Gobbinsite $(Na_2, Ca)_2K_2Al_6Si_{10}O_{32}\cdot 12H_2O$

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Crystal Data: Orthorhombic, pseudotetragonal, or tetragonal. *Point Group:* $mm2$ or 422. Individual crystals very rare, spikelike pyramidal, to 2 mm; more commonly as clusters of lath-shaped or fibrous crystals, elongated along [001]; massive. *Twinning:* On {110}, inferred from X-ray studies.

Physical Properties: *Fracture:* Brittle. Hardness = ∼4 D(meas.) = 2.194 on a mixture with impurities. D(calc.) = 2.147

Optical Properties: Transparent to translucent. *Color:* Chalky white to light brown. *Streak:* White.
Optical Class: Uniaxial (–) or biaxial (–). *Orientation:* $X = c$. $\omega = 1.494(3)$ $\epsilon = 1.489(3)$ 2V(meas.) = n.d.

Cell Data: *Space Group:* $Pmn2_1$. $a = 10.108(1)$ $b = 9.766(1)$ $c = 10.171(1)$ Z = 1, or *Space Group:* $P4_22_12$. $a = 10.115(3)$ $c = 9.766(3)$ Z = 1

X-ray Powder Pattern: Gobbins area, Ireland.
7.11 (100b), 4.116 (100), 3.201 (100), 3.106 (80), 2.699 (80b), 5.056 (50), 2.651 (40)

Chemistry:

	(1)	(2)
SiO_2	49.21	44.82
Al_2O_3	23.64	22.81
Fe_2O_3	0.04	
MgO	1.00	
CaO	1.58	2.51
SrO	0.36	
BaO	0.12	
Na_2O	9.85	6.01
K_2O	0.66	7.73
H_2O	[13.54]	16.12
Total	[100.00]	100.00

(1) Gobbins area, Ireland; by electron microprobe, average of six analyses; H_2O by difference, originally given as 13.55%; corresponds to $(Na_{3.98}Ca_{0.35}Mg_{0.31}Sr_{0.04}Ba_{0.01}Fe_{0.01})_{\Sigma=4.70}K_{0.18}Al_{5.80}Si_{10.25}O_{32}\cdot 9.41H_2O$. (2) Two-Mouth Cave, Ireland; by electron microprobe, corresponds to $(Na_{2.50}Ca_{0.59})_{\Sigma=3.09}K_{2.11}Al_{6.17}Si_{9.93}O_{32}\cdot 12H_2O$.

Mineral Group: Zeolite group.

Occurrence: A secondary mineral in amygdules in basalts (Co. Antrim, Ireland); in cavities in sodalite syenite in an intrusive alkalic gabbro-syenite complex (Mont Saint-Hilaire, Canada).

Association: Gmelinite, calcite (Co. Antrim, Ireland); tetranatrolite, sérandite (Mont Saint-Hilaire, Canada).

Distribution: On Island Magee, from Two Mouth Cave, at the coastal escarpment near Hills Port, south of The Gobbins, and at Dunseverick, near Giant's Causeway, Co. Antrim, Ireland. From Mont Saint-Hilaire, Quebec, Canada.

Name: For the type locality at The Gobbins, Ireland.

Type Material: Ulster Museum, Belfast, Ireland, I7881; The Natural History Museum, London, England, 1982,203; National Museum of Natural History, Washington, D.C., USA, 149432.

References: (1) Nawaz, R. and J.F. Malone (1982) Gobbinsite, a new zeolite mineral from Co. Antrim, N. Ireland. Mineral. Mag., 46, 365–369. (2) (1983) Amer. Mineral., 68, 642–643 (abs. ref. 1). (3) Nawaz, R. (1983) New data on gobbinsite and garronite. Mineral. Mag., 47, 567–568. (4) McCusker, L.B., C. Baerlocher, and R. Nawaz (1985) Rietveld refinement of the crystal structure of the new zeolite mineral gobbinsite. Zeits. Krist., 171, 281–289. (5) Mandarino, J.A. and V. Anderson (1989) Monteregian Treasures. Cambridge Univ. Press, 97.

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