Hendricksite

\[ \text{K(Zn, Mg, Mn}^{2+})_3(\text{Si}_3\text{Al})\text{O}_{10}(\text{OH})_2 \]

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**Crystal Data:** Monoclinic. \textit{Point Group:} \(2/m\). Euhedral crystals, to 14 cm, rare. Forms interlocking aggregates and anhedral plates, to over 30 cm, commonly bent, or showing other signs of mechanical deformation.

**Physical Properties:** Cleavage: \{001\}, perfect. Hardness = 2.5–3 D(meas.) = 2.86–3.43 D(calc.) = 3.30–3.37

**Optical Properties:** Translucent. Color: Coppery brown, bronze-brown, dark reddish brown to reddish black.

**Optical Class:** Biaxial (−). Pleochroism: \(X\) = pale yellow; \(Y = Z\) = light chestnut-brown.

**Orientation:** \(X = b; Z \wedge c = 36^\circ\). Dispersion: \(r < v\), slight. Absorption: \(Z = Y > X\).

\(\alpha = 1.598–1.624\ \ \ \beta = 1.658–1.686\ \ \ \gamma = 1.660–1.697\ \ \ \text{2V(meas.)} = 2^\circ–8^\circ\)

**Cell Data:** \textit{Space Group:} \(C2/m\). \(a = 5.340(2)\ \ \ b = 9.254(2)\ \ \ c = 10.235(3)\)

\(\beta = 100.07(2)\ \ \ Z = 2\)

**X-ray Powder Pattern:** Franklin, New Jersey, USA; 1M.

10.20 (100), 3.398 (60), 5.094 (36), 2.546 (35), 1.696 (17), 2.652 (13), 1.554 (10)

**Chemistry:**

| \(\text{SiO}_2\) | 31.58 | 31.9 | \(\text{BaO}\) | 0.65 | 0.3 |
| TiO\(_2\) | 0.32 | 0.35 | \(\text{Li}_2\text{O}\) | 0.04 |
| Al\(_2\text{O}_3\) | 13.72 | 13.6 | \(\text{Na}_2\text{O}\) | 0.24 | 0.1 |
| Fe\(_2\text{O}_3\) | 2.25 | 4.9 | \(\text{K}_2\text{O}\) | 7.91 | 8.6 |
| FeO | 0.34 | | \(\text{F}^-\) | 0.45 |
| MnO | 12.28 | 12.5 | \(\text{H}_2\text{O}^+ + \text{F}\) | 3.95 |
| ZnO | 22.97 | 19.8 | \(\text{H}_2\text{O}^+\) | 3.65 |
| MgO | 3.69 | 2.7 | \(\text{H}_2\text{O}^-\) | 0.95 |
| CaO | 0.02 | | \(\text{F}_2 = \text{F}^-\) | 0.19 |

Total \([99.86\ %]\ [99.71\ %]\)

(1) Franklin, New Jersey, USA; original total given as 99.57%, corresponds to \((\text{K}_{0.85}\text{Na}_{0.04}\text{Ba}_{0.02})\Sigma = 0.91(\text{Zn}_{1.43}\text{Mn}_{0.88}\text{Mg}_{0.46}\text{Fe}_{3.01}\text{Ti}_{0.14}\text{Al}_{0.02}\text{Fe}_{2.02})\Sigma = 3.00(\text{Si}_{2.66}\text{Al}_{1.34})\Sigma = 4.00\) \(\text{O}_{10}(\text{OH})_{0.98}\text{F}_{0.02}\Sigma = 2.00\). (2) Do.; original total given as 99.6%, corresponds to \((\text{K}_{0.93}\text{Na}_{0.02}\text{Li}_{0.02}\text{Ba}_{0.01})\Sigma = 0.99(\text{Zn}_{2.24}\text{Mn}_{0.90}\text{Mg}_{0.34}\text{Fe}_{3.32}\text{Al}_{0.08}\text{Ti}_{0.02})\Sigma = 2.90\) \((\text{Si}_{2.72}\text{Al}_{1.28})\Sigma = 4.00\) \(\text{O}_{10}(\text{OH})_{\text{F}}\Sigma = 2.05\).

**Polymorphism & Series:** 1M, 2M\(_1\), 3A polytypes.

**Mineral Group:** Mica group.

**Occurrence:** Restricted to irregular lens- or sheetlike skarn bodies in a metamorphosed stratiform zinc deposit.

**Association:** Andradite, rhodonite, calcite, barium feldspars, franklinite, willemite, axinite, axinite, hancockite.

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

**Name:** For Dr. Sterling B. Hendricks (1902– ), American crystallographer and chemist, a student of micas.

**Type Material:** Harvard University, Cambridge, Massachusetts, USA, 89818, 133712; The Natural History Museum, London, England, 1966,209.


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