

Ewaldite**Ba(Ca, Y, Na, K)(CO₃)₂·nH₂O**

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Crystal Data: Hexagonal. *Point Group:* 6mm. As tabular to prismatic or pyramidal hexagonal crystals, to 5 mm; syntactically intergrown with mckelveyite-(Y).

Physical Properties: Hardness = n.d. D(meas.) = 3.25(5), on impure material. D(calc.) = 3.37

Optical Properties: Semitransparent. *Color:* Bluish green, pale greenish gray. *Optical Class:* Uniaxial (-). *Pleochroism:* O = dark bluish green; E = pale yellowish green. $\omega = 1.646(3)$ $\epsilon = < 1.572$

Cell Data: *Space Group:* P6₃mc. *a* = 5.284–5.320 *c* = 12.78–12.84 *Z* = 2

X-ray Powder Pattern: Vuoriyarvi complex, Kola Peninsula, Russia. 3.135 (10), 2.044 (9), 2.024 (9), 2.655 (8), 2.626 (8), 4.340 (7), 1.609 (6)

Chemistry:	(1)	(2)		(1)	(2)
CO ₂	[27.9]	[25.46]	BaO	45.0	34.60
UO ₃	0.8		Na ₂ O	5.6	3.53
Fe ₂ O ₃	2.0		K ₂ O	1.4	
RE ₂ O ₃	7.7	11.57	H ₂ O		[12.55]
CaO	7.6	5.57	insol.	5.4	
SrO	0.8	6.72	Total	[104.2]	[100.00]

(1) Green River Formation, Wyoming, USA; no anions other than CO₃²⁻ detected, here calculated for charge balance excluding Fe³⁺; separate spectrographic analysis gave Y₂O₃ 62.0%, La₂O₃ 0.6%, Sm₂O₃ 0.4%, Eu₂O₃ 0.9%, Gd₂O₃ 8.5%, Dy₂O₃ 6.5%, Ho₂O₃ 1.6%, Er₂O₃ 10.6%, Yb₂O₃ 8.5%, Lu₂O₃ 0.6%; corresponds to Ba_{1.00}(Ca_{0.48}RE_{0.20}Na_{0.15}K_{0.11}Sr_{0.03}U_{0.02})_{Σ=0.99}(CO₃)_{2.00}.
 (2) Khibiny massif, Russia; by electron microprobe, CO₂ and H₂O calculated, H₂O confirmed by crystal-structure analysis, RE₂O₃ composed of Y₂O₃ 6.98%, La₂O₃ 0.80%, Ce₂O₃ 1.38%, Nd₂O₃ 0.16%, Gd₂O₃ 0.29%, Tb₂O₃ 0.09%, Dy₂O₃ 0.74%, Ho₂O₃ 0.27%, Er₂O₃ 0.50%, Yb₂O₃ 0.36%.

Occurrence: From drill core into trona beds in dolomitic marlstone (Green River Formation, Wyoming, USA); from carbonatites and hydrothermal veins in alkaline igneous rocks (Kola Peninsula, Russia).

Association: Mckelveyite-(Y), shortite, labuntsovite, leucosphenite, searlesite, hematite (Green River Formation, Wyoming, USA); kukharenkoite-(Ce), belovite, fluorite, nenadkevichite, ancylite-(Ce), synchysite-(Ce), mckelveyite-(Y), burbankite, calcite, barite, orthoclase (Khibiny massif, Russia).

Distribution: From the Green River Formation, Sweetwater Co., Wyoming, USA. Large crystals at Mont Saint-Hilaire, Quebec, Canada. In Russia, from the Vuoriyarvi carbonatite complex and the Khibiny massif, Kola Peninsula.

Name: Honors Professor Paul Peter Ewald (1888–1985), German physicist and crystallographer, founder of Zeits. Krist. and Acta Cryst., Polytechnic Institute of New York, Brooklyn, New York, USA.

Type Material: The Natural History Museum, London, England, 1971,137; National Museum of Natural History, Washington, D.C., USA, 121683.

References: (1) Donnay, G. and J.D.H. Donnay (1971) Ewaldite, a new barium calcium carbonate. I. Occurrence of ewaldite in syntactic intergrowth with mckelveyite [= mckelveyite-(Y)]. *Tschermaks Mineral. Petrog. Mitt.*, 15, 185–200. (2) Donnay, G. and H. Preston (1971) Ewaldite, a new barium calcium carbonate. II. Its crystal structure. *Tschermaks Mineral. Petrog. Mitt.*, 15, 201–212. (3) (1971) *Amer. Mineral.*, 56, 2156 (abs. refs. 1 and 2). (4) Voloshin, A.V., V.V. Subbotin, V.M. Yakovenchuk, Y.A. Pakhomovskii, Y.P. Men'shikov, T.N. Nadezhina, and D.Y. Pushcharovskiy (1992) New data on ewaldite. *Zap. Vses. Mineral. Obshch.*, 121, 56–67 (in Russian with English abs.).

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