Coronadite $Pb(Mn^{4+},Mn^{2+})_8O_{16}$

Crystal Data: Monoclinic. *Point Group:* $2/m$. As fibrous botryoidal aggregates, banded with other manganese oxides; as microscopic curved lamellae; laminated, granular, massive.

Physical Properties: Hardness = 4.5–5 D(meas.) = 5.246–5.505 D(calc.) = [5.45]

Optical Properties: Opaque. *Color:* Dark gray to black; white in reflected light.
Streak: Brownish black. *Luster:* Dull to submetallic.
Optical Class: Biaxial. *Pleochroism:* Strong; dark brown to gray. *Anisotropism:* Strong.

Cell Data: *Space Group:* $I2/m$. $a = 9.938(1)$ $b = 2.8678(5)$ $c = 9.834(2)$ $\beta = 90.39(2)^\circ$
$Z = 1$

X-ray Powder Pattern: Coronado vein, Arizona, USA; easily mistaken for hollandite.
3.104 (100), 3.466 (60), 1.542 (50), 2.400 (40), 2.205 (40), 2.155 (20), 1.836 (20)

Chemistry:

	(1)	(2)		(1)	(2)
SiO_2		0.40	ZnO	0.11	
MnO_2	60.80	58.29	PbO	28.66	26.20
Al_2O_3	0.68	1.51	CaO		0.39
Fe_2O_3	1.10	0.19	Na_2O		0.18
MnO	7.12	9.60	H_2O^+	1.11	1.70
CuO	0.05		rem.	0.48	
			Total	[100.00]	98.46

(1) Coronado vein, Arizona, USA; recalculated to 100% after removal of insolubles and alkalies 7.67%. (2) Bou Tazalt, Morocco. (3) Do.; by electron microprobe, analysis not given, but stated to correspond to $Pb_{1.06}Ba_{0.10}Mn_{7.7}V_{0.20}Al_{0.08}O_{16}$.

Mineral Group: Cryptomelane group.

Occurrence: A primary mineral in hydrothermal veins or from hot springs; of secondary origin in oxidized zones above manganese-bearing rocks; also in bedded sedimentary deposits.

Association: Hollandite, pyrolusite, other manganese oxides.

Distribution: Widespread; a few localities for pure or well-characterized material include: in the USA, in Arizona, from the Coronado vein, Clifton-Morenci district, Greenlee Co.; the Magma mine, Superior, Pinal Co.; from the Artillery Mountains, Mohave Co., and elsewhere. In New Mexico, from the Luis Lopez district, Socorro Co. From the Philipsburg district, Granite Co., Montana. In Mexico, from the Talamantes district, Chihuahua, and in the Ojuela mine, Mapimí, Durango. At many places in the Ouarzazate and Oujda districts, and elsewhere in Morocco. From the Almalyskoye Pb–Zn deposit, Kurgashikan, Uzbekistan. In the Dry Gill mine, Caldbeck Fells, Cumbria, England. In France, from the Richesse mine, near Bourgeten-Huile, Savoy. At Dongari Buzurg, Bhandara, Madhya Pradesh, and Kodur, Andhra Pradesh, India. From Broken Hill, New South Wales, and in the Puttapa zinc mine, near Beltana, South Australia. At Tsumeb, Namibia.

Name: Honors the first Spanish explorer of the American southwest, Francisco Vasquez de Coronado (ca. 1500–1554).

Type Material: National Museum of Natural History, Washington, D.C., USA, R2012, 86040.

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