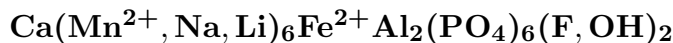


Griphite



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Crystal Data: Cubic; typically metamict in whole or part. *Point Group:* $2/m\bar{3}$. Massive, may be reniform, in nodules to 2 m.

Physical Properties: *Fracture:* Uneven to conchoidal. *Tenacity:* Brittle. Hardness = 5.5 D(meas.) = 3.40–3.64 D(calc.) = 3.65 May be radioactive.

Optical Properties: Transparent to translucent. *Color:* Very pale yellow, dark brown to brownish black when metamict; yellowish brown to brown in transmitted light. *Luster:* Resinous to vitreous.

Optical Class: Isotropic. $n = 1.630\text{--}1.687$

Cell Data: *Space Group:* $Pa\bar{3}$. $a = 12.205(2)$ $Z = 4$

X-ray Powder Pattern: Mas Claret, France.

2.720 (10), 3.04 (5), 2.482 (5), 2.951 (4), 1.625 (4), 3.36 (3), 2.275 (3)

Chemistry:	(1)	(2)	(3)		(1)	(2)	(3)
P ₂ O ₅	38.52	41.15	41.93	Na ₂ O	5.52	3.20	3.40
Al ₂ O ₃	10.13	10.41	9.67	K ₂ O	0.30		
Fe ₂ O ₃		0.70		F	trace	3.02	3.77
FeO	4.00	7.34	13.12	Cl	0.11		
MnO	29.64	25.20	21.45	H ₂ O	4.29	1.00	
MgO	0.15	0.25	0.00	insol.	0.16	0.22	
CaO	7.47	7.87	5.86	–O = (F, Cl) ₂	[0.02]	1.27	1.58
Li ₂ O	trace	0.78	[1.06]	Total	[100.27]	99.87	[98.68]

(1) Everly pegmatite, South Dakota, USA; average of two complete and three partial analyses; corresponds to $\text{Ca}_{1.00}(\text{Mn}_{3.85}^{2+}\text{Na}_{1.75}\text{Ca}_{0.31}\text{K}_{0.06}\text{Mg}_{0.04})_{\Sigma=6.01}(\text{Fe}_{0.50}^{2+}\text{Mn}_{0.25}^{2+})_{\Sigma=0.75}(\text{Al}_{1.95}\text{Fe}_{0.05}^{3+})_{\Sigma=2.00}[(\text{PO}_4)_{5.32}(\text{OH})_{0.68}]_{\Sigma=6.00}[(\text{OH})_{1.97}\text{Cl}_{0.03}]_{\Sigma=2.00}$. (2) Mas Claret, France; by AA, colorimetry, H₂O by the Penfield method; corresponds to $\text{Ca}_{1.00}(\text{Mn}_{3.56}^{2+}\text{Na}_{1.03}\text{Li}_{0.52}\text{Ca}_{0.41}\text{Fe}_{0.32}^{2+}\text{Fe}_{0.09}^{3+}\text{Mg}_{0.06})_{\Sigma=5.99}(\text{Fe}_{0.70}^{2+}\text{Mn}_{0.05}^{2+})_{\Sigma=0.75}\text{Al}_{2.00}[(\text{PO}_4)_{5.81}(\text{OH})_{0.19}]_{\Sigma=6.00}[\text{F}_{1.59}(\text{OH})_{0.37}]_{\Sigma=1.96}$. (3) Buranga pegmatite, Rwanda; by electron microprobe, total Fe as FeO; corresponds to $\text{Ca}_{1.00}(\text{Mn}_{3.07}^{2+}\text{Na}_{1.11}\text{Fe}_{1.10}^{2+}\text{Li}_{0.72}\text{Ca}_{0.06})_{\Sigma=6.06}\text{Fe}_{0.75}^{2+}\text{Al}_{1.93}(\text{PO}_4)_{6.00}\text{F}_{2.02}$.

Occurrence: An accessory mineral in complex granite pegmatites.

Association: Crandallite, apatite, montebrasite, triplite, hausmannite, albite, mica, quartz.

Distribution: From the Riverton Lode [Everly mine], near Harney City, three km east of Keystone, and in the Sitting Bull mine, 1.5 km northwest of Keystone, Pennington Co., South Dakota, USA. At Mt. Ida, about 160 km northwest of Alice Springs, Northern Territory, Australia. In the Jaffit pegmatite, Kamativu, Zimbabwe. From the Buranga pegmatite, near Gatumba, Rwanda. In a pegmatite near Rehamna, Morocco. At Mas Claret, in the Albères massif, Pyrénées-Orientales, France. From an undefined locality near the Karachin River, Turkestan.

Name: From the Greek for *enigma*, as the chemical composition was originally puzzling.

Type Material: National Museum of Natural History, Washington, D.C., USA, R5315.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 843–844. (2) Fontan, F., M. Orliac, and F. Permingeat (1978) Nouvelles données sur la griphite, d'après un échantillon non métamictite des pegmatites du massif des Albères (Pyrénées-Orientales). Bull. Minéral., 101, 536–543 (in French with English abs.). (3) Rinaldi, R. (1978) The crystal structure of griphite, a complex phosphate, not a garnetoid. Bull. Minéral., 101, 543–547. (4) Fransolet, A.-M. and K. Abraham (1983) Une association triplite – montebrasite – griphite dans la pegmatite de Buranga, Rwanda. Ann. Soc. Géol. Belg., 106, 299–309 (in French with English abs.).

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