Hydroxylpyromorphite $Pb_5(PO_4)_3(OH)$

Crystal Data: Hexagonal. *Point Group*: 6/*m*. As aggregates of randomly oriented hexagonal prisms to 250 μm that display {10*0} and {10*1}.

Physical Properties: *Cleavage*: Indistinct on {001}. *Tenacity*: Brittle. *Fracture*: Irregular. Hardness = 3.5-4 D(meas.) = n.d. D(calc.) = 7.32 Nonfluorescent.

Optical Properties: Translucent. *Color*: Colorless. *Streak*: White. *Luster*: Vitreous. *Optical Class*: Uniaxial (-). *n*(calc.) = 2.04

Cell Data: *Space Group*: $P6_3/m$. a = 9.7858(14) c = 7.3072(11) Z = 2

X-Ray Diffraction Pattern: Copps mine, Gogebic County, Michigan, USA.
2.93 (100), 1.83 (24), 1.94 (23), 3.21 (21), 2.04 (21), 4.08 (18), 1.59 (17)

Chemistry:

	(1)	(2)
PbO	82.20	83.41
P_2O_5	15.77	15.91
Cl	0.15	
F	0.46	
H_2O	[0.46]	0.67
-O = Cl	0.03	
-O = F	0.19	.
Total	98.82	100.00

(1) Copps mine, Gogebic County, Michigan, USA; average electron microprobe analysis supplemented by ATR FTIR spectroscopy, H_2O calculated; corresponding to $Pb_{4.97}(PO_4)_3[(OH)_{0.69}F_{0.33}Cl_{0.06}]_{\Sigma=1.08}$. (2) $Pb_5(PO_4)_3(OH)$.

Mineral Group: Apatite supergroup, pyromorphite group.

Occurrence: A geogenic secondary lead phase and not post-mining in origin.

Association: Quartz.

Distribution: From the Copps mine, Gogebic County, Michigan, USA. Other reported localities lack full analytical confirmation.

Name: Prefix, *hydroxyl*, identifies a member of the *pyromorphite* group with dominant $(OH)^-$ in the *X* position.

Type Material: Natural History Museum of Los Angeles County, Los Angeles, California, USA (66627).

References: (1) Olds, T.A., A.R. Kampf, J.F. Rakovan, P.C. Burns, O.P. Mills, and C. Laughlin-Yurs (2021) Hydroxylpyromorphite, a mineral important to lead remediation: Modern description and characterization. Amer. Mineral., 106, 922-929. (2) Barinova, A.V., M. Bonin, D.Y. Pushcharovskii, R.K. Rastsvetaeva, K. Schenk, and O.V. Dimitrova (1998) Crystal structure of synthetic hydroxylpyromorphite $Pb_5(PO_4)_3(OH)$. Crystallography Reports, 43, 189-192.