

Deloryite

$\text{Cu}_4(\text{UO}_2)(\text{MoO}_4)_2(\text{OH})_6$

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Crystal Data: Monoclinic. *Point Group:* $2/m$. As crystals, tabular on $\{010\}$, elongated along $[001]$, with arcuate terminations, to 3 mm; typically in rosettes of subparallel individuals.

Physical Properties: *Cleavage:* Perfect on $\{010\}$ and $\{100\}$; good on $\{001\}$.
Fracture: Conchoidal. Hardness = 4 D(meas.) = 4.9(1) D(calc.) = 4.78 Radioactive.

Optical Properties: Transparent to nearly opaque. *Color:* Dark green to black; yellow-green in transmitted light. *Streak:* Green. *Luster:* Vitreous to greasy.

Optical Class: Biaxial (+). *Orientation:* $Z = b$; $X \wedge c = 21.9^\circ$; $Y \wedge a = 36.2^\circ$.

Dispersion: $r > v$, strong. $\alpha = 1.90(3)$ $\beta = 1.93(3)$ $\gamma = 1.96(3)$ $2V(\text{meas.}) = 90^\circ$
 $2V(\text{calc.}) = 91.3(1)^\circ$

Cell Data: *Space Group:* $C2/m$. $a = 19.94(1)$ $b = 6.116(2)$ $c = 5.520(3)$
 $\beta = 104.18(5)^\circ$ $Z = 2$

X-ray Powder Pattern: Cap Garonne mine, France.

4.100 (100), 3.734 (90), 4.815 (80), 2.482 (60), 4.425 (40), 4.276 (40), 3.254 (40)

Chemistry:

	(1)	(2)
MoO ₃	29.16	30.43
SO ₃	0.27	
UO ₃	31.78	30.23
Al ₂ O ₃	0.10	
CuO	33.36	33.63
H ₂ O	5.8	5.71
Total	100.47	100.00

(1) Cap Garonne mine, France; by electron microprobe, average of three analyses, H₂O by TGA, (MoO₄)²⁻ and (OH)¹⁻ shown present by IR; corresponds to $\text{Cu}_{3.96}(\text{UO}_2)_{1.05}\text{Al}_{0.02}(\text{MoO}_4)_{1.91}(\text{SO}_4)_{0.03}(\text{OH})_{6.08}\text{O}_{0.06}$. (2) $\text{Cu}_4(\text{UO}_2)(\text{MoO}_4)_2(\text{OH})_6$.

Occurrence: Very rare in the oxidized portion of a uranium deposit in sandstone.

Association: Metazeunerite, atacamite, paratacamite, malachite, barite.

Distribution: From the Cap Garonne mine, near le Pradet, Var, France.

Name: Honors Jean Claude Delory (1953–), French mineral collector and land surveyor, Toulon, France, who collected the first specimens.

Type Material: Natural History Museum, Geneva, Switzerland, 435/82.

References: (1) Sarp H. and P.J. Chiappero (1992) Deloryite, $\text{Cu}_4(\text{UO}_2)(\text{MoO}_4)_2(\text{OH})_6$, a new mineral from the Cap Garonne mine near Le Pradet, Var, France. *Neues Jahrb. Mineral., Monatsh.*, 58–64. (2) (1992) *Amer. Mineral.*, 77, 1305 (abs. ref. 1). (3) Pushcharovskiy, D.Y., R.K. Rastsvetaeva, and H. Sarp (1996) Crystal structure of deloryite, $\text{Cu}_4(\text{UO}_2)[\text{Mo}_2\text{O}_8](\text{OH})_6$. *J. Alloys and Compounds*, 239, 23–26.