Lazurite $Na_6Ca_2Al_6Si_6O_{24}[(SO_4), S, Cl, (OH)]_2$

Crystal Data: Cubic; also monoclinic or triclinic. *Point Group:* $\bar{4}3m$. In dodecahedra, or more rarely cubes, up to 5 cm; granular, disseminated, or massive.

Physical Properties: *Cleavage:* {110}, imperfect. *Fracture:* Uneven. *Tenacity:* Brittle. Hardness = 5–5.5 D(meas.) = 2.38–2.45 D(calc.) = 2.39–2.42

Optical Properties: Translucent to opaque. *Color:* Deep blue, azure, violet-blue, greenish blue; blue in thin section. *Streak:* Bright blue. *Luster:* Vitreous.
Optical Class: Isotropic; anomalously anisotropic. $n = 1.502–1.522$

Cell Data: *Space Group:* $P\bar{4}3n$. $a = 9.09$ Z = 1

X-ray Powder Pattern: Sar-e-Sang, Afghanistan. (ICDD 17-749).
3.71 (100), 2.622 (80), 2.872 (45), 6.43 (40), 2.141 (35), 1.782 (30), 2.272 (25)

Chemistry:

	(1)
SiO_2	31.34
Al_2O_3	26.27
Fe_2O_3	0.27
MgO	2.47
CaO	7.97
Na_2O	15.75
K_2O	1.02
Cl	0.78
H_2O	3.87
SO_3	8.71
S	1.84
$-O = S, Cl_2$	0.67
Total	99.62

(1) Sar-e-Sang, Afghanistan; corresponds to $(Na_{5.88}K_{0.25})_{\Sigma=6.13}(Ca_{1.65}Mg_{0.71}Fe_{0.04})_{\Sigma=2.40}Si_{6.04}Al_{5.96}O_{24}[(SO_4)_{1.26}S_{0.66}Cl_{0.26}]_{\Sigma=2.18}$.

Polymorphism & Series: Triclinic and monoclinic polymorphs are known.

Mineral Group: Sodalite group.

Occurrence: A contact metamorphic mineral in limestones.

Association: Calcite, pyrite, diopside, humite, forsterite, haüyne, muscovite.

Distribution: Exceptional crystals from Sar-e-Sang, Badakhshan Province, Afghanistan. Well-crystallized material from the basins of the Slyudyanka and Bystraya Rivers, Sayan Mountains, near Lake Baikal, Siberia, Russia. At Lyadzhuar-Darinsk, near Ishkashima, Pamir Mountains, Tajikistan. From Monte Somma, Campania, and in the Alban Hills, Lazio, Italy. In the USA, at Ontario Peak and Cascade Canyon, San Bernardino Co., California, and on North Italian Mountain, Gunnison Co., Colorado. In Canada, about 15 km north of Lake Harbour, Baffin Island, Northwest Territory. At Thabapin, near Mogok, Myanmar (Burma). From along the Cazadero River, near Ovalle, Chile.

Name: For its color resemblance to azurite, named from the Persian *lazhward*, for *blue*.

References: (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 432–433. (2) Deer, W.A., R.A. Howie, and J. Zussman (1963) Rock-forming minerals, v. 4, framework silicates, 289–302. (3) Hogarth, D.D. and W.L. Griffin (1976) New data on lazurite. Lithos, 9, 39–54. (4) Hassan, I., R.C. Peterson, and H.D. Grundy (1985) The structure of lazurite, ideally $Na_6Ca_2(Al_6Si_6O_{24})S_2$, a member of the sodalite group. Acta Cryst., C41, 827–832. (5) Saposhnikov [Sapozhnikov], A.N. (1990) Indexing of additional reflections on the X-ray Debye diffraction patterns of lazurite concerning the study of modulation of its structure. Zap. Vses. Mineral. Obshch., 119(1), 110–116 (in Russian).