SHORT COMMUNICATIONS

Kaersutite from the Lugar sill, Ayrshire, and from alnöite breccia, Alnö Island, Sweden

THE alkaline rock occurring as veins in the picrite of the Lugar sill, Ayrshire, Scotland, which has been termed lugarite by Tyrell (1912), contains comparatively large crystals (length 2–3 cm) of brown amphibole, together with titanaugite and labradorite in a groundmass of nepheline and analcime. This amphibole was analysed by Scott (1914) who termed it barkevikite and compared it with the type material from Barkevik, Norway (Brögger, 1887). Since Scott's work, however, a fuller understanding of the crystal chemistry of the amphibole group has been reached and it can be seen that his analysis contains an abnormally high content of sodium (table I, anal. A): it can be recalculated on the basis of 24(O,OH) to give the approximate formula

$$Na_2Ca_2(Mg,Fe^{+2},Fe^{+3},Ti,Al)_4Si_{6\cdot7}Al_{1\cdot3}O_{23\cdot7}(OH)_{0\cdot3}.$$

A new analysis seemed desirable and, using a separate specimen of lugarite, the result obtained is given as anal. 1 (table I). It differs from the earlier analysis chiefly in showing a higher content of Ti, Al, and Mg and a lower content of Fe and Na. It can be recalculated (table I) on the basis of 24(O,OH) to give a formula consistent with kaersutite and is comparable in Mg : (Fe^{2+} + Fe^{3+} + Mn) ratio with an analysis reported by Yagi (1953).

An amphibole resembling barkevikitic hornblende occurs in spectacularly large crystals in the alnöite breccia at Hovid in the northwest of Alnö Island, Sweden (von Eckermann, 1948, 1960). A portion of a single crystal of amphibole from this rock has also been analysed (table I, anal. 2) and it can be seen that it also has a kaersutitic composition. It differs from the Lugar mineral in having a much higher Mg : (Fe^{2+} + Fe^{3+} + Mn) ratio. The Alnö amphibole has a somewhat lower Fe^{2+} : Fe^{3+} ratio than the Lugar kaersutite but for both minerals the Fe^{2+} : Fe^{3+} ratio is greater than unity, as distinct from the high Fe^{3+} content of basaltic hornblendes, or oxyhornblendes. In considering the classification of kaersutites and barkevikites, Wilkinson (1961) proposed that the name kaersutite be used for titaniferous amphiboles with Mg > 2. Not only on this basis, but also because of their high optic axial angles and relatively low refractive indices, both the Lugar and Alnö

minerals are termed kaersutite, though the Alnö mineral shows an apparent barkevikitic trend in having a relatively low birefringence.

Both analysed minerals occur in lustrous black crystals, which in thin section show moderate pleochroism with α yellow brown, β brown,

TABLE I

	1	A	B	2	Number of ions on the basis of 24(O,OH,F)				
SiO_2	38·24	42·48	40·73	39·12					
TiO_2 ...	5·61	2·90	8·47	2·97		1		2	
Al_2O_3 ...	15·16	8·58	10·62	14·67	Si ...	5·731 } 8·00		5·696 } 8·00	
Fe_2O_3 ...	1·24	6·81	1·39	4·82	Al ...	2·269 }		2·304 }	
FeO ...	11·30	15·62	11·91	6·14	Al ...	0·409 }		0·214 }	
MnO ...	0·16	0·39	0·25	0·05	Ti	0·632		0·326	
MgO ...	9·48	2·78	10·46	14·37	Fe^{3+}	0·138		0·529	
CaO ...	13·36	13·45	10·40	12·36	Mg	2·117 } 4·73		3·119 } 4·94	
Na_2O ...	2·21	6·32	2·92	2·02	Fe^{2+}	1·417		0·748	
K_2O ...	1·16	0·60	1·33	2·09	Mn	0·020 }		0·006 }	
H_2O^+ ...	1·83 } 0·25		1·97	2·27	Na	0·643 }		0·571 }	
H_2O^- ...	0·04		0·23	0·07	Ca	2·146 } 3·01		1·929 } 2·89	
F ...	tr.	—	—	tr.	K	0·221 }		0·389 }	
TOTAL	99·79	100·18	100·68	100·95	OH	1·830		2·205	
α ...	1·685	1·680	1·680(α')	1·670	$100Mg/(Mg+Fe^{3+}+Fe^{2+}+Mn)$				
γ ...	1·713	1·701	1·703(γ')	1·685		57·3		70·8	
$2V_\alpha$ ...	81°	52°	77°–79°	80°					
γ:[001] ...	17°	11½°	16°–19°						
D ...	3·27	3·298	—	3·20					
a(Å) ...	9·882	—	—	9·933					
b(Å) ...	18·080	—	—	18·058					
c(Å) ...	5·322	—	—	5·309					
β ...	105·32°	—	—	104·15°					
V(Å^3) ...	917	—	—	918					

1. Kaersutite, lugarite, Lugar sill, Lugar, Ayrshire. Anal. R. A. Howie.

A. 'Barkevikite', lugarite, Lugar sill, Lugar, Ayrshire (Scott, 1914.) Anal. A. Scott.

B. Kaersutite, monzonite, Tyaki, Morotu, Sakhalin, USSR. (Yagi, 1953). Anal. K. Yagi.

2. Kaersutite, alnöite breccia, Hovid, Alnö Island, Sweden. Anal. R. A. Howie.

γ dark brown. The α and γ refractive indices and birefringence in table I are quoted from Borley and Frost (1963), as also are the cell parameters, which are included here for completeness, and which are based on the C-face-centred cell rather than on the body-centred cell. The author is indebted to Dr. Borley for permission to quote these results, and also to Professor H. von Eckermann for introducing him to the Alnö area.

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Wulfenite from Poddy Gill, Caldbeck Fells

WULFENITE has been recorded from the Caldbeck Fells by Goodchild[1] in the last century and, more recently, by Sir Arthur Russell.[2] In the latter instance an exact locality is given ('a small dump derived from a trial level, three-quarters of the way up Brandy Gill') and the mineral is described as small, thin, honey-yellow rounded plates on tapering prisms of pyromorphite or on more or less iron-stained drusy quartz. Some material we have recently collected from a small weathered dump at the foot of Poddy Gill, Grid Reference NY/328328, consists of very similar matrix studded with orange-yellow thick rectangular and often elongated (bar-shaped) tablets of wulfenite of very simple crystal habit, up to 2 mm in length. Anglesite, mentioned by Goodchild as an associated mineral, is absent on our specimens and on those described by Sir Arthur Russell. We thank Dr. R. J. Davis and Miss E. E. Fejer of the British Museum (Natural History) for identifying an X-ray powder photograph of the wulfenite.

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[1] J. G. Goodchild, Geol. Mag. 1875, decade 2, vol. 2, p. 565.
[2] A. Russell, Min. Mag. 1936, vol. 24, p. 321.

Mercurous nitrate in mineral separation

MANY important silicate minerals, in particular pyroxenes, amphiboles, garnets, and epidote, have densities above 3·3 gm/cm^3 and below 4·3 gm/cm^3. Separation of these minerals cannot be carried out with