Vitusite-(Ce) \( \text{Na}_3(\text{Ce}, \text{La}, \text{Nd})(\text{PO}_4)_2 \)

Crystal Data: Orthorhombic, pseudohexagonal. Point Group: \( mm2 \). Crystals prismatic, to 5 mm, elongated along [001], showing \{100\}, \{101\}, \{110\}, \{120\}, \{210\}, \{101\}; granular, and in fine-grained aggregates. Twinning: Common, on \{160\}, forming cross triplets, and on \{120\}, forming combined cross doublets; composition planes may be \{130\}, \{140\}, and \{1.11.0\}.

Physical Properties: Cleavage: On \{100\}, \{101\}, \{001\}, good. Hardness = 4.5
D(meas.) = 3.60–3.70 D(calc.) = [3.63]

Optical Properties: Transparent. Color: White, pale pink, pale green, pale yellow, pinkish tan, gray, black; colorless in thin section. Luster: Vitreous, may be greasy.
Optical Class: Biaxial (−). Orientation: X = a; Y = b; Z = c. \( \alpha = 1.602–1.604 \) \( \beta = 1.646–1.650 \) \( \gamma = 1.649–1.654 \) 2V(meas.) = 28.5°–30°

Cell Data: Space Group: \( Pbc \)\(_2\)\(_b\). \( a = 5.3356(8) \) \( b = 18.6722(9) \) \( c = 14.0546(9) \) \( Z = 8 \)

X-ray Powder Pattern: Ilímaussaq intrusion, Greenland. 2.811 (10), 2.801 (10), 6.580 (9), 4.665 (9), 4.634 (9), 3.512 (9), 2.690 (9)

Chemistry:

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(1)</th>
<th>(2)</th>
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<tbody>
<tr>
<td>( \text{P}_2\text{O}_5 )</td>
<td>36.27</td>
<td>36.50</td>
<td>1.24</td>
<td>1.13</td>
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<tr>
<td>( \text{SiO}_2 )</td>
<td>0.25</td>
<td>0.15</td>
<td>4.39</td>
<td>4.33</td>
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<tr>
<td>( \text{La}_2\text{O}_3 )</td>
<td>15.56</td>
<td>12.20</td>
<td>0.92</td>
<td>4.75</td>
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<td>( \text{Ce}_2\text{O}_3 )</td>
<td>19.95</td>
<td>16.50</td>
<td>23.15</td>
<td>22.50</td>
</tr>
<tr>
<td>Total</td>
<td>101.73</td>
<td>98.06</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) Ilímaussaq intrusion, Greenland; by electron microprobe, corresponds to \( (\text{Na}_2.92\text{Ca}_0.06)_\Sigma=2.98 (\text{Ce}_{0.47}\text{La}_{0.38}\text{Nd}_{0.10}\text{Pr}_{0.03})_\Sigma=0.98(\text{PO}_4)_{2.00}(\text{SiO}_4)_{0.01})_\Sigma=2.01 \). (2) Mt. Sengischorr, Kola Peninsula, Russia; by electron microprobe, corresponds to \( (\text{Na}_2.83\text{Ca}_0.33)_\Sigma=3.16(\text{Ce}_{0.39}\text{La}_{0.29}\text{Nd}_{0.10}\text{Pr}_{0.03})_\Sigma=0.81(\text{PO}_4)_{2.00}(\text{SiO}_4)_{0.01})_\Sigma=2.01 \).

Occurrence: An alteration product of steenstrupine in differentiated alkalic massifs (Ilímaussaq massif; Kola Peninsula, Russia); in sodalite xenoliths associated with an intrusive alkalic gabbro-syenite complex (Mont Saint-Hilaire, Canada).

Association: Steenstrupine, aegirine, analcime, lovozerite, sphalerite, villaumite, arvedsonite, albite, microcline, nepheline, sodalite (Ilímaussaq intrusion, Greenland); steenstrupine, belovite-(Ce), neptunite, leucosphenite, sazhinite-(Ce) (Jubilee pegmatite, Kola Peninsula, Russia); vuonnemite, sodalite, eudialyte, steenstrupine, kogarkoite, sidorenkite, rasvumite (Mont Saint-Hilaire, Canada).


Name: To honor Vitus Bering (1681–1741), Danish-Russian explorer of the Arctic seas, and the dominant rare earth, cerium.

Type Material: Geology Museum, Kola Branch, Academy of Sciences, Apatity, 5544; Mining Institute, St. Petersburg, Russia, 1209/1; University of Copenhagen, Copenhagen, Denmark; National School of Mines, Paris, France; The Natural History Museum, London, England, 1994.36.


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