ART. XLV.—*Two Sulphantimonites from Colorado;* by L. G. EAKINS.*

THE mineral first to be described was sent to the Denver laboratory of the U. S. Geological Survey in the latter part of 1885, by Mr. E. R. Warren, of Crested Butte, Colorado.

At that time a hasty qualitative examination was made, establishing the fact that it was a sulphantimonite of lead, and since then nothing more has been done with it until the present analysis was made.

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This mineral comes from the "Domingo" Mine, on the ridge between Dark Cañon and Baxter Basin, Gunnison Co., Col.; in which locality it is known as "mineral wool." It consists of aggregates of small acicular crystals, forming matted, wool-like masses in the cavities of a highly decomposed gangue rock of siliceous material mixed with some calcite. It is dull, grayish black in color, with occasional spots of iridescence, due undoubtedly to a slight superficial oxidation.

In procuring material for analysis, a lot of loose material sent by Mr. Warren was slightly crushed and rubbed with water in a mortar and poured off, the fine needle-like crystals floating off readily; this was afterward purified by a re-treatment in the same manner, and then subjected for a short time to the action of dilute hydrochloric acid to remove the slight amount of attached calcite. The material obtained in this manner appeared under the microscope to be perfectly pure and homogeneous with the exception of a slight amount of gangue still remaining.

No crystalline form could be made out, and on account of its peculiar nature no attempt has been made to determine either specific gravity or hardness. Heated before the blowpipe it fuses readily without decrepitation; in the closed tube it gives a slight sublimate of sulphur only; in the open tube it gives off sulphurous acid and dense white fumes of oxide of antimony; heated strongly the antimony all volatilizes, leaving a fused residue of sulphate of lead, slightly colored by the iron present: on charcoal it gives the lead and antimony coatings, and in the reducing flame with soda, a lead button. It is soluble in hot, strong hydrochloric acid with evolution of hydrogen sulphide.

The analysis is as follows:

		Atomic ratios.	
Ag	trace		
Cu	trace		
Pb	39·33	÷207 = ·190	·222
Fe	1·77	÷ 56 = ·032	
Mn	trace		
Sb	36·34	÷120 =	·303
S	21·19	÷321 =	·662
Insoluble gangue,	·52		
	99·15		

Dividing these atomic ratios by ·222, we get:—

Pb, Fe,	= 1	=	3
Sb,	1·36		4·08
S,	2·98		8·94

Giving the formula:—$(Pb, Fe)_3Sb_4S_9$, or $3(Pb, Fe)S, 2Sb_2S_3$.

This mineral, it is seen, fills a place in the group—3RS, $2(As, Bi, Sb)_2S_3$, of which there are but few good examples, and which until now has not had an antimony representative.

The somewhat low summation of the analysis is probably due to two causes; first, a small amount of soluble gangue which was present and undetermined; second, the sulphur is about four-tenths of one per cent less than required, due to the slight natural oxidation of the mineral together with an additional amount induced by treatment with dilute hydrochloric acid for the removal of calcite. In addition to the complete analysis given, there were additional determinations made of lead, antimony and sulphur, the results obtained being in strict agreement with those given above.

The second of these sulphantimonites was collected in the summer of 1887, by Mr. Whitman Cross; it comes from a mine on Augusta Mountain, Gunnison Co., Col., this locality being about one mile east of the "Domingo" mine.

Locally this mineral is also known as "mineral wool," and although differing considerably in appearance from the one just described, they were, on account of the similarity of occurrence, considered as probably identical.

It occurs in a siliceous gangue together with pyrite and sphalerite, and forms groups of acicular crystals which are elongated prisms, deeply striated; but whose form could not be determined.

The individual crystals of this mineral are considerably larger than those of the one previously described, and in consequence they do not tend so much to form matted aggregates. Its color is a bright, steely, grayish black, with no tendency toward tarnish or iridescence. The separation of this mineral from the accompanying ones and the gangue, was a matter of considerable difficulty; on account of their size the crystals could not be successfully washed out from the other material, but by the use of a rapid current of water, and the Thoulet method, a small quantity was finally procured perfectly free from everything except some pyrite, and that had no effect upon the analysis, as the mineral was dissolved in a mixture of hydrochloric and tartaric acids, leaving the pyrite unattacked; it was then filtered through a Gooch crucible, and the amount of pyrite determined and deducted from the material taken. The fact that but a trace of iron was found in the analysis is conclusive proof that the pyrite was practically unattacked.

Blowpipe characteristics are the same as in the one before described.

The analysis is as follows:

		Atomic ratios.
Ag	trace	
Pb	55·52	÷207=·268
Fe	trace	
Sb	25·99	÷120=·217
(calculated) S,	18·98	÷ 32=·593
	100·49	

Dividing these atomic ratios by ·217 we get:

Pb,	= 1·24	= 4·96
Sb,	1	4
S,	2·74	10·96

Giving the formula:—$Pb_5Sb_4S_{11}$ or $5PbS, 2Sb_2S_3$.

We have here, in formula, a freieslebenite in which instead of lead and silver, the silver has been completely replaced by lead, and although the crystallographic agreement of this mineral with freieslebenite has not been established, there seems to be no good reason for not referring it to that species.

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