CHEMICAL ANALYSES OF BOROLANITE AND RELATED ROCKS. 417

Chemical Analyses of Borolanite and Related Rocks. By
ALEXANDER GEMMELL, B.Sc. Chemistry Department.
University of Edinburgh.

(Communicated by Dr Shand, 16th March 1910.)

THE following analyses were performed upon Material supplied by Dr S. J. Shand, and the names and localities of the rocks are those given by him in his paper in this volume.

The analyses, with the exception of alkalis, titanium and iron, were carried out by the methods laid down in Washington's "Chemical Analysis of Rocks," and Hillebrand's "Analysis of Silicate and Carbonate Rocks." The alkalis were estimated according to the Lawrence-Smith Method, except that the potassium was estimated by the method of Adie and Wood (Chem. Soc. Jour. Trans. 1900, p. 1076 *et seq.*). Iron and titanium were estimated by the author's own method (Analyst, 1910, p. 198 *et seq.*).

No. 1.

Cromaltite. Bad na h' Achlaise, near Ledmore.

	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeO	CaO	MgO	TiO ₂	K ₂ O	Na ₂ O	P ₂ O ₅	Total
A	33.52	7.60	10.69	6.98	22.82	6.94	4.51	1.37	3.52	2.31	100.26
B	37.35	7.33	11.23	7.33	21.93	7.90	4.01	.95	.96	2.27	100.80

Remarks. This analysis was originally intended to extend to iron and titanium alone ; its completion was an afterthought and was performed on a very small quantity of material. Water was not determined.

A and B were the results of different samples, and not duplicate results of the same sample.

No. 2.

Borolanite Granulite. Aultivullin.

SiO ₂	AlO	Fe ₂ O ₃	FeO	CaO	MgO	TiO ₂	K ₂ O	Na ₂ O	Total
43.22	15.14	9.57	2.62	14.35	3.33	2.72	7.18	2.94	101.07

Remarks. The same remarks apply here, as in the cromaltite analyses.

No. 3.

Assyntite. $\frac{1}{2}$ mile east of Ledbeg.

	SiO_2	Al_2O_3	Fe_2O_3	FeO	CaO	MgO	TiO_2	K_2O	Na_2O	H_2O (110°)	H_2O (+110°)	P_2O_5	Cl	SO_3	Total
1	53.16	16.72	3.95	2.25	6.19	3.02	2.40	3.99	4.32	.28	1.51	1.07	.77	Tr.	99.68
2	52.55	16.37	4.28	2.19	6.20	3.00	2.21	4.51	4.22	.18	1.58	1.08	.77	Tr.	99.14
Mean	52.85	16.55	4.12	2.22	6.20	3.01	2.30	4.25	4.27	.23	1.54	1.07	.77	Tr.	99.38

Remarks. About 50 grammes of the rock were taken, roughly broken up, and an average sample of about 20 grammes ground up for the analysis.

No. 4.

Nephelite Syenite. North foot of Cnoc-na-Sroine (Teall's original locality).

	SiO_2	Al_2O_3	Fe_2O_3	FeO	CaO	MgO	TiO_2	K_2O	Na_2O	H_2O (110°)	H_2O (+110°)	Total
1	53.12	24.73	2.37	1.29	2.61	Tr.	.60	7.26	5.56	.36	1.05	98.95
2	53.15	25.01	2.13	1.51	2.75	Tr.	.60	...	...	...	...	99.37
Mean	53.13	24.87	2.25	1.40	2.68	Tr.	.60	7.26	5.56	.36	1.05	99.16

Remarks. The amount of titanium in this rock was too small to be estimated by any other than a colorimetric method, which was accordingly used.

No. 5.

Ægirite Aplite. Ledmore.

	SiO_2	Al_2O_3	Fe_2O_3	FeO	CaO	MgO TiO_2	K_2O	Na_2O	H_2O	Total
1	70.46	17.01	1.62	.98	.82	Traces	1.92	7.17	.34	100.32
2	71.02	16.99	1.60	.98	...	...	...	...	...	...
Mean	70.74	17.00	1.61	.98	.82	Traces	1.92	7.17	.34	100.58

Remarks. Water was here determined by loss on ignition and adding to this the difference in weight after converting the FeO into Fe_2O_3 . This method is quite applicable in cases where the amount of iron oxides is small.

No. 6.

Melanite Syenite. North end of Cnoc-na-Sroine, 1000 feet altitude.

	SiO_2	Al_2O_3	Fe_2O_3	FeO	CaO	MgO	TiO_2	K_2O	Na_2O	H_2O (110°)	H_2O (+110°)	Total
1	62.96	21.26	2.48	.46	2.81	.19	.33	3.49	5.47	.22	.38	100.55

Remarks. TiO_2 was here estimated colorimetrically.

CHEMICAL ANALYSES OF BOROLANITE AND RELATED ROCKS. 419

No. 7.

Ledmorite. Ledmore River.

SiO_2	Al_2O_3	Fe_2O_3	FeO	CaO	MgO	TiO_2	K_2O	Na_2O	H_2O (110°)	H_2O (+110°)	P_2O_5	Total
45·06	20·95	6·23	2·84	8·32	3·31	1·25	4·09	3·51	·30	3·98	·66	100·50

Remarks. The best specimen that could be obtained for analysis was nevertheless somewhat weathered, so that the analysis does not accurately give the original composition of this rock.

No. 8.

Titaniferous Melanite. From ledmorite-pegmatite near Bad na h' Achlaise. Ledmore

	SiO_2	Al_2O_3	Fe_2O_3	FeO	CaO	MgO	TiO_2	Alkalies as K_2O	H_2O (110°)	H_2O (+110°)	Total
1	38·49	9·10	17·49	2·66	28·86	1·80	6·29	·46	·11	·56	100·82
2	38·52	7·29	18·31	2·74	...	...	7·20	...	·08	·55	100·81
Mean	38·1	8·20	17·90	2·70	28·86	1·80	6·74	·46	·09	·54	100·81

Remarks. The analysis was carried out on a sample taken from the rock, and freed as much as possible, by crushing and hand-picking, from the other rock constituents. The alkalis were taken as being all K_2O , and all were supposed to be present as feldspar. Taking this into account, and allowing for part of the titanium being present as TiO_2 , and part as Ti_2O the composition works out to that of schorlomite, viz. :

except that Al_2O_3 is present, which does not occur in schorlomite. The specific gravity, 3·663, is more in accordance with that of ivaarite. The ratio of SiO_2 to TiO_2 is, however, too high for either of these minerals, so that it must be either a titaniferous melanite or an isomorphous mixture of melanite, and either schorlomite or ivaarite.