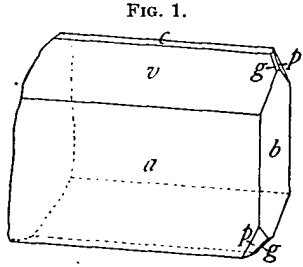
ART. XXXVI.—*Alamosite, a new Lead Silicate from Mexico;* by C. PALACHE and H. E. MERWIN.

In this paper is presented the description of a monoclinic lead metasilicate showing in form, habit, and composition close analogies with wollastonite, with which it is regarded as isomorphous. This mineral was sent to the Harvard Mineralogical Laboratory for identification by the Foote Mineral Co. of Philadelphia, who generously placed at our disposal their whole supply of the material. According to their meager data regarding its occurrence it is found in an undeveloped gold and copper prospect situated near Alamos, Sonora, Mexico. The minerals making up the ore in hand are, however, with trifling exceptions all compounds of lead.

The gangue is in part massive white quartz, in part a compact gray, brown or black material shown by analysis to contain quartz, the new lead silicate and either limonite or hematite, in varying admixtures. Interspersed through this massive material are occasional vugs lined with quartz crystals and irregular bunches of the lead compounds. Of these the most abundant is cerussite in snow-white aggregates and rare crystals. Minute flakes of pale green leadhillite were identified by cleavage, optical character and chemical reactions. Wulfenite is also found, partly in orange-colored crystals, more abundantly as a bright yellow stain in all the other minerals of the ore, particularly in the lead silicate.

FIG. 1.



The lead silicate is in radiated fibrous aggregates of more or less pronounced spheroidal form, irregularly interspersed among the minerals already mentioned. It is snow-white in the mass, transparent and colorless in the rare cases where tiny fibers had been free to develop singly in open spaces between the spheroids. There is a perfect cleavage transverse to the fibers yielding a curved concentric fracture surface of pearly luster which extends almost uninterruptedly through all the individuals of a spheroid. The few developed crystals that could be secured for study were minute—not more than 0·5^{mm} in diameter—and the best of them were but poorly adapted to measurement, several fibers being generally adherent in subparallel groups so that it was difficult to secure readings

from individual crystals. The high luster of the mineral, however, made it possible to obtain readings from the most minute faces and fairly consistent measurements were finally obtained from six crystals.

Alamosite is monoclinic, the fibers elongated parallel to the axis of symmetry (crystallographic axis *b*). This habit and the minute size of the crystals made it necessary to mount them on the two-circle goniometer with 010 as pole and the orthodome zone as prism; the measurements and calculated angles of the table are, therefore, given for that position, but the symbols and axial ratio are for the normal position. The position was chosen so as to bring out as well as might be, the relation in form to wollastonite.

The crystals are simple showing the forms *c*(001), *a*(100), *b*(010), *m*(110), *v*(101), *g*(011) *p*($\bar{1}21$), and *r*(121). The figure shows a typical combination in which the forms named, except *m* and *r*, are represented in about their normal development. The relations to wollastonite are shown by the following angles:

	Alamosite	Wollastonite
Axial Ratio	*a* : *b* : *c*	*a* : *b* : *c*
	1·375 : 1 : 0·924	1·053 : 1 : 0·967
Angle 001 to 100 = β	84°10′	84°30′
" 001 to 101	32 02	40 03
" 001 to 011	42 36	43 55
" 100 to 110	53 50	46 21

Table of calculated and observed angles of alamosite, with 010 as pole and 100 as first meridian.

Elements for this position: p_0=1·088; q_0=0·731; μ=84°10′
Elements for normal position: p_0=0·672; q_0=0·919; μ=84 10

		Calculated		Measured (mean)		No. of faces
		ϕ	ρ	ϕ	ρ	
c	001	84°10′	90°00′	84°10′	90°00′	8
a	100	00 00	90 00	00 00	90 00	6
b	010	00 00	00 00	00 00	00 00	6
m	110	00 00	36 10	00 00	36 00	1
v	101	52 08	90 00	51 53	90 00	3
g	011	84 10	47 24	84 10	47 29	6
p	$\bar{1}21$	−60 11	31 57	−60 12	31 58	9
r	121	52 03	34 25	52 10	34 18	2

Physical Properties:—Cleavage perfect parallel to 010, therefore across the fibers. Specific gravity 6·488 ±·003, determined in the pycnometer on ·6^{cc} of mineral (Merwin). Hardness 4·5. Luster adamantine. Plane of the optic axes

parallel to plane of symmetry. Refraction and double refraction high but not determined.

Chemical Composition:—A small amount of the mineral was picked out under the microscope as free as possible from adhering quartz and other substances contained in the ore. The absence of cerussite was proved by lack of effervescence in nitric acid. The mineral fuses at 3 to a greenish yellow bead, colorless when cold; it is easily reduced on charcoal to a lead button and is soluble in nitric acid with strong gelatinization.

The analysis by H. E. Merwin gave the following result:

	Per cent	Mol. Ratio	Per cent for $PbSiO_3$
SiO_2	21·11	·348	21·32
PbO	78·13	·351	78·68
CaO	trace	----	----
FeO	·09	----	----
Residue* from PbO	·53	----	----
Insol. residue, quartz	·08	----	----
	99·94		100·00

* This residue was lost after weighing and was therefore not determined.

The molecular ratio of PbO to SiO_2 is almost exactly 1 : 1, indicating for the mineral the formula $PbSiO_3$.

There seems little doubt after considering its characteristics that alamosite should be classified with wollastonite. That it is to be regarded as isomorphous with that mineral is, however, open to question. In favor of this interpretation are (1) similarity of chemical type and behavior with acids; (2) identity of crystal system and habit; (3) close approximation in the values of the angle β and in the lengths of the c-axes; (4) similarity of optical orientation. Opposed to the assumption of isomorphism are (1) difference in lengths of the a-axes; (2) difference of cleavage.

The case is analogous to the relation of anglesite and anhydrite where, however, isomorphism is less strongly indicated than in the present pair of minerals.

Alamosite is very similar in appearance to barysilite but may be readily distinguished from it by its optical characters.

Harvard University, March, 1909.