NOTES AND NEWS

ORTHO-ANTIGORITE AND THE TETRAHEDRAL CONFIGURATION OF HYDROXYL IONS

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Elsewhere in this issue of *The American Mineralogist* Brindley and von Knorring (1954) have described a new variety of antigorite from the Shetland Islands. The purpose of my remarks is to show the applicability of my hypothesis for the structure of montmorillonite (McConnell, 1950) to the unusual chemical composition of their "antigorite No. 2."

As their results indicate, difficulties arise from an attempt to obtain a reasonable structural formula by conventional methods of calculation on the basis $O+OH=9$ atoms. The (OH) content calculates to be 4.66 instead of 4.00 atoms and there is a deficiency for the two silicon positions even after all aluminum and iron atoms have been allocated to these positions. In another attempt to resolve this enigma, they calculated approximately 20 per cent of the total magnesium as though it occurred in the form of a brucite impurity. They do not present a strong justification for this procedure and indicate that the powder diffraction lines and the *d.t.a.* curve did not show the presence of brucite.

One can proceed on the assumption that brucite is *not* present and obtain satisfactory results. It is merely necessary to assume that the unit of structure contains 9 large anions $(O+OH)$ and to use the chemical analysis as a basis for deciding how many of these anions involve hydrogen. The methods for accomplishing this calculation are described in detail elsewhere (McConnell, 1951). Briefly, it is merely necessary to

TABLE 1. CALCULATION OF THE STRUCTURAL FORMULA OF ANTIGORITE NO. 2
(Analyst: O. von Knorring)

Oxides	Weight Per Cents	Molecular Ratios	Cation Ratios	Ratios of Cationic Charges	Cationic Charges $\Sigma=18$	Cations in Unit Cell (oxygen = 9)
SiO_2	38.40	.6394	.6394	2.5576	6.996	1.749
Al_2O_3	0.10	.0010	.0020	.0060	.016	.005
Fe_2O_3	3.42	.0214	.0428	.1284	.351	.117
MnO	0.05	.0007	.0007	.0014	.004	.002
MgO	41.91	1.0394	1.0394	2.0788	5.686	2.846
H_2O+	15.03	.8343	1.6686	1.8084	4.947	4.947*
H_2O-	1.26	.0699	.1398			
	100.17				18.000	

* $4.95 \doteq 4.00+4(0.24)$.

balance the electrical charges of all cations (including hydrogen) in their proper ratios against the 18 negative charges of the 9 oxygen atoms. The calculations are given in Table 1 and can be cast in the form of a structural formula, thus:

$$(Mg, Fe, Mn)_{2.97}[Si_{1.75}Al_{0.01}(H_4)_{0.24}]O_5(OH)_{4.00}.$$

Here it has been assumed that tetrahedral hydroxyl groups substitute for silica tetrahedra. The agreement is exceedingly good inasmuch as the octahedral cations differ from the theoretical requirement by merely one per cent if other constituents exactly match the requirements. To obtain this agreement it is necessary to assume that all of the water shown in von Knorring's analysis is essential to the structure.

These results offer further indirect evidence of the occurrence of hydrogens in substitution for silicon (i.e. tetrahedral hydroxyls) in structures of this general type. Although this hypothesis was originally presented in order to explain certain data for montmorillonite, it has been admitted (McConnell, 1951, p. 188) that the occurrence need not be restricted to montmorillonite.

I am indebted to Brindley and von Knorring for an opportunity to examine their results prior to publication and for their interest and cooperation.

References

Brindley, G. W., and von Knorring, O. (1954), A new variety of antigorite (ortho-antigorite) from Unst, Shetland Islands: *Am. Mineral.*, **39**, 794–804.

McConnell, Duncan (1950), The crystal chemistry of montmorillonite: *Am. Mineral.*, **35**, 166–172.

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ALLANITE PEGMATITE, SAN GABRIEL MOUNTAINS, LOS ANGELES COUNTY, CALIFORNIA*

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This short note is intended to bring to the attention of mineral collectors an intriguing locality for pegmatite minerals.

Pre-Cretaceous pegmatites, generally of simple mineralogy and of small size, abound in and near the anorthosite massif in the San Gabriel Mountains, Los Angeles County, California. One of these pegmatites is exceptional for its content of well-formed crystals of allanite, apatite, beryl, uranothorite, and zircon. This pegmatite occurs in a norite facies

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