Donnayite-(Y) NaCaSr$_3$(CO$_3$)$_6$·3H$_2$O

Crystal Data: Triclinic, pseudo-hexagonal, and hexagonal. Point Group: 1 or $3m$. As platy, tabular, saucer-shaped, columnar, barrel-shaped, or wedge-shaped pseudo-hexagonal crystals, to 1 cm; also as hemimorphic pyramidal crystals, terminated by {001}; as parallel crystal aggregates; as syntactic intergrowths with related minerals; as irregular grains. Twinning: Common by 120° rotation around [103] and reflection on {010}, {30T} or {331}.

Physical Properties: Cleavage: On {001}, fair to imperfect. Hardness = ~3 D(meas.) = 3.30(1) D(calc.) = 3.266 (triclinic); 3.44(3) (hexagonal).


Optical Class: Biaxial (−). $\alpha = 1.551$–1.561, $\beta = 1.646(2)$, $\gamma = 1.652(2)$, 2V(meas.) = 0°–30°

Cell Data: Space Group: P1 with $a = 8.993(2)$, $b = 8.985(2)$, $c = 6.780(2)$. $\alpha = 116.25(2)^\circ$, $\beta = 102.76(2)^\circ$, $\gamma = 60.00(1)^\circ$, $Z = 1$, or Space Group: R$3m$ with $a = 5.211(1)$, $c = 18.57(7)$, $Z = 3$.

X-ray Powder Pattern: Mont Saint-Hilaire, Canada.

Chemistry:

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO$_2$</td>
<td>[30.98]</td>
<td>[29.94]</td>
<td>1.83</td>
<td>2.70</td>
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<tr>
<td>Y$_2$O$_3$</td>
<td>13.1</td>
<td>9.13</td>
<td>1.45</td>
<td>1.55</td>
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<tr>
<td>La$_2$O$_3$</td>
<td>0.45</td>
<td>5.17</td>
<td>0.87</td>
<td>0.36</td>
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<tr>
<td>Ce$_2$O$_3$</td>
<td>10.33</td>
<td>1.55</td>
<td>3.37</td>
<td>3.87</td>
</tr>
<tr>
<td>Pr$_2$O$_3$</td>
<td>0.69</td>
<td>0.36</td>
<td>H$_2$O</td>
<td>[6.34]</td>
</tr>
</tbody>
</table>

Total [98.47] [100.00]

(1) Mont Saint-Hilaire, Canada; by electron microprobe, CO$_2$ and H$_2$O calculated for stoichiometry by analogy to weloganite; corresponds to Na$_{8.00(1)}$Ca$_{9.87}$Nd$_{0.69}$La$_{0.31}$Σ=0.99

(2) Khibiny massif, Kola Peninsula, Russia; by electron microprobe, CO$_2$ and H$_2$O calculated for stoichiometry; corresponds to Sr$_{2.92}$Ba$_{0.05}$(CO$_3$)$_6$·3H$_2$O.

Polymorphism & Series: Polytypes T and R.

Occurrence: In pegmatite dikes, milarolitic cavities, and interstices in nepheline syenite in an alkaline complex (Mont Saint-Hilaire, Canada).

Association: Ewaldite, mckelveyite-(Y), synchysite, gaidonnayite, arfvedsonite, aegirine, calcite, sphalerite, catapleiite, microcline, analcime, natrolite, “chlorite” (Mont Saint-Hilaire, Canada).

Distribution: In Canada, from Mont Saint-Hilaire, and near Saint-Amable, Quebec. In Russia, from Mt. Kukisvumchorr, Khibiny massif, Kola Peninsula, and at the Vishnevogorsk complex, Vishnev-Ilmen Mountains, Southern Ural Mountains.

Name: Honors Dr. Joseph Désiré Hubert Donnay (1902–1994), Belgian–American–Canadian crystallographer and his wife Dr. Gabrielle Donnay (1920–1987), American–Canadian mineralogist, Johns Hopkins University, Baltimore, Maryland, USA and McGill University, Montreal, Canada, for their contributions to mineralogy and crystallography.


References:
(2) (1979) Amer. Mineral., 64, 635–654 (abs. ref. 1).

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