process. Its transitional relations to the crystalline hoegbomite are in accord with this view. That somewhat similar relations were recognized by Gavelin for hoegbomite from the Routevare district is indicated in the statement on page (3 ms.) "that in some cases it [hoegbomite] gives the impression of having been secondarily formed at the expense of pleonaste."

SCHALLERITE, A NEW ARSENO-SILICATE MINERAL FROM FRANKLIN FURNACE, NEW JERSEY

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Introduction.—The new mineral herein described is a hydrous arseno-silicate chiefly of manganese. It was discovered by one of the authors, Mr. R. B. Gage, during the early part of 1924 and apparently has been mistaken for bustamite or rhodochrosite, which material in the massive form it resembles a great deal. The specimens secured were small pieces attached to the massive ore; yet, no doubt, this material occurred in considerable quantity, but unfortunately on account of its resemblance to some of the other minerals found at Franklin Furnace, no effort whatever was made to collect it. Consequently, it was crushed with the other zinc ores in the mill. The name *schallerite* is proposed for the mineral after Dr. Waldemar T. Schaller, of the United States Geological Survey, Washington, D. C.

Occurrence.—To date no crystals of schallerite have been seen but the massive material is fairly pure and appears uniform in chemical composition and physical properties. It is light brown with a vitreous, waxy luster. The fractured surface shows cleavage planes with pearly luster.

It can easily be distinguished from willemite, bustamite, rhodonite, rhodochrosite, or friedelite, for which it might be mistaken, by its behavior with acids, also in the closed tube, and by its optical properties. The arsenic coating in the neck of the closed tube is very characteristic. This test together with its appearance is sufficient to identify it.

Schallerite occurs in seams or on cleavage faces in the massive zinc ore. The thickness of these seams is from one-half inch to two inches, and, judging from the appearance of the specimens secured, may cover several square feet. The mineral is firmly attached to the massive ore and its surface is often covered with a thin coating of white calcite. The specimen secured came from about seven hundred feet beneath the surface, evidently from a locality in the mine that is impregnated with arsenic. Chlorophoenecite[1], another arsenic mineral, comes from this same locality.

Physical properties.—The physical properties and general appearance of schallerite are very similar to those of massive friedelite, but friedelite has a conchoidal fracture while the fracture surfaces of schallerite show numerous small cleavage faces with a pearly luster. Schallerite has a hardness of 4½ to 5 and a specific gravity of 3.368.[2]

In the closed tube schallerite gives off water at a fairly low heat, and upon increasing the heat to a dull red, forms an arsenic coating in the neck of the tube. Under the blow-pipe it turns black and fuses on the edge to a dark brown bead.

Schallerite is nearly colorless in powder, is uniaxial negative, and has a perfect basal cleavage. The indices of refraction are: $\omega=1.704$, $\epsilon=1.679$.

Chemical properties.—Schallerite is slowly decomposed by hot hydrochloric acid leaving a residue of granular silica.

A chemical analysis was made by Miss Vassar on a sample that was shown by the microscope to have only traces of impurities.

The mineral was decomposed by aqua regia to insure the oxidation of the arsenic. The silica was dehydrated by two evaporations with HCl and all but a negligible amount of the other elements dissolved. Arsenic was precipitated as sulphide in 1:1 HCl solution, dissolved in ammonium hydrogen peroxide and determined finally as $Mg_2As_2O_7$. After evaporation of the excess acid and oxidation of the iron an attempt was made to separate manganese from the iron by the basic acetate method. As this proved unsuccessful with such a small amount of iron, the iron was precipitated with NH_4OH, twice reprecipitated, and filtered rapidly to free it from the manganese. The manganese and zinc were precipitated as sulphides leaving the magnesium in the filtrate to be determined in the usual manner. Some manganese which passed into the

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[1] Foshag, Wm. F. and Gage, R. B., A Preliminary Description of Chlorophoenecite, *J. Wash. Acad. Sc.*, 14, 362-363, (1924).

[2] The specific gravity calculated by the law of Gladstone and Dale using the mean index of refraction and the values of k given by Larsen is 3.44. See Larsen, E. S., The Microscopic Determination of the Nonopaque Minerals. *U. S. Geological Survey, Bull.* **679,** 1921, pp. 30-31.

filtrate was recovered in the magnesium precipitate by the bismuthate method. The precipitate of MnS and ZnS was dissolved in acid; the manganese precipitated thrice as NH_4MnPO_4, the first two precipitations in an excess of NH_4OH to keep the zinc in solution. Zinc was precipitated in the filtrate as $ZnNH_4PO_4$, after boiling off the excess NH_4OH.

Water was determined by the Penfield method. Some of the arsenic sublimed in the tube along with all the condensed water and both were weighed, but instead of driving off the water in the usual way with a bunsen burner, it was dried out in an oven at 110°, which left the arsenic.

ANALYSIS AND RATIOS OF SCHALLERITE

		MOLECULAR RATIOS		THEORETICAL COMPOSITION
SiO_2	31.20	.5174	9×.0575	31.0
As_2O_5	13.81	.0601	1×.0601	13.1
MnO	44.20	.6234	12×.0583	48.7
FeO	1.33	.0184		
MgO	2.13	.0528		
ZnO	.39	.0047		
H_2O (total)	6.93	.3850	7×.0550	7.2

The analysis is very close to $12MnO.9SiO_2.As_2O^5 .7H_2O$ or $9MnSiO_3.Mn_3As_2O_8.7H_2O$.

The composition is similar to that of friedelite, the chlorine being replaced by arsenic.

Schallerite $9MnSiO_3.Mn_3As_2O_8.7H_2O$
Friedelite $9MnSiO_3.MnCl_2.7H_2O$

Both schallerite and friedelite are uniaxial negative and both have a perfect basal cleavage.

Schallerite is related chemically to dixenite but contains much more silica and less arsenic.

SUMMARY.—Schallerite occurs at Franklin, New Jersey, seven hundred feet below the surface in veinlets an inch or more across, cutting the normal zinc ore. It is massive, light brown in color, and has a vitreous to waxy luster. It has a hardness of 4½ to 5, a specific gravity of 3.368, and is difficultly fusible. In the closed tube it gives off water at a low heat and an arsenic coating at a dull red heat. It has a perfect basal cleavage, is uniaxial negative, and $\omega = 1.704$, $\epsilon = 1.679$. It has the composition $12MnO.9SiO_2.As_2O$-.$_5$ $7H_2O$.