

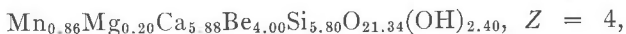
THE AMERICAN MINERALOGIST, VOL. 53, JULY-AUGUST, 1968

RELATION OF THE MANGANESE-CALCIUM SILICATES, GAGEITE AND HARSTIGITE: A CORRECTION

PAUL B. MOORE, *The Department of the Geophysical Sciences,
The University of Chicago, Chicago, Illinois*

Dr. Michael Fleischer has kindly called a serious oversight to my attention. In a paper on harstigitite (Moore, 1968), I referred to the chemical analysis reported in Flink (1886) and overlooked a revised analysis, published much later (Flink, 1917). In this later paper, Flink noted that the original harstigitite material was almost entirely sacrificed for the old analysis but specimens located in the 1890s permitted a new and more reliable analysis. The average of the two more recent analyses, performed by R. Mauzelius, is given in Table 1. The revised specific gravity is 3.16.

The new analysis is similar to the old one, except that all alumina actually proved to be beryllia. Calculation of the cell contents in Table 1 shows that the formula should be



using my structure cell data (Moore, 1968).

Harstigitite is closely related to but distinct from aminoffite. A recent crystal structure analysis of aminoffite by Coda, Rossi, and Ungaretti (1967) led to cell criteria in Table 2, which, if transformed to the C-

TABLE 1. REVISED CRYSTALLOCHEMICAL CALCULATION FOR HARSTIGITE
[Mauzelius in Flink (1917)]

	Weight percent	Moles in cell	Ideal
SiO ₂	40.00	23.22	24.00
BeO	11.49	16.02	16.00
MnO	7.05	3.44	4.25
MgO	0.94	0.81	
CaO	37.82	23.52	24.00
F ₂	0.15	—	
H ₂ O	2.48	9.60 (OH)	8.00
	99.93		

centered tetragonal cell, can be immediately related to harstigitite. This structure analysis led to the crystallochemical formula $\text{Ca}_6(\text{BeOH})_4 \cdot [\text{Si}_3\text{O}_{10}]_2$ for aminoffite. This is to be compared with $\text{MnCa}_6(\text{Be}_2\text{OOH})_2 \cdot [\text{Si}_3\text{O}_{10}]_2$ for harstigitite.

There are several facts which support the distinction between aminoffite and harstigitite. The powder data of aminoffite (Mandarino, 1964) are only remotely related to those for harstigitite (Moore, 1968). Though the two cells are geometrically similar, the space group criteria are distinct. Furthermore, Flink (1886) noted $2V = 52^\circ$ for harstigitite, whereas aminoffite is uniaxial (Hurlbut, 1937). Finally Flink (1917) shows a cruciform twin, composed of two orthorhombic individuals twinned on $p(110)$ using Flink's letter and my orientation.

It is doubtful that harstigitite is merely a stuffed derivative of the aminoffite crystal structure since the relative intensities of the diffraction spec-

TABLE 2. RELATIONSHIP BETWEEN HARSTIGITE AND AMINOFFITE

Harstigitite ^a		Aminoffite ^b		
		True cell		C-cell
<i>a</i>	13.90 Å	9.865 Å	$x\sqrt{2}$	13.95
<i>b</i>	13.62	—	—	—
<i>c</i>	9.68	9.930	—	9.930
Space group	<i>Pcmm</i>	<i>P4₂/n</i>		—
	4	2		4
Formula	MnCa ₆ (Be ₂ OOH) ₂ [Si ₃ O ₁₀] ₂	Ca ₆ (BeOH) ₄ [Si ₃ O ₁₀] ₂		

^a Moore (1968)

^b Coda, Rossi, and Ungaretti (1967)

tra are quite different. Aminoffite is a sheetlike structure, composed of [Si₃O₁₀] triplets linked to Be-(O,OH) tetrahedra, with the large cations intercalated between the sheets (Coda, *et al.*, 1967). Harstigitite is probably similar, though the order of the tetrahedra and the large cations may be different and a crystal structure analysis will be necessary to elucidate these differences.

In my previous paper (Moore, 1968), I suggested a relationship between harstigitite and gageite. The crystal structure of gageite is now known and there doesn't appear to be any relationship between the two minerals. It is suggested that harstigitite be classified with aminoffite under the melilite group of minerals and related structures.

REFERENCES

- CODA, A., G. ROSSI AND L. UNGARETTI (1967) The crystal structure of aminoffite. *Acad. Naz. Lincei, Rend. Class. Sci. Fis. Mat. Nat.* (8), **43**, 225-232.
- FLINK, G. (1886) Mineralogiska notiser I(1-16). 14. Harstigit från Pajsberg. *Bihang Kungl. Svenska Vetensk. Akad. Handl.* **12**, Afd. 2, No. 2, 59-63.

- (1917) Bidrag till Sveriges mineralogi. 105. Harstigit från Harstigsgrufvan. *Ark. Kem. Mineral. Geol.*, **6**, 49–51.
- HURLBUT, C. S. (1937) Aminoffite, a new mineral from Långban. *Geol. Fören. Stockholm Förhandl.*, **59**, H. 3, 290–292.
- MANDARINO, J. A. (1964) X-ray powder data for aminoffite. *Amer. Mineral.*, **49**, 212–214.
- MOORE, P. B. (1968) Relations of the manganese-calcium silicates, gageite and harstigte. *Amer. Mineral.*, **53**, 309–315.