Cobaltoblödite $Na_2Co(SO_4)_2 \cdot 4H_2O$

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.) = 2.29(2) D(calc.) = 2.347

Optical Properties: Transparent. *Color*: Colorless, reddish pink in aggregates. *Streak*: White. *Luster*: Vitreous.
Optical Class: Biaxial (–). $\alpha = 1.498(2)$ $\beta = 1.503(2)$ $\gamma = 1.505(2)$ 2V(meas.) = 70(10)° 2V(calc.) = 64° *Dispersion*: Weak, $r > v$.

Cell Data: *Space Group*: $P2_1/a$. $a = 11.147(1)$ $b = 8.268(1)$ $c = 5.5396(7)$ $\beta = 100.517(11)°$ $Z = 2$

X-ray Powder Pattern: Blue Lizard mine, White Canyon district, San Juan County, Utah, USA. 3.29 (100), 4.551 (80), 3.258 (58), 4.269 (50), 3.339 (43), 2.296 (22), 2.644 (21)

Chemistry:	(1)
Na_2O	17.00
MgO	3.42
MnO	3.38
CoO	7.68
NiO	2.53
SO_3	45.41
H_2O	[20.20]
Total	99.63

(1) Blue Lizard mine, White Canyon district, San Juan County, Utah, USA; average of 5 electron microprobe analyses, H_2O calculated from stoichiometry; corresponds to $Na_{1.96}(Co_{0.36}Mg_{0.30}Mn_{0.17}Ni_{0.12})_{\Sigma=0.95}S_{2.02}O_8 \cdot 4H_2O$.

Polymorphism & Series: Forms a series with blödite and manganoblödite, 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, chalcanthite, gypsum, johannite, sideronatrite, quartz, feldspar.

Distribution: Blue Lizard mine, White Canyon district, San Juan County, Utah, USA.

Name: For the chemical composition of the M^{2+} structural site and relationship to blödite.

Type Material: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia (4271/1)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, $Na_2Mn(SO_4)_2 \cdot 4H_2O$, and cobaltoblödite, $Na_2Co(SO_4)_2 \cdot 4H_2O$: 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).