Liebenbergite (Ni, Mg)$_2$SiO$_4$

Crystal Data:  Orthorhombic.  

Point Group:  2/m 2/m 2/m.  

Grains, to 1 mm, filling interstices between trevorite grains.

Physical Properties:  

Cleavage:  {010}, fair to poor; {100}, poor.  

Hardness = 6–6.5  

D(meas.) = 4.60  

D(calc.) = 4.60

Optical Properties:  

Transparent to translucent.  

Color:  Yellowish green; colorless to pale green to greenish yellow in thin section.  

Optical Class:  Biaxial (−).  

Pleochroism:  

X = colorless to pale green; 

Z = greenish yellow.

Orientation:  

X = b; Y = c; Z = a.  

Dispersion:  

r > v.  

α = 1.820(3)  

β = 1.854  

γ = 1.888(3)

2V(meas.) = 88(2)°

Cell Data:  

Space Group:  Pbnm.  

a = 4.727(1)  

b = 10.191(3)  

c = 5.955(2)  

Z = 4

X-ray Powder Pattern:  

Bon Accord, South Africa.  

2.442 (100), 2.759 (90), 1.738 (90), 2.503 (80), 3.47 (60), 5.09 (30), 2.252 (30)

Chemistry:  

<table>
<thead>
<tr>
<th>Element</th>
<th>Formula</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>SiO$_2$</td>
<td>29.39</td>
<td></td>
</tr>
<tr>
<td>FeO</td>
<td>4.37</td>
<td></td>
</tr>
<tr>
<td>CoO</td>
<td>1.80</td>
<td></td>
</tr>
<tr>
<td>NiO</td>
<td>56.32</td>
<td></td>
</tr>
<tr>
<td>MgO</td>
<td>6.50</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>98.38</td>
<td></td>
</tr>
</tbody>
</table>

(1) Bon Accord, South Africa; by electron microprobe, average of eight grains; corresponds to 

(Ni$_{1.52}$Mg$_{0.33}$Fe$_{0.12}$Co$_{0.05}$)$_2$Si$_{2.02}$O$_{39}$.

Mineral Group:  

Olivine group.

Occurrence:  

In a small tabular nickel deposit at the contact between quartzite and serpentinized ultramafics; it appears to have formed at ~730 °C and < 2 kbar during thermal metamorphism, possibly of a nickel-rich meteorite.  

Association:  

Trevorite, nickeloan serpentine, nickeloan ludwigite, bunsenite, violarite, millerite, gaspéite, ninite, bonaccordite.

Distribution:  

From three km west of the Scotia Talc mine, Bon Accord, Barberton, Transvaal, South Africa.

Name:  For W.R. Liebenberg, Deputy Director-General of the National Institute for Metallurgy of South Africa.

Type Material:  

Royal Ontario Museum, Toronto, Canada, M33443; Harvard University, Cambridge, Massachusetts, 133404; National Museum of Natural History, Washington, D.C., USA, 132463.

References:  


Amer. Mineral., 58, 733–735.  


Cation ordering in synthetic and natural Ni–Mg olivine.  