ART. LVIII.—*On the Gahnite of Rowe, Massachusetts*; by
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IN some car-loads of pyrite brought to New Haven, Connecticut, from the mines of J. M. Davis & Co., in the town of Rowe, Massachusetts, eight miles east of the Hoosac tunnel, I found some fragments of the mineral gahnite. On visiting the locality I learned that the gahnite occurred on the outer portions of a "vein" or "lenticular mass" of pyrite, of exceptional purity, varying from seven to twenty feet in thickness. The including rock is gneiss and schist. The mine had, at the time of my first visit, reached a depth of 200 feet. The waste heaps afforded a large amount of material and some good specimens, though the hardness of the enclosing rock made it difficult to obtain the crystals unbroken. Part of them were entirely embedded in the pyrite and part seemed to have once lined cavities, most of which had since been filled in by quartz and the rest by chalcopyrite.

The crystals in the quartz were greenish in color and sometimes had a slightly greasy lustre, while those in the pyrite were almost black, but green by transmitted light, and had a high vitreous lustre. These latter, though apparently the most pure, were so filled with minute particles of pyrite that for analysis it was necessary for the most part to use those in the quartz.

The largest crystals had a diameter of three-quarters of an inch, but the majority were much smaller. Their habit was octahedral, with the faces usually built up terrace-like from the alternations of the octahedron with the dodecahedron. Simple dodecahedrons were rare. No other planes were observed, though many crystals were examined. Good examples of the spinel twin were occasionally met with.

The specific gravity taken on a piece of exceptional purity weighing nearly two grams was 4.53.

An analysis of the gahnite, made because of the refractory nature of the substance on half a gram, gave:

	I.	II.	Mean.
Al ₂ O ₃	54.61	55.04	54.83
Fe ₂ O ₃	3.22	2.79	3.00
FeO	3.25	3.49	3.37
MnO	tr.	tr.	tr.
MgO	2.01	1.86	1.93
ZnO	36.91	36.93	36.92
SiO ₂ and insoluble residue....	.57	.48	.53
	<hr/> 100.57	<hr/> 100.59	<hr/> 100.58

The mineral was decomposed by repeated fusion with $K_2S_2O_8$. The insoluble residue having been filtered off, the zinc was thrown down as sulphide by H_2S in an HCl solution—according to the method elaborated by Mr. Osborne of this laboratory*—then dissolved and re-precipitated as carbonate. The ignited ZnO was examined for iron and the small amount found taken into account. The alumina and iron were twice precipitated as hydroxides with NH_4OH and weighed together. The iron was determined by titration with permanganate of potash, and the alumina obtained by difference. The amount of iron obtained was divided between the protoxide and sesquioxide in such proportion that the oxygen ratio should be as the formula demanded. The magnesium was weighed as pyrophosphate.

Besides the pyrite, which is seldom found in crystals of any size, the chalcopyrite and the quartz, the minerals associated more or less intimately with the gahnite are: thin plates of titanite iron, sometimes an inch across; steel gray rutile, occasionally in good crystals; apatite in small light green crystals; sphalerite; garnet; calcite; a triclinic feldspar in greenish crystals, and epidote.

The epidote occurs in curving, thick columnar forms and mostly in the pyrite. It is nearly opaque and of a greenish gray color passing into ash gray.

An analysis showed that it had the following composition:

	I.	II.	Mean.
SiO_2	38.18	38.23	38.20
Al_2O_3	24.57	24.66	24.62
Fe_2O_3	12.16	12.24	12.20
MnO (two separate portions) ..	.57	.57	.57
MgO	.12	.14	.13
CaO	21.64	21.54	21.59
Alkalies (one portion)	.37	.37	.37
H_2O	2.15	2.17	2.16
Insoluble residue	.35	.34	.35
	100.11	100.26	100.19

$$Ca : R : Si = 409 : 935 : 1.272 \text{ or nearly } 4 : 9 : 12$$

In this connection it may be interesting to add that during a recent visit to Franklin Furnace, New Jersey, I found the gahnite imbedded in magnetite from the "Trotter" mine. One crystal $\frac{9}{16}$ of an inch in diameter had the planes 0, 1, i and 3-3 well developed.

Laboratory of the Sheffield Scientific School, April, 1885.

* Am. Chem. Journ., vi, No. 3.