LITHIUM CONTENTS OF NORWEGIAN BERYLS

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About 60 beryl samples, nearly all from Precambrian granite pegmatites, were examined by optical spectrography. Li contents range from 0.07 % to below 0.005 %. One single sample showed as much as 0.2 % Li. The variations are quite local; averages for the Østfold area and the Iveland-Evje area are nearly equal, about 0.025 %. Cs contents in excess of 0.05 % are recorded in a few cases only.

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Some years ago Dr. H. Neumann sent me a large number of prepared samples of Norwegian minerals, asking me to examine them for their contents of scandium by rapid optical spectrography. The results were used in a paper by him (1961). The material included nearly 60 beryl samples. Reviewing the beryl exposures, I found that they also contain information on the contents of lithium, and in a few cases on the contents of cesium. Dr. Neumann kindly consented that I might publish this information. Standard mixtures for comparison with the beryl samples were prepared using a virtually Li- and Cs-free beryl as the base substance, and mixing this with a Li- and Cs-rich lepidolite from Varuträsk, analyzed and labelled B by Thelma Berggren (1941). The standard mixtures contained Li 0.5 % – 0.05 % – 0.005 % and Cs 0.45 % downwards. The spectral lines available – Li 4603 and especially Cs 4555 – are not very sensitive, but the resulting working curve for Li appears to be satisfactory down to about 0.005 %. The data recorded below are given in round figures. In the material the Østfold and Iveland-Evje areas are well represented. Results for these areas are given in Table 1. Results from some other scattered localities are given in Table 2.

Comments

Nearly all the beryl samples come from ordinary Precambrian granite pegmatites. The Li contents are all low as compared with the highest values given in the literature. This is in accordance with the general scarcity of Li in Norway. One sample, from Tørdal, is considerably richer in Li than the others;

Table 1.

	Li, %	Samples	Localities
Østfold:	0.07	1	Ånnerød, Våler
	0.05	5	Aspedammen – Ski, Rakkestad – Ødegårdssletten, Våler
	0.03	3	Ånnerød – Halvorsrød – Vatvet, Rakkestad
	0.02	4	Ånnerød – Halvorsrød – Grefsrud, Rygge
	0.005	5	Elvestad, Råde – Aker, Råde – Råde – Berby, Moss – Årvollskåven, Vansjø
	0.028	18	Arithmetic Mean
Iveland-Evje:	0.07	3	Havåsen, Eptevann
	0.05	3	Håverstad – Tveit
	0.04	1	Nedre Frigstad
	0.03	1	Mannekleiv, Håverstad
	0.02	8	Frigstad – Støledalen – Evje – Eptevann – Mannekleiv – Ljoslandsknipan
	0.01	2	Tveit – Vådne
	0.005	7	Dalane – Mølland – Tveit – Håverstad – Ljoslandsknipan – Landsverk, Evje
	0.025	25	Arithmetic Mean

Table 2.

Li, %	Samples	Localities
0.2	1	Høydalen, Tørdal, Telemark (light red)
0.05	3	Rona, near Kristiansand – Eitland, near Farsund – Stetind, Tysfjord, N. Norway
0.03	3	Buvasshei, Telemark – Rona – Ollestad, Rogaland
0.02	2	Hidra (Hitterø), near Flekkefjord – Drammen granite
0.005	5	Bjertnes, Buskerud – Skarpnes, near Arendal – Straumsfjord, Aust-Agder – Brudalen, Telemark – Drammen granite

Table 3.

Localities	Li, %	Cs, %
Ånnerød, Østfold (green beryl)	0.03	0.15
Ånnerød, Østfold (colourless beryl)	0.07	0.2
Ødegårdssletten, Østfold	0.05	0.5
Ski, Rakkestad, Østfold	0.05	0.05
Vatvet, Rakkestad, Østfold	0.03	0.05
Høydalen, Telemark	0.2	0.2
Ollestad, Rogaland	0.03	0.05

this comes from a cleavelandite-quartz pegmatite which contains lepidolite and other Li-rich micas (Oftedal 1942). On the average, the Li-contents of the samples from the Østfold and Iveland-Evje areas are about the same, indicating that there is no appreciable difference in general abundance of Li between these two areas. On the other hand, both areas show strong local variations; Li is relatively concentrated in certain localities. It may be supposed that the Li-richer beryls come from relatively 'young' pegmatites. It may be added that the material shows no positive or negative correlation between the contents of Li and Sc.

Very little can be said about the cesium contents of the samples, because of the poor sensitivity of the above Cs line. The line is hardly visible at concentrations below 0.05 % Cs. Only in a few samples has the presence of Cs been definitely recorded; these are collected in Table 3. Every one of the other samples may possibly contain Cs up to several hundred ppm. Table 3 shows that the Cs-rich beryls are also fairly rich in Li, and that they usually contain more Cs than Li (by weight). This is in accordance with earlier observations. But the correlation between the contents of Li and Cs is not very pronounced. Geochemically this is to be expected, since Cs has a stronger tendency than Li to be enriched in late phases. Also crystal-chemically the two elements behave differently, because of the very different ionic sizes. Textbooks already display the information that in alkali beryls Li substitutes for Al in octahedral positions, and Al replaces some Be in tetrahedral positions; this results in a surplus negative charge, which is then compensated for by Cs and other large alkali ions in the structural channels (e. g. Deer, Howie & Zussman).

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REFERENCES

Berggren, Thelma. 1941: Minerals from the Varuträsk pegmatite. XXV. Some new analyses of lithium-bearing mica minerals. *Geol. Fören. Stockh. Förhandl. 63,* 262–278.

Neumann, H. 1961: The scandium content of some Norwegian minerals and the formation of thortveitite, a reconnaissance survey. *Norsk Geol. Tidsskr. 41,* 197–210.

Oftedal, I. 1942: Lepidolit- og tinnsteinførende pegmatitt i Tørdal, Telemark. *Norsk Geol. Tidsskr. 22,* 1–14.