Cowlesite $CaAl_2Si_3O_{10}\cdot 6H_2O$

Crystal Data: Orthorhombic. *Point Group:* n.d. Very thin, lath-shaped crystals showing few forms, with sharp terminations, to 2 mm; radiating sprays of crystals and compact balls.

Physical Properties: *Cleavage:* {010}, perfect. *Tenacity:* Brittle. Hardness = Soft. D(meas.) = 2.14(2) D(calc.) = 2.05

Optical Properties: Transparent. *Color:* Colorless, white, gray, blue-gray. *Luster:* Pearly. *Optical Class:* Biaxial (–). *Orientation:* $X = a$; $Y = b$; $Z = c$. α = 1.505–1.513 β = 1.509–1.516 γ = 1.509–1.518 2V(meas.) = 44°–53°

Cell Data: *Space Group:* n.d. $a = 11.27(1)$ $b = 15.25(1)$ $c = 12.61(3)$ Z = 6

X-ray Powder Pattern: Goble, Oregon, USA.
15.2 (100), 3.81 (35), 2.964 (35), 2.934 (25), 3.052 (20), 5.08 (17), 7.62 (15)

Chemistry:

	(1)	(2)
SiO_2	42.73	46.37
Al_2O_3	24.32	25.87
Fe_2O_3		0.08
CaO	12.86	15.12
Na_2O	0.70	0.80
K_2O		0.10
H_2O	22.8	21.0
Total	103.41	109.34

(1) Goble, Oregon, USA; by electron microprobe, H_2O by weight loss to 600 °C; corresponds to $(Ca_{0.96}Na_{0.10})_{\Sigma=1.06}Al_{2.00}Si_{2.99}O_{10}\cdot 5.6H_2O$. (2) Superior, Arizona, USA; by electron microprobe; H_2O by weight loss to 600 °C; corresponds to $(Ca_{1.04}Na_{0.10}K_{0.01})_{\Sigma=1.15}Al_{1.96}Si_{2.98}O_{10}\cdot 5.0H_2O$.

Mineral Group: Zeolite group.

Occurrence: In cavities in basalts and scoria, typically the only zeolite within a single vesicle.

Association: Zeolites, apophyllite.

Distribution: In the USA, at Goble, Columbia Co., at Beech Creek, Grant Co., and at Spray, Wheeler Co., Oregon; on Capitol Peak, Thurston Co., Washington; from eight km south of Superior, Pinal Co., Arizona; and at Table Mountain, Jefferson Co., Colorado. In Canada, at Monte Lake, British Columbia. From Dunseverick, Ballyclare, and elsewhere in Co. Antrim, Ireland. At Kingsburgh, Isle of Skye, Scotland. In Mjoädalsá Canyon, near Hvammur, Iceland. From Dalsnipa, on Sandoy and Satan, on Streymoy, Faeroe Islands. At Kuniga, Oki Islands, Japan. From Flinders and Jindivick, Victoria, Australia. A number of other localities are known.

Name: To honor John Cowles (1907–1985), amateur mineralogist of Rainier, Oregon, USA.

Type Material: University of California, Santa Barbara, California, 6720, 6721; National Museum of Natural History, Washington, D.C., USA, 135026.

References: (1) Wise, W.S. and R.W. Tschernich (1975) Cowlesite, a new Ca-zeolite. Amer. Mineral., 60, 951–956. (2) Vezzalini, G., G. Artioli, S. Quartieri, and H. Foy (1992) The crystal chemistry of cowlesite. Mineral. Mag., 56, 575–579.