Mawbyite $PbFe_2^{3+}(AsO_4)_2(OH)_2$

Crystal Data: Monoclinic. *Point Group:* $2/m$. Crystals, to 0.2 mm, show $\{\bar{1}01\}$, {110}, {001}, "dogtooth" to prismatic ‖ [001]; typically in hemispherical, cylindrical, and spongy sheaflike aggregates, druses, and crusts. *Twinning:* "V"-shaped, about {100}, common.

Physical Properties: *Cleavage:* On {001}, good. *Fracture:* Conchoidal. Hardness = ∼4 D(meas.) = n.d. D(calc.) = 5.365

Optical Properties: Transparent to translucent. *Color:* Pale orange, orange-brown to reddish brown. *Streak:* Yellow-orange. *Luster:* Adamantine.
Optical Class: Biaxial (–). *Pleochroism:* Faint; brown to reddish brown. *Orientation:* $Y = b$; $X \simeq c$. $\alpha = 1.94(2)$ $\beta = 2.00(2)$ $\gamma = 2.04(2)$ 2V(meas.) = 80(5)°

Cell Data: *Space Group:* $C2/m$. $a = 9.066(4)$ $b = 6.286(3)$ $c = 7.564(3)$ $\beta = 114.857(5)°$ Z = 2

X-ray Powder Pattern: Broken Hill, Australia.
4.647 (100), 3.245 (100), 2.724 (70), 2.546 (50), 2.860 (40), 4.458 (30), 3.136 (30)

Chemistry:

	(1)	(2)		(1)	(2)
P_2O_5	0.23		ZnO	0.82	
As_2O_5	34.90	36.44	PbO	37.91	35.38
Al_2O_3	0.02		H_2O	[2.46]	2.85
Fe_2O_3	23.66	25.33	Total	[100.00]	100.00

(1) Broken Hill, Australia; by electron microprobe, total Fe as Fe_2O_3, H_2O by difference; corresponds to $Pb_{1.11}(Fe_{1.94}Zn_{0.07})_{\Sigma=2.01}[(As_{0.99}P_{0.01})_{\Sigma=1.00}O_4]_2(OH)_{1.79}$.
(2) $PbFe_2(AsO_4)_2(OH)_2$.

Polymorphism & Series: Dimorphous with carminite.

Mineral Group: Tsumcorite group.

Occurrence: In an arsenic-rich reaction halo in fractures and cavities in a spessartine-quartz rock in the oxidization zone of a metamorphosed stratiform Pb–Zn orebody (Broken Hill, Australia); in the oxidization zone of Ag–Pb–Cu–Bi mineralization in fluorite–barite–quartz veins (Moldava, Czech Republic).

Association: Corkite–beudantite, adamite–olivenite, duftite, bayldonite, hidalgoite, pharmacosiderite, segnitite, Fe–Mn oxides (Broken Hill, Australia); mimetite, philipsbornite, thometzekite (Moldava, Czech Republic).

Distribution: In the Kintore open cut, Broken Hill, New South Wales, Australia. From Moldava, 20 km northwest of Teplice, Czech Republic. In Germany, from the Clara mine, near Oberwolfach, the Silberbrünnle mine, near Gengenbach, and in the St. Josef mine, Schuttertal, Black Forest; from Oberwiesenthal, Saxony.

Name: To honor Sir Maurice Alan Edgar Mawby (1904–1977), Chairman of CRA, Ltd., for his contribution to the Australian mining industry and preservation of Broken Hill minerals.

Type Material: South Australian Museum, Adelaide, G16062, G16066; Museum Victoria, Melbourne, Australia, M39065, M39068, M39173, M39178.

References: (1) Pring, A., E.M. McBriar, and W.D. Birch (1989) Mawbyite, a new arsenate of lead and iron related to tsumcorite and carminite, from Broken Hill, New South Wales. Amer. Mineral., 74, 1377-1381. (2) Kharisun, M.R. Taylor, D.J.M. Bevan, A.D. Rae, and A. Pring (1997) The crystal structure of mawbyite, $PbFe_2(AsO_4)_2(OH)_2$. Mineral. Mag., 61, 685–691. (3) Krause, W., K. Belendorff, H.-J. Bernhardt, C. McCammon, H. Effenberger, and W. Mikenda (1998) Crystal chemistry of the tsumcorite-group minerals. New data on ferrilotharmeyerite, tsumcorite, thometzekite, mounanaite, helmutwinklerite, and a redefinition of gartrellite. Eur. J. Mineral., 10, 179–206.