Franklinfurnaceite $Ca_2(Fe^{3+},Al)Mn^{3+}Mn^{2+}_3Zn_2Si_2O_{10}(OH)_8$

Crystal Data: Monoclinic. *Point Group:* 2. As very thin, platy crystals, tabular on {001}, to 0.3 mm, with dominant {001} showing serrated edges; as polycrystalline aggregates of subparallel individuals.

Physical Properties: *Cleavage:* Perfect on {001}. *Tenacity:* Extremely brittle. Hardness = 3 D(meas.) = 3.66 D(calc.) = 3.737

Optical Properties: Translucent. *Color:* Dark brown; in thin section, brown to very dark brown. *Streak:* Brown. *Luster:* Vitreous.
Optical Class: Biaxial (–). *Pleochroism:* Intense; X = very dark brown; Y = brown; Z = deep brown. *Orientation:* $Z = b$; $Y \wedge c = 29°$. *Dispersion:* $r < v$, moderate. *Absorption:* Strong; $X \gg Z > Y$. $\alpha = 1.792(4)$ $\beta = 1.798(4)$ $\gamma = 1.802(4)$ 2V(meas.) = 79° 2V(calc.) = 78.5°

Cell Data: *Space Group:* $C2$. $a = 5.483(7)$ $b = 9.39(3)$ $c = 14.51(1)$ $\beta = 97.04(8)°$ Z = 2

X-ray Powder Pattern: Franklin, New Jersey, USA.
2.305 (100), 2.707 (80b), 2.602 (70b), 14.4 (50), 3.35 (50), 3.60 (40), 3.20 (40)

Chemistry:

	(1)	(2)
SiO_2	14.5	15.0
Al_2O_3	0.8	0.4
Fe_2O_3	9.4	9.3
Mn_2O_3	9.5	10.6
MnO	17.0	19.0
ZnO	22.7	24.1
MgO	3.6	0.6
CaO	14.3	12.6
H_2O	[8.2]	8.4
Total	[100.0]	100.0

(1) Franklin, New Jersey, USA; by electron microprobe, Fe_2O_3 shown present by microchemical tests, Mn^{2+}:Mn^{3+} from crystal structure, H_2O by difference; corresponds to $Ca_2(Fe^{3+}_{0.76}Al_{0.24})_{\Sigma=1.00}(Mn^{3+}_{0.97}Mg_{0.03})_{\Sigma=1.00}(Mn^{2+}_{0.54}Mg_{0.28}Zn_{0.18})_{\Sigma=2.00}Zn_2Si_2O_{10}(OH)_8$.
(2) Do; H_2O by TGA, corresponds to $Ca_{1.88}(Fe^{3+}_{0.97}Al_{0.06})_{\Sigma=1.03}Mn^{3+}_{1.12}Mn^{2+}_{2.24}Mg_{0.12}Zn_{2.47}Si_{2.08}O_{10.22}(OH)_{7.78}$.

Occurrence: A late-stage mineral in vugs in a metamorphosed stratiform zinc deposit.

Association: Willemite, clinohedrite, hodgkinsonite, hetaerolite, franklinite, barite, rhodonite.

Distribution: From Franklin, Sussex Co., New Jersey, USA.

Name: After Franklin Furnace, the former name for Franklin, New Jersey, USA.

Type Material: National Museum of Natural History, Washington, D.C., USA, C6309, R19144.

References: (1) Dunn, P.J., D.R. Peacor, R.A. Ramik, S.-C. Su, and R.C. Rouse (1987) Franklinfurnaceite, a Ca–Fe^{3+}–Mn^{3+}–Mn^{2+} zincosilicate isotypic with chlorite, from Franklin, New Jersey. Amer. Mineral., 72, 812–815. (2) Peacor, D.R., R.C. Rouse, and S.W. Bailey (1988) Crystal structure of franklinfurnaceite: a tri-dioctahedral zincosilicate intermediate between chlorite and mica. Amer. Mineral., 73, 876–887.