NEW SPECIES

FAMILY: SULFATES. DIVISION: R″ : R‴‴‴ : H_2O = 1 : 1 : 7.

Zinc-copper-melanterite.

ESPER S. LARSEN AND M. L. GLENN: Some minerals of the melanterite and chalcanthite groups with optical data on the hydrous sulfates of manganese and cobalt. *Am. J. Sci.* **50**, 225–233, 1920; this mineral, p. 225.

NAME: From the composition, containing much *zinc* and less *copper* replacing the iron in a *melanterite*, Fe $[7H_2O]$ SO_4.

CHEMICAL PROPERTIES: *Formula:* (Zn, Cu, Fe)O: SO_3: $7H_2O$ or (Zn, Cu, Fe) $[7H_2O]$ SO_4. (The water of crystallization is placed in brackets next to the metal in accordance with Werner's coördination principle.) Ratio Zn: Cu: Fe = 100: 98: 19. (The Fe may be disregarded). An analysis gave: ZnO 12.89, CuO 12.37, FeO 2.14, SO_3 28.78, H_2O 42.61, insol. 1.11, sum 99.90%. These are close to the theoretical values, except that the water is somewhat low, owing to partial dehydration. Before the blowpipe it fuses readily with intumescence to a white froth which turns black; on rapid heating it decrepitates and colors the flame green. Readily soluble in water.

CRYSTALLOGRAPHIC AND OPTICAL PROPERTIES: System monoclinic; only known in columnar-massive forms. Under the microscope it shows pale blue-green rods, not sensibly pleochroic. Refractive indices: $\alpha = 1.479$, $\beta = 1.483$, $\gamma = 1.488$, $\gamma - \alpha = 0.009$, all ± 0.001. Biaxial with sign + and 2 V near 90°. Shows inclined extinction up to 34°. Dispersion slight.

PHYSICAL PROPERTIES: Color pale greenish blue (Ridgway 43 d). Luster vitreous. H. = 2. Sp. gr. 2.02.

OCCURRENCE: In large amount as a secondary mineral on the dumps of mines at Vulcan, Gunnison Co., Colorado, formed by the oxidation of an intimate mixture of pyrite, chalcopyrite and sphalerite.

DISCUSSION: Fits well into the group comprising melanterite, pisanite, etc.

E. T. W.

NEW CO-SPECIES[1]

FAMILY: SULFATES. DIVISION: R″ : R‴‴‴: H_2O = 1 : 1 : 5.

Zinc-copper-chalcanthite.

LARSEN AND GLENN, *op. cit.*, p. 228.

NAME: From the composition, containing *zinc* partially replacing the *copper* in *chalcanthite*, Cu $[5H_2O]$ SO_4.

CHEMICAL PROPERTIES: *Formula:* Essentially (Zn, Cu)O: SO_3: $5H_2O$ or (Zn, Cu) $[5H_2O]$ SO_4. Constituents except water as in zinc-copper-melanterite. H_2O found, 35.0%; theory for 5 mols., 36.1%.

[1] The term "co-species" is here suggested for minerals formed naturally, yet subsequent to the intervention of man. In the present instances, the bringing of the highly hydrated sulfate minerals into the dry air of a building results in the spontaneous loss of part of the water. Other illustrations are the lead minerals formed by the action of sea water on the slags of the Laurium furnaces, and materials like Lacroix's "reaumurite," produced by volcanic heat from artificial glasses. Suggestions of a better term will be welcome.

CRYSTALLOGRAPHIC AND OPTICAL PROPERTIES: System triclinic. Under the microscope finely crystalline and pale blue. $\alpha=1.513$, $\beta=1.533$, $\gamma=1.540$, $\gamma-\alpha=0.027$, all ± 0.003. Biaxial with 2V moderate and sign $-$.

PHYSICAL PROPERTIES: Color pale blue. Structure, a fine aggregate.

OCCURRENCE: Forms by the spontaneous dehydration of zinc-copper-melanterite in dry air.

DISCUSSION: Fits well into the group comprising chalcanthite, siderolite, etc. Being formed by nature only with the aid of man, it does not deserve a special name. E. T. W.

Iron-copper-chalcanthite.

LARSEN AND GLENN, *op. cit.*, p. 228.

NAME: From the composition, containing *iron* partially replacing the *copper* in *chalcanthite.*

CHEMICAL PROPERTIES: *Formula:* (Fe, Cu)O: SO_3: $5H_2O$ or (Fe, Cu) $[5H_2O]$ SO_4.

CRYSTALLOGRAPHIC AND OPTICAL PROPERTIES: System triclinic. Under the microscope pale green; $\alpha=1.517$, $\beta=1.536$, $\gamma=1.543$, $\gamma-\alpha=0.026$, all ± 0.003. Biaxial with 2V moderate and sign $-$. Dispersion slight.

OCCURRENCE: Forms by the spontaneous dehydration of pisanite in dry air; most specimens labeled pisanite in collections prove to consist now of this material. E. T. W.

Cobalt-chalcanthite.

LARSEN AND GLENN, *op. cit.*, p. 228.

NAME: From the composition, containing *cobalt* entirely replacing the copper of *chalcanthite.*

CHEMICAL PROPERTIES: *Formula:* CoO: SO_3: $5H_2O$ or Co $[5H_2O]$ SO_4. Only artificial material has been analyzed; it contains 35.9% H_2O, whereas the theory for the $5H_2O$ compound is 36.7%.

CRYSTALLOGRAPHIC AND OPTICAL PROPERTIES: Triclinic. Under the microscope rose pink; $\alpha=1.523-1.531$, $\beta=1.542-1.549$, $\gamma=1.547-1.552$, $\gamma-\alpha=0.024-0.021$. Biaxial with 2V medium, sign $-$. Dispersion not strong, pleochroism distinct.

OCCURRENCE: Forms by the spontaneous dehydration of bieberite and of other cobalt sulfates; material labeled bieberite in Col. Roebling's collection has been found to consist largely of this compound. E. T. W.

Manganese-chalcanthite.

LARSEN AND GLENN, *op. cit.*, p. 228.

NAME: From the composition, containing *manganese* entirely replacing the copper of *chalcanthite.*

CHEMICAL PROPERTIES: *Formula:* MnO: SO_3: $5H_2O$ or Mn $[5H_2O]$ SO_4. Only artificial material analyzed.

CRYSTALLOGRAPHIC AND OPTICAL PROPERTIES: System triclinic. Under the microscope pale pink; $\alpha=1.495$, $\beta=1.508$, $\gamma=1.514$, $\gamma-\alpha=0.019$, all ± 0.003. Biaxial with 2V moderately large, sign $-$, dispersion slight.

OCCURRENCE: Obtained artificially by evaporation of a solution of manganous sulfate in a dessicator under reduced pressure at 23°. E. T. W.