Alpersite $Mg(SO_4)\cdot 7H_2O$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. Equant euhedral crystals to 0.3 mm display {110}, {001}, {010}, and {101}.

Physical Properties: *Cleavage*: Good on {001}. *Tenacity*: Brittle. *Fracture*: Uneven. Hardness = 2.5 D(meas.) = n.d. D(calc.) = 1.820 Closely resembles melanterite and chalcanthite. Quickly dehydrates to cuprian pentahydrite.

Optical Properties: Translucent. *Color*: Turquoise-blue. *Streak*: White. *Luster*: Vitreous. *Optical Class*: Biaxial (-). $\alpha = 1.462$ $\beta = 1.465$ $\gamma = 1.469$ 2V(meas.) = 79.8(7)° 2V(calc.) = 82° *Dispersion*: $r > v$, weak.

Cell Data: *Space Group*: $P2_1/c$. $a = 14.166(4)$ $b = 6.534(2)$ $c = 10.838(3)$ $\beta = 105.922(6)°$ Z = 4

X-ray Powder Pattern: Big Mike mine, Tobin Range, Pershing County, Nevada, USA. 4.850 (100), 3.779 (38), 4.439 (16), 3.663 (15), 3.254 (15), 4.792 (14), 2.721 (14)

Chemistry: (1) Big Mike mine, Tobin Range, Pershing County, Nevada, USA; by electron microprobe analysis and TGA; corresponding to $Mg_{0.58}Cu_{0.37}Zn_{0.02}Mn_{0.02}Fe_{0.01}SO_4\cdot 7H_2O$.

Mineral Group: Melanterite group.

Occurrence: An efflorescent secondary mineral, likely widespread and unnoticed in mine wastes that contain copper-bearing sulfides, but in which solubilized Fe^{2+} is not available for melanterite crystallization because of oxidation to Fe^{3+} in surface waters of near-neutral pH. Natural material collected at relative humidity = 65% and T = 4° C.

Association: Pickeringite, alunogen, epsomite, gypsum.

Distribution: At the Big Mike mine, on the south side of Panther Canyon, on the west flank of the north end of the Tobin Range, Pershing County, north-central Nevada, USA. Likely more widespread and overlooked because of its similar appearance to melanterite and chalcanthite.

Name: Honors Charles N. *Alpers*, geochemist with the United States Geological Survey, for his contributions to our understanding of the mineralogical controls of mine-water geochemistry.

Type Material: Canadian Museum of Nature, Ottawa, Ontario (CNMNC 83921).

References: (1) Peterson, R.C., J.M. Hammarstrom, and R.R. Seal, II (2006) Alpersite $(Mg,Cu)SO_4\cdot 7H_2O$, a new mineral of the melanterite group, and cuprian pentahydrite: Their occurrence within mine waste. Amer. Mineral., 91, 261-269.