

Melanophlogite

SiO₂·n(C, H, O, S)

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Crystal Data: Tetragonal, pseudocubic. *Point Group:* $4/m\ 2/m\ 2/m$ supercells are statistically oriented along the pseudocubic axes. As well-formed cubes, modified by {210}, to 5 mm. Most commonly as thin crusts of complexly intergrown crystals and rounded, droplike aggregates. *Twinning:* Interpenetrant twinning on {201}, probable, giving sector and depressed cube faces.

Physical Properties: *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 6.5–7 VHN = 649–724, 680 average (100 g load). D(meas.) = 1.99–2.11 D(calc.) = 1.98–1.99 Impurities incorporated may include CH₄, CO₂, S.

Optical Properties: Transparent to translucent. *Color:* Colorless when pure; pale yellow to deep red-brown with impurities; turbid white when weathered. *Luster:* Adamantine. *Optical Class:* Isotropic; may be weakly anisotropic. $n = 1.425\text{--}1.457$

Cell Data: *Space Group:* $P4_232$. $a = 26.82(3)$ $c = 13.37(2)$ $Z = 184$

X-ray Powder Pattern: Chvaletice, Czech Republic. 5.99 (10), 3.580 (9), 5.471 (7), 3.862 (6), 3.248 (6), 3.716 (5), 3.158 (5)

Chemistry:	(1)	(2)	(3)		(1)	(2)	(3)
SiO ₂	92.4	94.6	96.18	O	3.40	2.6	2.24
C	1.2	0.9	0.84	S	2.3	0.1	< 0.01
H	0.81	0.6	0.79				
				Total	100.11	98.8	100.05

(1) Racalmuto, Sicily, Italy. (2) Chvaletice, Czech Republic; by electron microprobe and neutron activation, corresponding to 46SiO₂·(C_{2.17}H_{17.25}O_{5.42}S_{0.09}). (3) Mt. Hamilton, California, USA; corresponding to 46SiO₂·(C_{2.01}H_{22.69}O_{4.02}).

Polymorphism & Series: Becomes cubic above ~40 °C.

Occurrence: A late-stage, low-temperature mineral in sulfur deposits (Racalmuto, Sicily, Italy); in low-temperature hydrothermal veins associated with metamorphosed sedimentary manganese deposits (Chvaletice, Czech Republic); in carbonate-bearing serpentinites (Fortullino, Italy; Mt. Hamilton, California, USA).

Association: Sulfur, calcite, “opal,” cristobalite, quartz, dolomite, celestite, pyrite, marcasite, rhodochrosite, magnesite.

Distribution: In Italy, at Solfatara Giona, Racalmuto, and at Caltanissetta, Sicily; and from Fortullino, near Quercianella, Tuscany. In the Chvaletice deposit, Czech Republic. In the USA, at Mt. Hamilton, Santa Clara Co., California.

Name: From the Greek for *black* and *to be burned*, in allusion to the fact that some specimens of the mineral turn black when heated.

Type Material: Natural History Museum, Paris, France, 135245; Harvard University, Cambridge, Massachusetts; National Museum of Natural History, Washington, D.C., USA, C1279, 93011.

References: (1) Frondel, C. (1962) Dana's system of mineralogy, (7th edition), v. III, silica minerals, 283–284. (2) Skinner, B.J. and D.E. Appleman (1963) Melanophlogite, a cubic polymorph of silica. *Amer. Mineral.*, 48, 854–867. (3) Kamb, B. (1965) A clathrate crystalline form of silica. *Science*, 148, 232–234. (4) Appleman, D.E. (1966) The crystal structure of melanophlogite, a cubic polymorph of SiO₂. *Amer. Mineral.*, 51, 258 (abs.). (5) Žák, L. (1972) A contribution to the crystal chemistry of melanophlogite. *Amer. Mineral.*, 57, 779–796. (6) Cooper, J.F., Jr. and G.E. Dunning (1972) Melanophlogite from Mount Hamilton, Santa Clara County, California. *Amer. Mineral.*, 57, 1494–1504. (7) Gallo, S. (1974) Melanophlogite, a new and interesting find. *Mineral. Record*, 5, 207–208. (8) Gies, H. and F. Liebau (1981) Melanophlogite: composition, thermal behavior and structure refinement. *Acta Cryst.*, A37, C187–C188.

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