Description and Analysis of a Mineral from Faroe, not before examined. By ARTHUR CONNELL, Esq. F.R.S. ED.

(Read Jan. 6. 1834.)

SOME time ago a mineral was put into my hands by Mr ROSE, the intelligent mineral dealer of this city, the nature of which was not known, although it had been conjectured to be a variety of Mesotype. Mr ROSE obtained it from Count VARGAS BEDEMAR of Copenhagen, who brought it from the Faroe Islands, and subsequently visited this country some years ago. A short chemical examination soon satisfied me that it differed entirely from mesotype; and having ascertained that it contained silica, lime, water, and potash, and no notable quantity of alumina, I was led to conjecture that it would prove to be a variety of apophyllite, although, in that view, it would have presented very remarkable deviations from the ordinary structure of that mineral.

Some time afterwards, in the course of last autumn, I had an opportunity of recognising, in the possession of Sir DAVID BREWSTER, a large mass of the mineral in question; and as its nature was quite unknown to Sir DAVID, he thought it would be a matter of some interest to have its chemical nature fully determined, particularly with the view of ascertaining whether it could possibly be of the nature of apophyllite.

I accordingly proceeded to complete an analysis of it; and the result was, that it was found to differ from all other mineral bodies with which I am acquainted. Its external and chemical characters, as well as the steps and result of the analysis, are as follows.

The colour of the mineral is white, with an opalescent tint.

Its lustre is glistening and vitreous. Its hardness is intermediate between that of fluor and that of felspar. It possesses a considerable degree of translucency. Its texture is imperfectly fibrous; but in a few places the fibres appear diverging with considerable regularity, showing some approach to a crystalline structure. Its specific gravity, at 67° Fahrenheit, was found to be 2.3616: at 55°, it was 2.3622; we may take 2.362 as a mean. The most characteristic peculiarity of this mineral is its remarkable toughness and difficult frangibility. To such an extent does this quality extend, that a mass of it cannot be broken into smaller fragments without great difficulty and repeated blows of a heavy hammer.

The chemical characters of the mineral were as follows:—Exposed to heat in a glass-tube, it gave off water in considerable abundance, which did not affect the colour of litmus or turmeric, and did not stain Brazil-wood paper yellow, nor in the slightest degree corrode the tube. Neither was the glass in any degree attacked by the moisture expelled when the mineral was heated in an open tube with previously fused salt of phosphorus. Urged by the blowpipe in the platinum forceps, it did not swell up, but became opaque and white, and fused only on the edge, and with difficulty. Alone, on charcoal, the result was the same, except that the fusion on the edges was scarcely visible. With soda, it melted with effervescence into a semitransparent glass. With salt of phosphorus, it gave a colourless glass, showing silica as an opaque mass, in the midst of a clear globule, which, however, opalesced on cooling, especially after the heat had been continued some time. With borax, it fused into a transparent colourless glass. With soda, on platinum foil, no manganese reaction could usually be observed, although occasionally a feeble tint was visible. With nitrate of cobalt, a fragment of the mineral gave no trace either of alumina or magnesia. In order to ascertain whether it contained any phosphoric acid, a little of the mineral in powder was heated to drive off the water, and then

ignited in a tube with potassium ; and after the excess of potassium had been removed by mercury, no trace of the smell of phosphuretted hydrogen could be observed on blowing into the tube.

When the mineral in fine powder was treated with muriatic acid, it gelatinized immediately, with considerable increase of temperature. Even when in coarse powder, there was speedy gelatinization of the finer particles, and the larger were gradually acted on. The external weathered coating of the mineral effervesced slightly with acid, owing to partial decomposition and absorption of carbonic acid from the air ; but the fresh mineral did not show the least trace of effervescence.

In a preliminary examination of a portion of the mineral which was decomposed by muriatic acid, the only constituents found were silica, lime, a little potash, and traces of one or more metallic oxides. Magnesia was sought for, but none found. The presence of water, and absence of fluoric and phosphoric acids, have already appeared.

The steps of the analysis were as follows :—

a, 20.66 grains of the mineral, in small fragments, lost by ignition 3.04 grains, equivalent to 14.714 per cent. of water. The ignited mineral became opaque, and whiter.

b, 24.68 grains were reduced to coarse powder in the steel mortar, and were treated with muriatic acid. Immediate gelatinization of a part took place, with rise of temperature, and the mineral and acid were left in contact with one another in a close vessel till complete decomposition appeared to have taken place. From accidental circumstances, the substances were left in contact in the present instance for several months. It was thought better not to reduce the mineral to fine powder at first in the usual manner in a siliceous mortar, as, from the great tenacity and considerable hardness of the mineral, a good deal of silica would probably have been abraded from the mortar.

c, Water was now added to the mass, and heat applied. Silica was separated by filtration, and, after edulcoration and igni-

tion, it weighed 14.35 grains. It dissolved in boiling potash ley except a residue of .47 of a grain, which shall be afterwards noticed. There was thus left of silica 13.88 grains.

d, The liquid separated from silica was treated with ammonia in some excess. A few flocks only fell, becoming gradually brown. These were separated by filtration, and, after ignition, weighed .14 of a grain.

e, These ignited flocks were digested in muriatic acid, and were dissolved, except a residue of .02 of silica. The solution was boiled with excess of caustic potash. The precipitate remaining undissolved was separated by filtration, and the liquid supersaturated with muriatic acid, and treated with carbonate of ammonia. A slight muddiness ensued; but the quantity or nature of the precipitate was not determined, from its small amount.

f, The residue left by the caustic potash in *e*, was dissolved in muriatic acid, boiled with a little nitric acid, neutralized by ammonia, and precipitated by benzoate of ammonia. The precipitate, ignited with a little nitric acid, yielded .04 of oxide of iron. The residual liquid was boiled with carbonate of soda. A white precipitate fell, which, after ignition, weighed .05. This, when examined, proved to be oxide of manganese, mixed with some lime; but as the proportion of lime could not be determined, the whole may be held as red oxide of manganese, equivalent to .046 of protoxide, although, from the reaction of the mineral on platinum foil with soda, formerly mentioned, the real quantity of that oxide was apparently less.

g, The liquid which had been precipitated by ammonia in *d*, after concentration by heat, was brought nearly to the boiling point, and carbonate of ammonia added. A plentiful white precipitate fell, which, after being collected by filtration, and duly dried, weighed 11.74 grains. This precipitate, which was carbonate of lime, dissolved without residue in diluted muriatic acid. A few drops of hydrosulphuret of ammonia were added to the

solution, and a minute quantity of sulphuret of manganese got, which, by treatment with muriatic acid, and precipitation with potash, yielded .01 of red oxide of manganese, or .009 of protoxide; leaving 11.73 of carbonate of lime, equivalent to 6.602 of lime.

h, The liquid separated from carbonate of lime in *g*, was evaporated to dryness, and the ammoniacal salt driven off by heat. A small quantity of a white saline residue remained, which, ignited, weighed .39. This residue, redissolved in water, left .07 of silica, giving .32 for the weight of salt.

i, To the saline solution in *h*, a few drops of carbonate of ammonia were added, by which .02 more of carbonate of lime were got, equivalent to .11 of lime, and to .22 of chloride of calcium, which, subtracted from the saline residue of .32, gave now .298 for the salt. The solution of the salt was not affected by hydrosulphuret of ammonia.

k, After the saline solution had been again evaporated, the residue ignited and redissolved, cubical crystals were obtained by spontaneous evaporation. To the solution of these crystals, chloride of platinum was added, when, after a little, a yellow precipitate formed; and the liquid being crystallized spontaneously, crystals of the double chloride of platinum and sodium were obtained, which were taken up by weak alcohol. The residual double chloride of platinum and potassium, duly dried, weighed .3, equivalent to .0580 of potash, and to .0916 of chloride of potassium, leaving for chloride of sodium .2064, equivalent to .1099 of soda. The double chloride of platinum and sodium decomposed by sulphate of ammonia and heat, yielded efflorescent crystals of sulphate of soda.

l, The residue of .47 left by the potash ley in *c*, was resolved by fusion with carbonated alkalies, and other necessary steps, into .27 of silica, .04 of oxide of iron, and .01 of lime.

We have thus in 24.68 grains of the mineral, exclusive of water,

a Mineral from Faroe.

51

Silica,	c,	13.88	
	e,	2	
	h,	7	
	l,	27	
		<hr/>	14.24
Lime,	g,	6.602	
	i,	11	
		<hr/>	6.613
Soda,	k,	.109	.109
Potash,	k,	.058	.058
Oxide of Iron,	f,	.04	
	l,	.04	
		<hr/>	.08
Oxide of Manganese,	f,	.046	
	g,	.009	
		<hr/>	.55
		<hr/>	21.650

And in 100 parts,

Silica,	57.69
Lime,	26.83
Water,	14.71
Soda,	0.44
Potash,	0.23
Oxide of Iron,	0.32
Oxide of Manganese,	0.22
	<hr/>
	100.44

The above composition differs, so far as my information extends, from that of all other known minerals; and shews the mineral under analysis to be essentially a hydrated quatersilicate of lime. Its constitution is expressed by the formula $9S^4C + 16Aq$, which gives

Silica,	58.06
Lime,	26.85
Water,	15.08
	<hr/>
	99.99

From table-spar, the mineral obviously differs in containing water as an essential constituent, and in the relative proportions of silica and lime, table-spar being a bisilicate of lime. From those zeolites which do not contain alumina as a necessary ingredient, such as apophyllite, and Dr THOMSON'S wollastonite, it differs, in respect that the quantity of alkali is too small to be viewed as an essential constituent, as well as in the relative proportions of silica and base.

As soon as I had completed the analysis, I sent an account of the result to Sir DAVID BREWSTER, who was so kind as to examine a few of the optical properties, and to give me the following notice of his observations :

“ MY DEAR SIR,

“ I ought to have thanked you sooner for your letter of the 5th December. There can be no doubt that the mineral is a new one, and I have made various ineffectual attempts to obtain crystals from the surface of the large specimen which I have of it, and which I received from Count VARGAS BEDEMAR. The crystallized faces are perfectly distinct, but they lie so near the general surface, that it is impossible to detach any fragment without pounding it.

“ I have, however, ground and polished a piece of the tough mass, and have ascertained that it possesses double refraction. It is also opalescent, reflecting a bluish light, and consequently transmitting a yellowish one. I have also found that its powder possesses no pyro-electricity. I cannot help thinking, that, by a careful examination of different specimens, small crystals will be found in some of the superficial cavities. I am, My Dear Sir, ever faithfully yours,

“ D. BREWSTER.”

“ *Belleville, Dec. 26. 1833.*”

On receiving this letter, I examined the specimens with greater care, to endeavour to discover crystals, and I could observe with a lens, in several places, in one of them faces apparently belonging to minute crystals, and reflecting a fine lustre; but still the portions so observed were too small, and the connection of the faces with one another not sufficiently apparent to enable me to draw any conclusion as to the crystalline form. As I have every reason, however, to hope that larger quantities of the mineral are in the possession of Count BEDEMAR, more light may possibly still be thrown on that matter.

Its other external characters will, I trust, be held as sufficiently distinctive, especially when supported by the chemical analysis; and in case mineralogists shall be willing to receive it as a new species, I should propose to distinguish it by the name of *Dysclasite* *, as expressive of the peculiarity in its external characters formerly mentioned, its remarkable tenacity and difficult frangibility. It will of course be arranged with the Zeolites.

Since this paper was read, I have had a thin slice of the mineral cut and polished by a lapidary; and Sir DAVID BREWSTER, who was so obliging as to examine it, observed the same appearances as before, and found that it polarised light in all directions, shewing that the mineral consists of a congeries of crystals, adhering together in all positions. This structure may serve to explain its great tenacity.

* From *δυσ* and *κλαω*.