

**Crystal Data:** Monoclinic. *Point Group:* 2/m. As aggregates of anhedral grains to 60 μm.

**Physical Properties:** *Cleavage:* None. *Fracture:* Uneven. *Tenacity:* Brittle. *Hardness* = 2.5  
D(meas.) = 2.25(2) D(calc.) = 2.338

**Optical Properties:** Transparent. *Color:* Colorless, reddish pink in aggregates. *Streak:* White.  
*Luster:* Vitreous.

*Optical Class:* Biaxial (-).  $\alpha = 1.493(2)$   $\beta = 1.498(2)$   $\gamma = 1.501(2)$   $2V(\text{meas.}) = 80(10)^\circ$   
 $2V(\text{calc.}) = 75^\circ$  *Dispersion:* Weak,  $r > v$ .

**Cell Data:** *Space Group:* P2<sub>1</sub>/a.  $a = 11.137(2)$   $b = 8.279(1)$   $c = 5.5381(9)$   $\beta = 100.42(1)^\circ$   
Z = 2

**X-ray Powder Pattern:** Blue Lizard mine, White Canyon district, San Juan County, Utah, USA.  
3.291 (100), 4.556 (70), 3.256 (67), 4.266 (45), 3.791 (26), 2.647 (24), 3.338 (21)

<b>Chemistry:</b>	(1)
Na <sub>2</sub> O	16.94
MgO	3.29
MnO	8.80
CoO	2.96
NiO	1.34
SO <sub>3</sub>	45.39
<u>H<sub>2</sub>O</u>	<u>[20.14]</u>
Total	98.86

(1) Blue Lizard mine, White Canyon district, San Juan County, Utah, USA; average of 5 electron microprobe analyses, H<sub>2</sub>O calculated from stoichiometry; corresponds to  
Na<sub>1.96</sub>(Mn<sub>0.44</sub>Mg<sub>0.29</sub>Co<sub>0.14</sub>Ni<sub>0.06</sub>)<sub>Σ=0.93</sub>S<sub>2.03</sub>O<sub>8</sub>·4H<sub>2</sub>O.

**Polymorphism & Series:** Forms a series with blödite and cobaltoblödite, from which it can be distinguished only with a chemical analysis.

**Mineral Group:** Blödite group.

**Occurrence:** Coating the walls of underground mine works, related to post-mining oxidation of primary U deposits of the Colorado Plateau type hosted by sandstones.

**Association:** Mn-Co-Ni-bearing blödite, chalcantite, gypsum, johannite, sideronatriite, quartz, feldspar (Utah); szmikite, jökokuite (Australia).

**Distribution:** Blue Lizard mine, White Canyon district, San Juan County, Utah, USA and at the Womobi mine, near Thologolong, in northern Victoria, Australia.

**Name:** For the chemical composition of the M<sup>2+</sup> structural site and relationship to blödite.

**Type Material:** A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia (4257/1) and in the Museum Victoria, Melbourne, Australia (M52196).

**References:** (1) Kasatkin, A.V., F. Nestola, J. Plášil, J. Marty, D.I. Belakovskiy, A.A. Agakhanov, S.J. Mills, D. Pedron, A. Lanza, M. Favaro, S. Bianchin, I.S. Lykova, V. Goliáš, and W.D. Birch (2013) Manganoblödite, Na<sub>2</sub>Mn(SO<sub>4</sub>)<sub>2</sub>·4H<sub>2</sub>O, and cobaltoblödite, Na<sub>2</sub>Co(SO<sub>4</sub>)<sub>2</sub>·4H<sub>2</sub>O: Two new members of the blödite group from the Blue Lizard mine, San Juan County, Utah, USA. *Mineral. Mag.*, 77(3), 367-383. (2) (2015) *Amer. Mineral.*, 100, 2011 (abs. ref. 1).