Nasonite $Pb_6Ca_4Si_6O_{21}Cl_2$

Crystal Data: Hexagonal. *Point Group:* $6/m$. Rare crystals are prismatic with $\{10\bar{1}0\}$, $\{11\bar{2}0\}$, terminated by $\{10\bar{1}1\}$; commonly granular, massive.

Physical Properties: *Cleavage:* Good on {0001}; indistinct prismatic. Hardness = 4
D(meas.) = 5.42–5.55 D(calc.) = 5.63

Optical Properties: Transparent to translucent. *Color:* White, rarely yellow or blue-green, probably as the result of impurities. *Luster:* Greasy to adamantine.
Optical Class: Uniaxial (+). $\omega = 1.913$–1.946 $\epsilon = 1.923$–1.963

Cell Data: *Space Group:* $P6_3/m$. $a = 10.08$ $c = 13.27$ $Z = 2$

X-ray Powder Pattern: Långban, Sweden. (ICDD 14-328).
3.27 (100), 1.81 (100), 3.16 (90), 2.61 (90), 2.88 (60), 2.16 (60), 2.73 (50)

Chemistry:

	(1)	(2)
SiO_2	18.32	18.9
FeO		trace
MnO	2.37	trace
ZnO	0.03	
PbO	65.96	66.0
MgO	0.00	
CaO	10.98	13.0
Cl	3.07	3.5
H_2O^+	0.25	
$-O = Cl_2$	0.69	0.8
Total	100.29	[100.6]

(1) Franklin, New Jersey, USA. (2) Do.; by electron microprobe, original total given as 99.9%; corresponding to $Pb_{6.00}Ca_{4.42}Si_{5.64}O_{21}Cl_2$.

Occurrence: A rare mineral, formed under hydrothermal conditions, cutting franklinite-willemite ore in a metamorphosed stratiform zinc deposit (Franklin, New Jersey, USA); in calcite-filled veins in a metamorphosed Fe–Mn deposit (Långban, Sweden).

Association: Clinohedrite, barysilite, datolite, prehnite, willemite, axinite, hancockite, garnet, manganophyllite (Franklin, New Jersey, USA); manganoan diopside, manganoan aegirine, lead, apophyllite, margarosanite, thaumasite (Långban, Sweden).

Distribution: In the USA, at Franklin, Sussex Co., New Jersey, and at Crestmore, Riverside Co., California. From Långban and Jakobsberg, Värmland, Sweden.

Name: For Frank Lewis Nason (1856–1928), American geologist, Geological Survey of New Jersey, USA.

Type Material: Yale University, New Haven, Connecticut, USA, 2.4192, 2.4193.

References: (1) Dana, E.S. (1899) Dana's system of mineralogy, (6th edition), app. I, 48. (2) Palache, C. (1935) The minerals of Franklin and Sterling Hill, Sussex County, New Jersey. U.S. Geol. Sur. Prof. Paper 180, 92–93. (3) Frondel, C. and L. H. Bauer (1951) Nasonite and its relation to pyromorphite. Amer. Mineral., 36, 534–537. (4) Guiseppetti, G., G. Rossi, and C. Tadini (1971) The crystal structure of nasonite. Amer. Mineral., 56, 1174–1179. (5) Dunn, P.J. (1985) The lead silicates from Franklin, New Jersey: occurrence and composition. Mineral. Mag., 49, 721–727. (6) Brès, E.F., W.G. Waddington, J.L. Hutchinson, S. Cohen, I. Mayer, and J.-C. Vogel (1987) Detection of non-hexagonal symmetry in an apatite-structure-related mineral (nasonite). Acta Cryst., 43, 171–174.