ON THE PRESENCE OF BERYLLIUM IN MILARITE

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Two recent papers[1] have called attention to the probability that the element beryllium is more widely distributed in minerals and rocks than has been recognized. The fact that beryllium, unless particularly sought by the analyst, is determined with the alumina in silicate analysis, makes it easy for its presence to be overlooked.

E. K. Gedney, a student in this laboratory during the year 1929–30, investigated the distribution of beryllium in a large number of minerals by spectroscopic methods, checked in some cases by chemical analysis. His interesting results are not yet ready for publication as a whole; but as one product of the study the following analysis showing that beryllium is an essential constituent of the mineral milarite seems worthy of record. Gedney found strong lines of the element in spectrograms of milarite and his analysis, for beryllium only, showed nearly 5 per cent of BeO present.

A sample of milarite was prepared by H. Berman. He found that it was practically impossible to separate milarite from adularia with which it is intimately associated; not only are they so nearly of the same specific gravity that they fail to separate in the heavy solution; but their refractive indices are so nearly identical that no satisfactory estimate of relative purity of a powder was possible under the microscope. He therefore picked out by hand fragments of clear crystals, obtaining a sample of 0.4 gram. This was analyzed by F. A. Gonyer, the result, except for the beryllium found, confirming earlier analyses. The separation of aluminum from beryllium was effected by the use of 8–hydroxyquinoline (oxin) as described in Hillebrand and Lundell, Applied Inorganic Analysis, p. 114, 1929.

[1] C. Palache and L. H. Bauer, On the occurrence of beryllium in the zinc deposits of Franklin, N. J.: *American Mineralogist,* **15,** 30, 1930. H. S. Washington, Beryllium in minerals and rocks: *Idem.,* **16,** 37, 1931.

ANALYSIS OF MILARITE

	Per cent	Molecular ratios
SiO_2	71.66	1.19 $=24\times.050$
Al_2O_3	4.68	.046 $=1\times.046$
BeO	5.24	.209 $=4\times.052$
CaO	11.70	.209 $=4\times.052$
K_2O	4.91	.052 } $=1\times.059$
Na_2O	0.46	.007 }
H_2O+	1.02	.057 $=1\times.057$
H_2O-	0.05	
	99.72	

These figures show a satisfactory ratio except for a slight deficiency of alumina. They may be expressed by the formula $K_2Ca_4(Be_4Al_2Si_{24})O_{60}+H_2O$ which differs from that generally given for milarite chiefly in that one molequivalent of aluminum is replaced by beryllium and that the water is expressed in separate form. This seems to be a good illustration of the type of formula demanded by the "felspattypus" structure recently proposed by Machatschki.[2] The so-called disilicates and polysilicates of the Dana classification probably belong to this structural type which receives its name from feldspar, the most important member of the group. For example, the formula of petalite, expanded for comparison, may be written:

petalite	$Li_6\ Al_6$	$Si_{24}O_{60}$
milarite	$(K_2Ca_4)(Be_4Al_2)$	$Si_{24}\ O_{60}+H_2O$

This does not mean, of course, that the two minerals should be necessarily isomorphous; but it does imply that they are structurally related, the type being defined by the ratio (Be+Al+Si): O=1:2. The extent to which Be or Al or both replace Si in this ratio determines the amount of alkali or calcium present.

[2] F. Machatschki, Zur Frage der Struktur und Konstitution der Feldspate: *Cenralblatt für Mineralogie,* A, 97, 1928.