

Crystal Data: Triclinic (pseudo-orthorhombic). *Point Group:* 1. As hexagonal tabular crystals, to 0.7 mm, displaying {001}, {00 $\bar{1}$ }, {110}, {130}, {010}, { $\bar{1}$ 1 0}, { $\bar{1}$ 3 0}, and {0 $\bar{1}$ 0}.

Physical Properties: *Cleavage:* Perfect on {001}, 2 more less-perfect sets perpendicular to (001). *Fracture:* n.d. *Tenacity:* Sectile. *Hardness* = 1.5 *D(meas.)* = 2.98(2) *D(calc.)* = 2.995

Optical Properties: Translucent. *Color:* Colorless. *Streak:* n.d. *Luster:* n.d. *Optical Class:* Biaxial (–). $\alpha = 1.568(2)$ $\beta = 1.612(2)$ $\gamma = 1.613(2)$ $2V(\text{meas.}) = 18(3)^\circ$ $2V(\text{calc.}) = 17^\circ$ *Orientation:* $X \sim c$, $Y \sim b$, $Z \sim a$. *Dispersion:* None.

Cell Data: *Space Group:* $P1$. $a = 8.312(1)$ $b = 14.545(1)$ $c = 18.504(2)$ $\alpha = 89.71(1)^\circ$ $\beta = 90.05(1)^\circ$ $\gamma = 90.13(1)^\circ$ $Z = 8$

X-ray Powder Pattern: Friedrichsseggen mine, near Lahnstein, Rhineland-Palatinate, Germany. 9.30 (100), 2.723 (57), 2.624 (36), 2.503 (35), 1.574 (23), 3.476 (19), 3.290 (19)

Chemistry:	(1)
FeO	3.87
CuO	1.68
ZnO	57.85
SO ₃	15.83
H ₂ O	22.3
Total	101.53

(1) Friedrichsseggen mine, near Lahnstein, Rhineland-Palatinate, Germany; average of 6 electron microprobe analyses, H₂O by gas chromatography; corresponding to $(\text{Zn}_{3.53}\text{Fe}_{0.27}\text{Cu}_{0.11})_{\Sigma=3.91}(\text{S}_{0.98}\text{O}_4)(\text{OH})_6 \cdot 3\text{H}_{2.10}\text{O}$.

Occurrence: In the oxidized zone of a hydrothermal polymetallic sulfide deposit.

Association: Hydrozincite, pyromorphite, native copper, goethite.

Distribution: From dumps at the Friedrichsseggen mine, near Lahnstein, Ems District, Rhineland-Palatinate (Rheinland-Pfalz), Germany.

Name: For the city nearby the locality from which the first specimens were collected.

Type Material: A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia (4352/1).

References: (1) Chukanov, N.V., R.K. Rastsvetaeva, S.M. Aksenov, I.V. Pekov, D.I. Belakovskiy, G. Blass, and G. Möhn (2013) Lahnsteinite, $\text{Zn}_4(\text{SO}_4)(\text{OH})_6 \cdot 3\text{H}_2\text{O}$, a new mineral species from the Friederichsseggen Mine, Germany. *Zap. Ross. Mineral. Obshch.*, 142(1), 39-46 (in Russian, with English abstract). (2) Rastsvetaeva, R.K., S.M. Aksenov, N.V. Chukanov, and I.A. Verin (2012) Crystal structure of a new mineral lahnsteinite $\text{Zn}_4(\text{SO}_4)(\text{OH})_6 \cdot 3\text{H}_2\text{O}$. *Kristallografiya*, 57, 5, 825-829 (in Russian). With English translation: *Crystallography Reports* (2012), 57(5) 737-741. (3) (2014) *Amer. Mineral.*, 99, 246 (abs. refs. 1 and 2).