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On the Composition of Some Montreal
Minerals

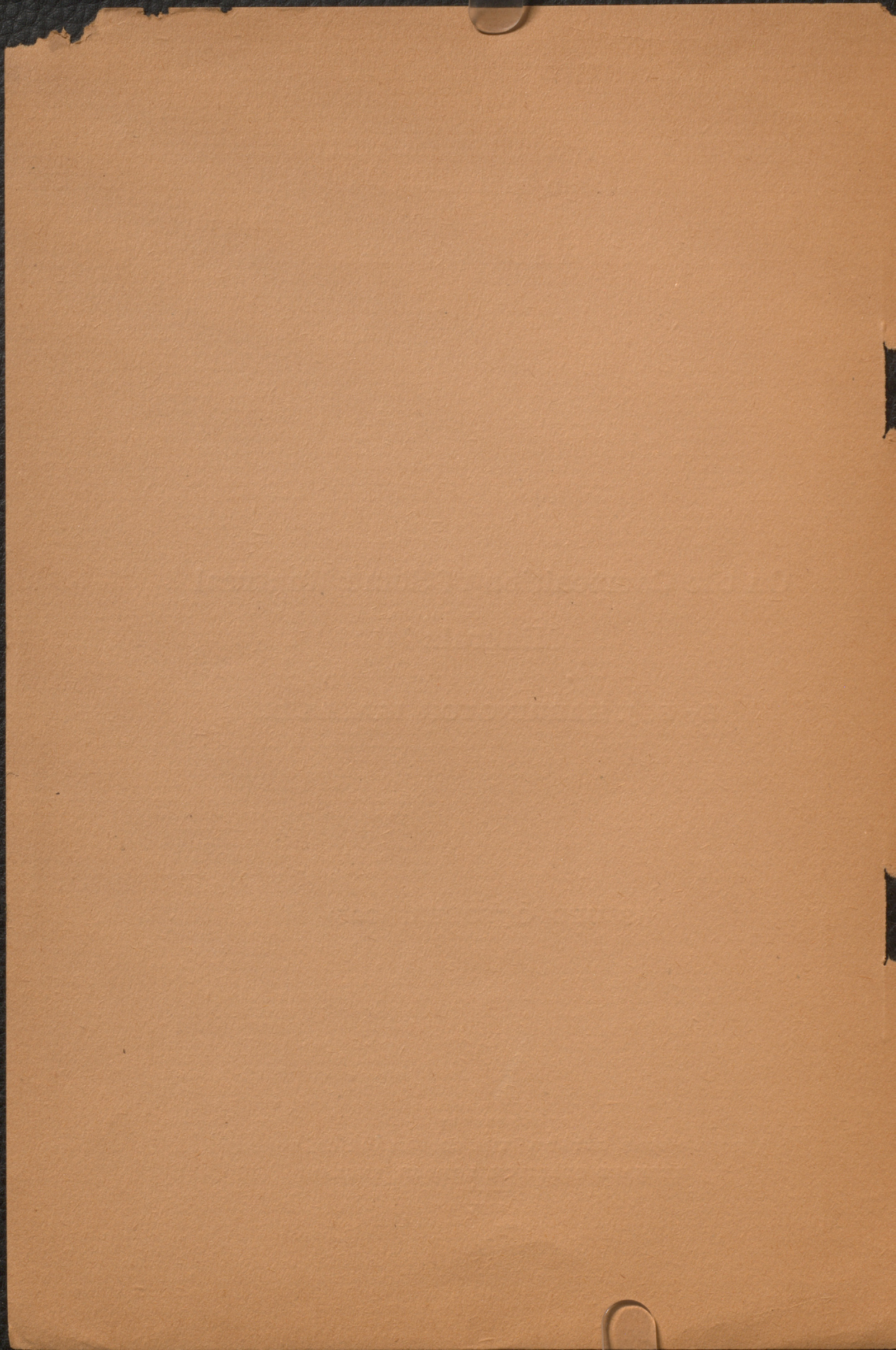
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1905



III.—*On the Composition of some Montreal Minerals.*

By B. J. HARRINGTON, M.A., LL.D.

(Read May 24, 1905.)

Though the nepheline-syenites of Montreal have been made the subject of considerable study no quantitative analyses of their constituent minerals have hitherto been published. The present paper gives the results of some recent studies which, it is hoped, will shortly be followed by others.

NEPHELINE.

The material for the following analysis was derived from one of the segregated veins in the nepheline-syenite of the Corporation Quarry ¹ at the back of Mount Royal. Great care was taken to separate it from the associated minerals and the microscope showed that with the exception of some very minute inclusions it was free from admixed substances. The nepheline analysed was of a pale flesh-red colour, translucent and vitreous to slightly greasy in lustre. It showed no marked cleavage, but sub-conchoidal to uneven fracture; with hydrochloric acid gelatinised readily, and before the blow-pipe fused quietly at about 3.5 to a vesicular glass. The percentage composition is given under I. and, for the sake of comparison, other analyses are included under II., III. and IV.:—

	I.	II. ²	III. ³	IV. ⁴
Silica.....	44.98	43.51	43.74	45.10
Alumina.....	32.65	33.78	34.48	33.28
Ferric Oxide.....	0.72	0.15	....	...
Lime	tr.	0.16	tr.	....
Magnesia.....	....	tr.	tr.	....
Soda.....	16.08	16.94	16.62	16.36
Potash.....	4.54	5.40	4.55	5.05
Water.....	0.97	0.40	0.86	0.70
	99.94	100.34	100.25	100.49

¹ Sometimes known as Forsyth's Quarry.² From nepheline-syenite of Dungannon, Ont. Anal. by the writer. Am. Jour. of Sc., July, 1894.³ Litchfield, Me. Anal. by F. W. Clarke. Am. Jour. Sc., 1886⁴ Fredriksvärn, Norway. Anal. by Lemberg. Zs. G. Ges., 1876.

ACMITE (ÆGERTE).

The occurrence of this mineral at the Corporation Quarry was called attention to by the writer many years ago, but no analysis was then made. The specimen recently examined was from a segregated vein in the nepheline-syenite composed of a number of minerals, including, in addition to the acmite, nepheline, plagioclas, sodalite, cancrinite, lepidomelane, minute crystals of zircon, small quantities of purple fluo-rite, honey-yellow sphalerite and galena. There are also occasional specks of a mineral which resembles in appearance the variety of thorite known as orangeite, but which has not yet been examined. The acmite occurs in the form of deeply striated prisms, mostly of a greenish black colour, though occasionally brown externally and greenish-black within. It has a sub-vitreous lustre and is nearly opaque. The hardness is nearly 6 and specific gravity 3.521. The analysis of the greenish-black material is given under 'I., while II., III. and IV. are quoted for comparison:

	I.	II. ¹	III. ²	IV. ³
Silica	49.51	51.60	50.25	49.32
Titanium Dioxide.....	0.61	....	....	1.25
Alumina	2.72	1.92	1.22	4.88
Ferrie Oxide.....	22.26	26.29	22.07	16.28
Ferrous Oxide....	5.82	4.20	8.80	5.65
Manganous Oxide.....	1.51	....	1.40	....
Lime.....	7.16	4.25	5.47	9.39
Magnesia.....	1.09	1.15	1.28	4.28
Soda.....	8.62	8.89	9.29	8.68
Potash.....	0.38	1.05	0.94	0.68
Water.....	0.57	0.56	....	....
	100.27	99.91	100.72	100.41

The Montreal mineral fuses easily and quietly to a black magnetic glass. As yet it has not been studied optically. It has been termed acmite, the general name of the species, but its characters and mode of occurrence appear to be those of the variety *ægirite*.

¹ "Ægerin" from elæolite-syenite of Barreros, Brazil. Machado, Tscherm. Mitth. N. F.9, 333.

² "Ægerin" from Langesundfjord. Ramm., Pogg. Anal., 1858.

³ "Ægerinaugite" from cancrinite-nepheline-syenite of Särna. Rosenbusch, Elemente der Gesteinslehre, 1901, p. 125.

LEPIDOMELANE.

Like the last mineral described this was obtained from one of the coarse segregations of the nepheline-syenite at the Corporation Quarry. The material examined occurred in rude crystals or plates measuring in some cases as much as a quarter of an inch across. The colour was black (green by transmitted light), and the lustre vitreous to adamantine, optic axial angle small. The scales showed very little flexibility. The hardness was 3, and the specific gravity 3.269. The percentage composition was found to be as follows:—

Silica.....	32.96
Titanium Dioxide.....	2.80
Alumina.....	10.34
Ferric Oxide.....	8.85
Ferrous Oxide.....	27.19
Manganous Oxide.....	2.79
Lime.....	0.64
Magnesia.....	0.73
Soda.....	0.98
Potash.....	7.75
Lithia.....	0.03
Fluorine.....	none.
Water.....	4.36
	99.42

Before the blowpipe the mica fused to a black magnetic slag. It was readily decomposed by hydrochloric acid, the silica being left in the form of scales.

If the titanium dioxide be calculated in with the silica the molecular ratios are as follows:

$$\begin{array}{cccc}
 (R_2O) & (RO) & : & (R_2O_5) & : & (SiO_2) \\
 340 & 444 & & 156 & & 607 \\
 \hline
 & 784 & & 156 & & 607 \\
 & 5 & & 1 & & 4
 \end{array}$$

The composition is, on the whole, similar to that of the black mica occurring in the nepheline-syenite of Monmouth, Ontario. In both cases the specific gravity and the proportion of ferrous oxide are unusually high.

NATROLITE AND ANALCITE.

Though not among the constituents proper of the nepheline-syenite, these minerals are occasionally met with at the Corporation Quarry as secondary products in cavities or veins. The natrolite examined occurred in aggregations of columns or prisms, closely associated with analcite. It was white, translucent, and vitreous in lustre. Hardness 5, specific gravity 2.234. The results obtained on analysis are as follows:—

Silica.....	47.09
Alumina.....	26.99
Ferric Oxide.....	tr.
Lime.....	tr.
Soda.....	16.46
Potash.....	0.01
Water.....	9.80
	100.35

The mineral gelatinized readily with hydrochloric acid, and fused quietly at 2 to a blebby glass, colouring the flame strongly yellow.

The analcite crystals examined were white trapezohedrons nearly a quarter of an inch in diameter. They were vitreous in lustre and sub-translucent. Hardness a little over 5, and specific gravity 2.22. An analysis by Mr. J. A. E. Egleson, Demonstrator in Chemistry, gave the following results:—

Silica.....	54.83
Alumina.....	24.20
Lime.....	0.08
Soda.....	12.01
Water.....	8.50
	99.62

McGill University,
May, 1905.

