

Huréaulite



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Crystal Data: Monoclinic. *Point Group:* $2/m$. Crystals long to short prismatic, elongated along [001], with {100}, {110}, or tabular {100}, to 3 cm, may be equant; in bundled fascicles, less commonly fibrous, scaly, compact, massive.

Physical Properties: *Cleavage:* On {100}, good. Hardness = 3.5 D(meas.) = 3.15–3.19 D(calc.) = 3.19

Optical Properties: Transparent to translucent. *Color:* Light pink, rose-violet, pale rose, amber, orange, red-orange, red, brownish orange, reddish to yellowish brown. *Streak:* Nearly white. *Luster:* Vitreous, inclined towards greasy. *Optical Class:* Biaxial (-). *Pleochroism:* X = colorless; Y = yellow to pale rose; Z = reddish yellow to reddish brown. *Orientation:* X = b; Z \wedge c = 75°. *Dispersion:* r < v, very strong, crossed. $\alpha = 1.647\text{--}1.654$ $\beta = 1.654\text{--}1.662$ $\gamma = 1.660\text{--}1.667$ 2V(meas.) = 75°–82°

Cell Data: *Space Group:* C2/c (synthetic). a = 17.587(4) b = 9.127(3) c = 9.497(5) $\beta = 96.68(3)^\circ$ Z = 4

X-ray Powder Pattern: Stewart mine, Pala, California, USA. (ICDD 34-146). 3.152 (100), 8.09 (70), 2.992 (65), 8.75 (40), 2.630 (40), 4.545 (35), 3.198 (30)

Chemistry:	(1)	(2)	(3)	(1)	(2)	(3)
P ₂ O ₅	38.00	38.09	38.96	MgO	0.30	
FeO	11.10	20.65		CaO	0.38	
MnO	32.85	28.72	48.68	H ₂ O	18.00	[11.86]
				Total	99.95	[100.00]
						100.00

(1) Huréaux, France. (2) São Jose de Safira, Brazil; by electron microprobe, average of three analyses, total Fe as FeO, H₂O by difference. (3) Mn₅(PO₄)₂(PO₃OH)₂·4H₂O.

Occurrence: A late-stage secondary mineral formed by alteration of primary phosphates in complex granite pegmatites.

Association: Lithiophilite, triphylite, heterosite, rockbridgeite, cacoxenite, vivianite, fairfieldite, dickinsonite, eosphorite, stewartite, strengite, phosphosiderite, roscherite, many rarer phosphates.

Distribution: Many localities. In France, from Huréaux, St. Sylvestre, and in the La Vilate quarry, near Chanteloube, Haute-Vienne. At the Mangualde pegmatite, near Mesquitela, Portugal. In Germany, fine crystals from Hagendorf, at Pleystein, and Hühnerkobel, near Zwiesel, Bavaria. In the Varuträsk pegmatite, 15 km northwest of Skellefteå, Västerbotten, Sweden. From the Viitaniemi pegmatite, near Eräjärvi, Finland. In the USA, from the Strickland quarry, Portland, Middlesex Co., and at Branchville, Fairfield Co., Connecticut; in the Fletcher and Palermo #1 mines, near North Groton, Grafton Co., New Hampshire; from the Emmons quarry, Greenwood, Oxford Co., and many other places in Maine; in the Bull Moose and Tip Top mines, near Custer, and the White Elephant mine, near Pringle, Custer Co., and elsewhere in South Dakota. In Brazil, at the Sapucaia pegmatite mine, about 50 km east-southeast of Governador Valadares; fine examples from the Criminoso mine, near São Jose de Safira, and the Joca mine, Galiléia, Minas Gerais. At the Buranga pegmatite, near Gatumba, Rwanda. Extraordinary crystals from Shengus, Gilgit district, Pakistan.

Name: For its first-noted occurrence near Huréaux, France.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 700–702. (2) Fransolet, A.-M. (1976) L'huréaulite: ses propriétés minéralogiques et son rôle dans l'évolution génétique des phases Li(Fe, Mn)PO₄. Bull. Soc. fr. Minéral., 99, 261–273 (in French with English abs.). (3) Moore, P.B. and T. Araki (1973) Hureaulite, Mn₅²⁺(H₂O)₄[PO₄(OH)]₂[PO₄]₂: its atomic arrangement. Amer. Mineral., 58, 302–307. (4) Dunn, P.J., P.B. Leavens, B.D. Sturman, R.V. Gaines, and C. do P. Barbosa (1979) Hureaulite and barbosolite from Lavra do Criminoso, Minas Gerais, Brazil. Mineral. Record, 10, 147–151. (5) Gerault, Y., A. Riou, and Y. Cudennec (1987) Phosphate hydrogénophosphate hydrate de manganése. Acta Cryst., C43, 1829–1830 (in French with English abs.).

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