

ART. XV.—*On some minerals associated with the Cryolite in Greenland*; by G. HAGEMANN.

A NOTICE of the pachnolite, discovered by Prof. Knop in the Greenland cryolite, has already appeared in this Journal.¹ On examination of several cargoes of cryolite imported by the Pennsylvania Salt Manufacturing Company, I have not only found pachnolite, but also have observed some other minerals which may be of interest.

Dimetric Pachnolite.—Among these is a mineral first observed by Prof. Julius Thomsen of Copenhagen, the originator of the cryolite industry. As I am informed, he found a mineral, which on a preliminary examination he thought might prove a fluorid of silicon compound, but I have not heard of any further investigation of the substance. In looking over the cargoes of cryolite I have found a mineral which I believe to be the same with that noticed by Prof. Thomsen.

The mineral crystallizes in dimetric form, the dimetric pyramid and prisms being plainly seen, but no further crystallographic examination was made. It has a distinct basal cleavage. The color is white with a reddish tinge, the crystals have a bright luster, and are coated with a white earthy envelop (*Siit*). Sp. gr., 2·74–2·76; hardness, about that of cryolite. Heated in the closed tube this mineral yields water with an acid reaction which etches the glass. At a higher temperature it melts to a clear glass, fusing even more readily than cryolite. When pulverized it is easily decomposed by sulphuric acid, and on qualitative analysis it proves to contain water and fluorine, aluminum, calcium, sodium, and some silica. In the quantitative examination it was found extremely difficult to separate the alumina from the lime when precipitated by ammonia from the solution in sulphuric acid. I redissolved and reprecipitated six times before obtaining a complete separation. The water was determined by heating the mineral with previously ignited

¹ Vol. xli, p. 119.

quicklime. The fluorine was determined as fluorid of calcium by decomposing the mineral with a mixture of silica, and the carbonates of potash and soda. After the soluble fluorids were separated from the insoluble silicates, alumina and silica were separated by carbonate of ammonia, and fluorid of calcium with carbonate of lime were thrown down with chlorid of calcium; this precipitate was dried and ignited, and the carbonate of lime was removed by acetic acid. The silica was imperfectly determined, as I had not the means at my disposal to estimate it accurately. I treated the pulverized mineral with solution of soda and carbonate of soda, filtered, and decomposed the solution by chlorhydric acid; evaporating to dryness thus rendering the silica insoluble. Analysis gave,

			Equivalents.	
Fluorine, - - -	50.08		2.63	
Aluminum, - - -	14.27		1.05	
Sodium, - - -	7.15		0.311	} 1.036
Calcium, - - -	14.51		0.725	
Water, - - -	9.70		1.07	
Silica, - - -	2.		0.135	
	<u>97.71</u>			

The formula is very near $Al_2Fl_2 + 2(\frac{2}{3}Ca + \frac{1}{3}Na)Fl + 2HO$, which corresponds closely with Knop's formula for pachnolite, $Al_2Fl_2 + 3(\frac{3}{5}Ca + \frac{2}{5}Na)Fl + 2HO$. I scarcely know how to place the silica, but I think it does not really belong to the compound.

Arksutite.—This is a white crystalline granular mineral with a high luster. No crystals were observed, but each grain shows at least one good cleavage. Sp. gr., 3.029–3.175, (variation probably caused by minute crystals of iron-pyrites). Hardness, the same as cryolite. Fuses at a red heat without giving off water. Analysis gave,

Fluorine, - - -	51.03	2.68	2
Aluminum, - - -	17.87	1.307	1
Sodium, - - -	23.00	1.	} 1.35 1
Calcium, - - -	7.01	0.35	
Moisture, - - -	0.57		
Insoluble, - - -	0.74		
	<u>100.22</u>		

Hence the compound gives the formula $Al^2Fl^2 + 2(Ca,Na)Fl$. I hope in time to find a series of these fluorids which will, perhaps, show how cryolite is decomposed into pachnolite, and this may be still further altered into what the Greenlanders call "natural soap," (a hydrate of alumina?). Both these minerals are found associated with cryolite in the vicinity of Iviktant near Arksut-fiord, in South Greenland.

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