Franklinite

\[(Zn, Mn^{2+}, Fe^{2+})(Fe^{3+}, Mn^{3+})_2O_4\]

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Crystal Data: Cubic. Point Group: 4/m\(\overline{3}m\). Typically as octahedra, commonly with rounded edges, to 22 cm; may be modified by \{011\}, \{001\}, rare \{013\}, \{051\}, others. Also exsolved within other minerals; coarse to fine granular, massive. Twinning: On \{111\} as both twin and composition plane, the spinel law, common.

Physical Properties: Cleavage: Parting on \{111\}, fair. Fracture: Uneven to subconchoidal. Tenacity: Brittle. Hardness = \(\sim 6\) VHN = 852–882 (100 g load). D(meas.) = 5.05–5.22 D(calc.) = 5.163 Strongly to weakly magnetic.


Cell Data: Space Group: Fd\(3m\). \(a = 8.43–8.47\) \(\text{\AA}\) \(Z = 8\)

X-ray Powder Pattern: Franklin, New Jersey, USA. 2.55 (100), 1.499 (80), 2.99 (70), 1.632 (70), 1.104 (50), 0.978 (50), 2.12 (40)

Chemistry:

\begin{align*}
\text{SiO}_2 & \quad 0.72 \\
\text{TiO}_2 & \quad 0.7 \\
\text{Al}_2\text{O}_3 & \quad 0.3 \\
\text{Fe}_2\text{O}_3 & \quad 66.58 \\
\text{FeO} & \quad 3.6 \\
\text{MnO} & \quad 9.96 \\
\text{ZnO} & \quad 66.7 \\
\text{MgO} & \quad 1.25 \\
\text{CaO} & \quad 63.9 \\
\text{H}_2\text{O} & \quad 0.3 \\
\end{align*}

(1) New Jersey, USA: total Fe as Fe\(^{3+}\). (2) Do.; by electron microprobe, average of five analyses, total Fe as Fe\(^{3+}\). (3) Långban, Sweden: by electron microprobe, average of four analyses, Fe\(^{2+}\):Fe\(^{3+}\) calculated from stoichiometry; corresponds to (Zn\(^{0.88}\)Fe\(^{2+}\))\(\Sigma=1\) Zn\(^{0.00}\)Fe\(^{3+}\)\(\Sigma=2\) Mn\(^{2+}\)Ti\(^{0.02}\)\(\Sigma=2.00\)O\(_4\).

Mineral Group: Spinel group.

Occurrence: In beds and veins formed by high-temperature metamorphism of Fe, Zn, Mn-rich marine carbonate sediments. As a minor mineral in some manganese and iron deposits.

Association: Zincite, willemite, calcite, andradite, manganosite, rhodochrosite, galninite, magnetite, rhodonite, hausmannite, hetaerolite, Jacobsite, braunite, sarkinite, benzelliite, hematite.

Distribution: From Franklin and at Sterling Hill, Ogdensburg, Sussex Co., New Jersey, USA. Found at Långban, Värmland, Sweden. Occurs at Hraničná, Czech Republic. In Kazakhstan, from Nayzatas, Dzhumart, and in the Ushkayn deposits, Atasui area. At the Pervel marble quarry, near Slyudyanka, Sayan Mountains, south of Lake Baikal, Siberia, Russia. From the Koduru manganese mine, Srikakulam district, Andhra Pradesh, India. At the Bonnie prospect, near Mungkinbudin, Western Australia.

Name: Named for Franklin Furnace (now Franklin), New Jersey, USA; and in honor of the American statesman, philosopher and inventor Benjamin Franklin (1706–1790).