkali group, oxy-subgroup 3.

**Occurrence:** A primary mineral in metaquartzite (granulite facies) in marble.

**Association:** Quartz, Cr-V-bearing tremolite, muscovite-celadonite-chromphylite-rosoeolite, diopside-kosmochlor-natalyte, Cr-bearing goldmanite, escolaitke-karelianite, dravite–oxy-vanadium-dravite, V-bearing titanite and rutile, ilmenite, oxyvanite-berdesinskiite, shreyerite, plagioclase, scapolite, zircon, pyrite.

**Distribution:** From the Peverel marble quarry, Sludyanka, Lake Baikal, Russia.

**Name:** As an oxy-chromium-dravite with dominant vanadium in the Y site and V$^{3+}$ contents between 5 and 1.5 atoms per formula unit.

**Type Material:** Museum of Mineralogy, Earth Sciences Department, Sapienza University, Rome, Italy (33067).