

**Ranciéite**

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**Crystal Data:** Hexagonal. *Point Group:* n.d. As fine lamellar to polycrystalline aggregates; in stalactites and incrustations.**Physical Properties:** Hardness = n.d.  $D(\text{meas.}) = 3.336$   $D(\text{calc.}) = \text{n.d.}$ **Optical Properties:** Opaque, transparent in thin fragments. *Color:* Black, brown, violet; brown in transmitted light. *Streak:* Pale reddish brown with a lilac to purple hue.*Luster:* Bright metallic.*Optical Class:* Uniaxial. $R_1$ – $R_2$ : n.d.**Cell Data:** *Space Group:* n.d.  $a = 2.83$ – $2.86$   $c = 7.53$ – $7.55$   $Z = \text{n.d.}$ **X-ray Powder Pattern:** Rancié, France; close to takanelite, variable with hydration. 7.50 (10), 3.71 (5), 2.70 (4), 2.46 (4), 2.34 (4), 9.55 (2), 2.04 (1)

<b>Chemistry:</b>	(1)	(2)	(3)	(1)	(2)	(3)
SiO <sub>2</sub>		0.62	0.09	CaO	2.30	8.20
MnO <sub>2</sub>	70.80	75.04	76.22	Na <sub>2</sub> O		0.12
Al <sub>2</sub> O <sub>3</sub>		0.12	0.61	K <sub>2</sub> O		0.26
Fe <sub>2</sub> O <sub>3</sub>	9.20	0.12	0.15	H <sub>2</sub> O <sup>+</sup>		11.09
MnO		3.31		H <sub>2</sub> O <sup>−</sup>		1.53
CuO		0.02		H <sub>2</sub> O	15.00	[14.48]
MgO	1.35	0.16		P <sub>2</sub> O <sub>5</sub>		0.10
				<b>Total</b>	<b>98.65</b>	<b>100.59</b> [100.00]

(1) Rancié, France. (2) Oriente Province, Cuba; corresponding to  $(\text{Ca}_{0.76}\text{Mn}_{0.22})_{\Sigma=0.98}\text{Mn}_{4.14}\text{O}_9 \cdot 3.36\text{H}_2\text{O}$ . (3) Sheliya deposit, Russia; by electron microprobe,  $\text{Mn}^{4+}:\text{Mn}^{3+}:\text{Mn}^{2+}$  calculated from site occupancy and charge balance considerations; corresponding to  $(\text{Ca}_{0.70}\text{Mn}_{0.22}^{2+}\text{Al}_{0.06}\text{K}_{0.02})_{\Sigma=1.00}(\text{Mn}_{3.75}^{4+}\text{Mn}_{0.12}^{3+}\text{Fe}_{0.01}^{3+})_{\Sigma=3.88}\text{O}_9 \cdot 3.86\text{H}_2\text{O}$ .

**Polymorphism & Series:** Forms a series with takanelite.**Occurrence:** A product of weathering or alteration of manganese deposits, commonly formed in limestone or in caves in limestone.**Association:** Todorokite, calcite, “limonite”.**Distribution:** Some well-authenticated localities are: in France, at Rancié, near Vicdessos, Ariège; at Prader, Pyrénées-Oriental; at Montmirat, Lozève; and elsewhere. From near Newbiggin, Teesdale, Durham, England. At Barranco de Maspalomas, Grand Canary Island, Spain. In a cave at Kefali, near Itea, Greece. From Monte Gelato, near Mazzano Romano, Latium, Italy. In the Sheliya deposit, Ural Mountains, Russia. At Winterberg, Harz Mountains, Germany. From Oriente Province, Cuba. In the USA, from Batesville, Independence Co., Arkansas; in Mammoth Cave, Kentucky; at the Anson Betts mine, Plainfield, Hampshire Co., Massachusetts; in Paxton's Cave, near Bolling Springs, Alleghany Co., Virginia; at Courtland, Cochise Co., and Ajo, Pima Co., Arizona.**Name:** For its first-noted occurrence at Rancié, France.**References:** (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 572. (2) Richmond, W.E., M. Fleischer, and M.E. Mrose (1969) Studies on manganese oxide minerals. IX. Ranciéite. Bull. Soc. fr. Minéral., 92, 191–195. (3) Chukhrov, F.V., A.I. Gorshkov, E.S. Rudnitskaya, V.V. Beresovkaya, and A.V. Sivtsov (1980) Manganese minerals in clay: a review. Clays and Clay Minerals, 28, 346–453. (4) Kim, S.J. (1993) Chemical and structural variations in ranciéite–takanelite solid solution series. Neues Jahrb. Mineral., Monatsh., 233–240.

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