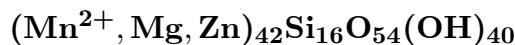


Gageite



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Crystal Data: Monoclinic, pseudotetragonal, or triclinic. *Point Group:* $2/m$ or $\bar{1}$. Minute laths or saddlelike crystals grouped radially, in bundles, or as matted fibers.

Physical Properties: *Cleavage:* {110}, pronounced. *Hardness* = 3 *D*(meas.) = 3.46–3.584 *D*(calc.) = 3.599

Optical Properties: Transparent to translucent. *Color:* Colorless, pale pink, pale brown.

Luster: Highly vitreous.

Optical Class: Biaxial (–). *Orientation:* $Z \parallel$ fiber length. *Dispersion:* $r < v$, extreme.

$\alpha = 1.723(3)$ $\beta = 1.734(3)$ $\gamma = 1.736(3)$ $2V(\text{meas.}) = \text{n.d.}$

Cell Data: *Space Group:* $P2_1/n$. $a = 19.42$ $b = 19.42$ $c = 9.84$ $\beta = 89.5^\circ$ $Z = [1]$,
or *Space Group:* $P\bar{1}$. $a = 14.17$ $b = 14.07$ $c = 9.84$ $\alpha = 76.5^\circ$ $\beta = 76.6^\circ$ $\gamma = 86.9^\circ$
 $Z = [1]$

X-ray Powder Pattern: Franklin, New Jersey, USA.

6.87 (100), 2.758 (80), 2.707 (80), 3.44 (60), 3.25 (60), 2.556 (60), 1.6742 (60)

Chemistry:

	(1)	(2)	(3)
SiO ₂	24.71	23.58	23.90
Al ₂ O ₃		0.15	
FeO		0.03	0.20
MnO	50.19	53.74	51.06
ZnO	8.76	3.96	4.30
MgO	11.91	9.95	11.34
CaO			0.19
H ₂ O	[4.43]	8.24	[9.01]
Total	[100.00]	99.65	[100.00]

(1) Franklin, New Jersey, USA; H₂O by difference. (2) Do. (3) Do.; by electron microprobe, average of seven analyses, H₂O by difference; corresponds to $(\text{Mn}_{28.95}\text{Mg}_{11.32}\text{Zn}_{2.13}\text{Ca}_{0.14}\text{Fe}_{0.11})_{\Sigma=42.65}\text{Si}_{16}\text{O}_{54.53}(\text{OH})_{40.23}$.

Polymorphism & Series: 2M, 1A polytypes.

Occurrence: A late-stage low- to medium-temperature mineral, implanted on other species in fissures and solution cavities, in a metamorphosed stratiform zinc orebody (Franklin, New Jersey, USA).

Association: Zincite, willemite, pyrochroite, leucophoenicite, calcite, chlorophoenicite (Franklin, New Jersey, USA); leucophoenicite, hausmannite, rhodochrosite, manganoan calcite (near Kuruman, South Africa).

Distribution: In the USA, at Franklin, Sussex Co., New Jersey, and in the Pennsylvania mine, San Antonio Valley, Santa Clara Co., California. In the Wessels and N'Chwaning II mines, near Kuruman, Cape Province, South Africa.

Name: For Robert B. Gage, of Trenton, New Jersey, USA, who analyzed the first specimens.

Type Material: National Museum of Natural History, Washington, D.C., USA, R6444, 86845.

References: (1) Phillips, A.H. (1910) Gageite, a new mineral from Franklin, New Jersey. *Amer. J. Sci.*, 30, 283–284. (2) Palache, C. (1935) The minerals of Franklin and Sterling Hill, Sussex County, New Jersey. *U.S. Geol. Sur. Prof. Paper* 180, 111. (3) Moore, P.B. (1968) Relations of the manganese-calcium silicates, gageite and harstigitite. *Amer. Mineral.*, 53, 309–315. (4) Moore, P.B. (1969) A novel octahedral framework structure: gageite. *Amer. Mineral.*, 54, 1005–1017. (5) Dunn, P.J. (1979) The chemical composition of gageite: an empirical formula. *Amer. Mineral.*, 64, 1056–1058. (6) Ferraris, G., M. Mellini, and S. Merlino (1987) Electron-diffraction and electron microscopy study of balangeroite and gageite: crystal structures, polytypism, and fiber texture. *Amer. Mineral.*, 72, 382–391.

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