

[CONTRIBUTION FROM THE CHEMICAL LABORATORY, UNIVERSITY OF MISSOURI, COLUMBIA, MO., AND THE NEW MEXICO NORMAL UNIVERSITY, LAS VEGAS, N. M.]

The Analysis of Bedford Cyrtolite for Lead and Uranium

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A recent analysis¹ of a specimen of cyrtolite from Bedford, N. Y., shows a lead-uranium ratio of 0.051 (Pb, 0.374%; U, 7.29%; Th, 0.0). Baxter and Alter² obtained an atomic weight of 205.93 for the lead from this cyrtolite. This is an unusually low atomic weight for the lead, and as it was made on a small quantity of material (approximately 1250 g. of cyrtolite), they decided to make another determination on a new lot of the cyrtolite obtained presumably from the same vein as the first lot.

It has been suggested by Hess, Schaller and Kirsch, as well as by Lane and also by Alter, that different specimens of mineral from the same vein of a pegmatite might give different ages due to a reopening of the dike from time to time. It was for this reason that another age determination was undertaken on a portion (150 g.) of the new sample sent by Alter.

Method of Analysis

The sample when received had been crushed and ground in a clean mill. The feldspar and quartz had been removed by heavy liquids and then dried at 100° and sampled; 5000 g. of the mineral was retained for atomic weight work and 150 g. sent to the writer for analysis. The 150-g. sample was ground in a clean iron mortar until all of it passed an 80-mesh sieve, which had no solder from which contamination might be derived.

The method of analysis in the lead determination was essentially that described in the previous paper³ on Bedford cyrtolite. Reagents which had been tested and found lead free were used throughout. Recoveries of lead by electrolysis were made on the filtrates and are included in the weights of the lead chromate precipitates.

The first three uranium determinations were carried out as described previously,³ while in the last three the method used in the analysis of Hybla cyrtolite⁴ was followed.

Thorium was not tested for in this sample since former determinations revealed only a trace, if any, of thorium present, and other workers have

confirmed that there is no thorium in Bedford cyrtolite.⁵

RESULTS OF ANALYSES

Lead			Uranium		
Sample, g.	PbCrO ₄ , g.	Lead, %	Sample, g.	(UO ₂) ₂ P ₂ O ₇ , g.	Uranium, %
5.0007	0.0273	0.349	1.0021	0.1013	6.74
5.1033	.0283	.355	1.0207	.1030	6.73
5.0232	.0272	.347	0.9500	.0962	6.75
5.0045	.0276	.353	1.0015	.1005	6.69
5.0021	.0274	.351	1.1006	.1112	6.74
Average		0.351	1.0512	.1063	6.74
Loss at 110°, 3 hrs.		0.77%	Average		6.73
Loss on ignition		6.10%			
Lead-uranium ratio, 0.351/6.73 = 0.052					

Approximate Age of the Mineral.—Arthur Holmes⁶ gives corrected ages, in the form of a graph, corresponding to various lead-uranium ratios. Reading from this curve the Bedford cyrtolite has an age of 384 million years. The approximate age⁷ is

$$\frac{0.052 \times 1.15 \text{ million years}}{1.57 \times 10^{-4}} = 381 \text{ million years}$$

Acknowledgment.—The author is indebted to the Elizabeth Thompson Science Fund for financial aid in this work and hereby expresses his thanks for their generous help. To Dr. A. C. Lane for his criticism and suggestions, the author acknowledges his indebtedness. This research was made possible through the use of the laboratories of the University of Missouri, which Dr. H. Schlundt so kindly placed at the author's disposal.

Conclusion

The lead-uranium ratio is practically the same as was obtained by the earlier determination (0.051). The result indicates that the material is uniform in age and does not favor the possibility that the dike has been reopened and material intruded. It is also a check on the previous work and the method of analysis which was developed at that time.

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RECEIVED MAY 12, 1934

(5) A. C. Lane, private communication: "The thorium is unimportant for you, and Hecht, and everyone agrees that at Bedford there is no thorium."

(6) "The Age of the Earth," Bulletin 80, National Research Council, 1931, pp. 208-209.

(7) G. Kirsch, "Geologie und Radioaktivität," 1928, p. 128. The value 1.57 as given by Kirsch on p. 134 is used in this formula.

(1) O. B. Muench, *Am. J. Sci.*, **21**, 350 (1931).

(2) Baxter and Alter, *This Journal*, **55**, 1445, 2785 (1933).

(3) Muench, *Am. J. Sci.*, **21**, 350 (1931).

(4) Muench, *ibid.*, **25**, 487 (1933).