Haüyne $(Na, Ca)_{4-8}Al_6Si_6(O, S)_{24}(SO_4, Cl)_{1-2}$

Crystal Data: Cubic. *Point Group:* $\bar{4}3m$. Crystals dodecahedra or pseudo-octahedra, to 3 cm; in rounded grains. *Twinning:* On {111}, common, rarely as penetration twins; also as polysynthetic or contact twins.

Physical Properties: *Cleavage:* {110}, distinct. *Fracture:* Uneven to conchoidal. *Tenacity:* Brittle. Hardness = 5.5–6 D(meas.) = 2.44–2.50 D(calc.) = n.d. May show reddish orange to purplish pink fluorescence under LW UV.

Optical Properties: Transparent to translucent. *Color:* Bright blue to greenish blue; white or shades of black, gray, brown, green, yellow, red, may be patchy; colorless or pale blue in thin section. *Streak:* Slightly bluish to colorless. *Luster:* Vitreous to greasy.
Optical Class: Isotropic; weakly birefringent when included. $n = 1.494–1.509$

Cell Data: *Space Group:* $P\bar{4}3n$. $a = 9.08–9.13$ $Z = 1$

X-ray Powder Pattern: Niedermendig, Germany.
3.72 (100), 2.623 (25), 6.47 (16), 2.873 (14), 2.141 (14), 1.781 (10), 2.428 (8)

Chemistry:

	(1)	(2)		(1)	(2)
SiO_2	34.04	29.3	K_2O	5.44	3.71
Al_2O_3	28.27	29.0	Cl	0.76	
Fe_2O_3		0.07	H_2O	0.34	
FeO	0.69		CO_2	0.4	
MgO	0.48	0.15	SO_3	10.02	13.1
CaO	9.51	11.2	$-O = Cl_2$	0.17	
Na_2O	10.39	13.0	Total	100.17	99.53

(1) Monte Vulture, Italy; corresponds to $(Na_{3.55}Ca_{1.80}K_{1.22}Mg_{0.13})_{\Sigma=6.70}Al_{5.89}Fe_{0.11}Si_{6.00}O_{24}[(SO_4)_{1.33}Cl_{0.22}]_{\Sigma=1.55}$. (2) Anguillara, Italy; by electron microprobe, corresponds to $(Na_{4.76}Ca_{2.26}K_{0.90}Mg_{0.45})_{\Sigma=8.37}Al_{6.46}Fe_{0.01}Si_{5.53}O_{24}(SO_4)_{1.86}$.

Mineral Group: Sodalite group.

Occurrence: In phonolites and related leucite- or nepheline-rich igneous rocks; less commonly in nepheline-free extrusives.

Association: Nepheline, leucite, titanian andradite, melilite, augite, sanidine, biotite, phlogopite, apatite.

Distribution: In Italy, in Lazio, at many localities in the Alban Hills, as at Ariccia, Marino, Sacrofano, and Campagnaro; on Monte Somma, and near Melfi, on Monte Vulture, Campania; in the Pitigliano quarry, near Grosseto, Tuscany. From Mendig, Mayen, and elsewhere in the Eifel district, Germany. In the USA, from Winnett, Petroleum Co., Montana, and in the Edwards mine, St. Lawrence Co., New York. In the Niangniang Shan complex, Nanjing, Jiangsu Province, China. On the smaller island of Taiarupu, Tahiti. A few other localities are known.

Name: To honor Abbé René Just Haüy (1743–1822), French crystallographer and mineralogist.

References: (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 431–432. (2) Deer, W.A., R.A. Howie, and J. Zussman (1963) Rock-forming minerals, v. 4, framework silicates, 289–302. (3) Taylor, D. (1967) The sodalite group of minerals. Contr. Mineral. Petrol., 16, 172–188. (4) Löhn, J. and H. Schulz (1968) Strukturverfeinerung am gestörten Hauyn, $(Na_5K_1Ca_2)Al_6Si_6O_{24}(SO_4)_{1.5}$. Neues Jahrb. Mineral., Abh., 109, 201–210 (in German with English abs.). (5) Burragato, F., A. Maras, and A. Rossi (1982) The sodalite group minerals in the volcanic areas of Latium. Neues Jahrb. Mineral., Monatsh., 433–445. (6) Hassan, I. and P. Buseck (1989) Cluster ordering and antiphase domain boundaries in hauyne. Can. Mineral., 27, 173–180.