

**Crystal Data:** Hexagonal. *Point Group:*  $\bar{3}2/m$ . Crystals complex rhombohedral, pseudocubic, prismatic, rarely scalenohedral, to 13 cm, with triangular striations on {0001} and {10 $\bar{1}$ 1}; thin tabular, to micaceous or platy, commonly in rosettes; radiating fibrous, reniform, botryoidal or stalactitic masses, columnar; earthy, granular, oolitic, concretionary. *Twining:* Penetration twins on {0001} or with {10 $\bar{1}$ 0} as composition plane; also lamellar on {10 $\bar{1}$ 1}.

**Physical Properties:** *Cleavage:* Parting on {0001} and {10 $\bar{1}$ 1} due to twinning. *Fracture:* Uneven to subconchoidal. *Tenacity:* Brittle; elastic in thin laminae. Hardness = 5–6 VHN = 1000–1100 (100 g load). D(meas.) = 5.26 D(calc.) = 5.255

**Optical Properties:** Opaque, transparent on thin edges. *Color:* Steel-gray, may have iridescent tarnish, dull to bright red; white to gray-white, with a bluish tint, in reflected light, with deep blood-red internal reflections. *Streak:* Cherry-red or reddish brown. *Luster:* Metallic or submetallic to dull.

*Optical Class:* Uniaxial (-). *Pleochroism:* O = brownish red; E = yellowish red. *Dispersion:* Very strong. *Absorption:* O > E.  $\omega = 3.15$ –3.22  $\epsilon = 2.87$ –2.94 *Anisotropism:* Distinct. R<sub>1</sub>–R<sub>2</sub>: (400) 32.0–34.5, (420) 31.0–34.0, (440) 30.0–33.5, (460) 29.1–32.7, (480) 28.4–32.2, (500) 27.8–31.6, (520) 27.2–31.0, (540) 27.0–30.6, (560) 26.8–30.4, (580) 26.4–30.0, (600) 25.5–29.2, (620) 24.8–28.3, (640) 24.1–27.5, (660) 23.5–26.7, (680) 23.1–26.1, (700) 22.8–25.6

**Cell Data:** *Space Group:*  $R\bar{3}c$ .  $a = 5.038(2)$   $c = 13.772(12)$   $Z = 6$

**X-ray Powder Pattern:** Elba, Italy. (ICDD 24-72). 2.703 (100), 2.519 (70), 1.6966 (36), 3.686 (33), 1.8428 (31), 1.4873 (22), 1.4543 (21)

<b>Chemistry:</b>	(1)	(1)
	Fe <sub>2</sub> O <sub>3</sub> 98.14	FeO 1.29
	Mn <sub>2</sub> O <sub>3</sub> 0.54	MnO 0.38
		<hr/>
		Total 100.35

(1) Franklin, Sussex Co., New Jersey, USA.

**Polymorphism & Series:** Dimorphous with maghemite.

**Mineral Group:** Hematite group.

**Occurrence:** An accessory mineral in felsic igneous rocks, a late-stage sublimate in volcanic rocks, and in high-temperature hydrothermal veins. A product of contact metamorphism and in metamorphosed banded iron formations. A common cement in sedimentary rocks and a major constituent in oolitic iron formations. Abundant on weathered iron-bearing minerals.

**Association:** Ilmenite, rutile, magnetite (metamorphic and igneous); goethite, siderite, lepidocrocite (sedimentary).

**Distribution:** Widespread. Exceptional crystals from Switzerland, as at Fibbia, St. Gotthard, Uri; Binntal, Valais; Cavradi, Tavetsch, Graubünden; and many other places. At Ocna de Fier (Morávicza; Vaskó), Romania. From Rio Marina, Elba, Italy. At Cleator Moor, Cumbria, England. From Kragerø and Hiassen, Norway. In Brazil, large crystals from Mesa Redonda and Congonhas do Campo, Minas Gerais; at Itabira and in the Brumado mine, Bahia; at Miguel Burnier, Ouro Preto. From the Kuruman district, Cape Province, South Africa. At Nador, Algeria. In the USA, in the Thomas Range, Juab Co., Utah, and near Quartzsite, La Paz Co., Arizona.

**Name:** From the Greek for *blood*, in allusion to its color.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 527–534. (2) Deer, W.A., R.A. Howie, and J. Zussman (1962) Rock-forming minerals, v. 5, non-silicates, 21–27. (3) Blake, R.L., R.E. Hessevick, T. Zoltai, and L.W. Finger (1966) Refinement of the hematite structure. Amer. Mineral., 51, 123–129. (4) Maslen, E.N., V.A. Streltsov, N.R. Streltsova, and N. Ishizawa (1994) Synchrotron X-ray study of the electron density in  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub>. Acta Cryst., 50, 435–441.

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