

SHORT COMMUNICATIONS

The crystal structure of the mineral zussmanite

A SPECIMEN of zussmanite from the Franciscan of the Laytonville district, Mendocino Co., California, has been investigated using three-dimensional single-crystal X-ray data. The space group, cell, and formula unit (previously published by Agrell, Bown, and McKie, 1965) are: $R\bar{3}$, a_{hex} 11.66, c_{hex} 28.69 Å, with three formula units of $(\text{Na}_{0.07}\text{K}_{0.92})_{0.99}(\text{Mg}_{1.33}\text{Mn}_{0.46}\text{Fe}_{10.85}^{2+}\text{Fe}_{0.11}^{3+}\text{Al}_{0.34}\text{Ti}_{0.91})_{13.10}(\text{Si}_{16.6}\text{Al}_{1.4})_{18}\text{O}_{42.2}(\text{OH})_{13.8}$.

TABLE I. Crystal structure of zussmanite: Atomic coordinates referred to hexagonal axes; a 11.66, c 28.69 Å

Atom	x/a	y/b	z/c
Fe,Mg	0.000	0.000	0.000
Fe,Mg	0.229	-0.076	-0.001
Fe,Mg	0.384	0.539	-0.003
OH	0.333	0.667	0.033
OH	0.178	0.051	0.035
O	0.411	-0.025	0.037
O	0.258	0.360	0.038
OH	0.483	0.281	0.037
Si	0.257	0.373	0.093
Si	0.410	-0.040	0.094
O	0.266	-0.157	0.111
O	0.401	0.489	0.111
O	0.222	0.237	0.119
O	0.445	0.095	0.119
O	0.530	0.323	0.166
Si	0.525	0.180	0.167
K	0.333	0.667	0.167

Using 1156 $0k\bar{k}l$, $1.k.\overline{1+k.l}$, $2.k.\overline{2+k.l}$, and $3.k.\overline{3+k.l}$ reflections, the structure has been determined and refined, and the agreement index R is 12.5%. The atomic coordinates are given in table I and a perspective view of the structure is shown in fig. 1.

The structure contains continuous sheets of (Fe,Mg)-(O,OH) octahedra parallel to (0001), on either side of which are attached six-membered rings of tetrahedra, $(\text{Si,Al})_6\text{O}_{18}$. The composite layers so formed are linked to one another and also by three-membered rings of tetrahedra, which share oxygens with the six-membered rings. According to the chemical composition, the unshared oxygens form

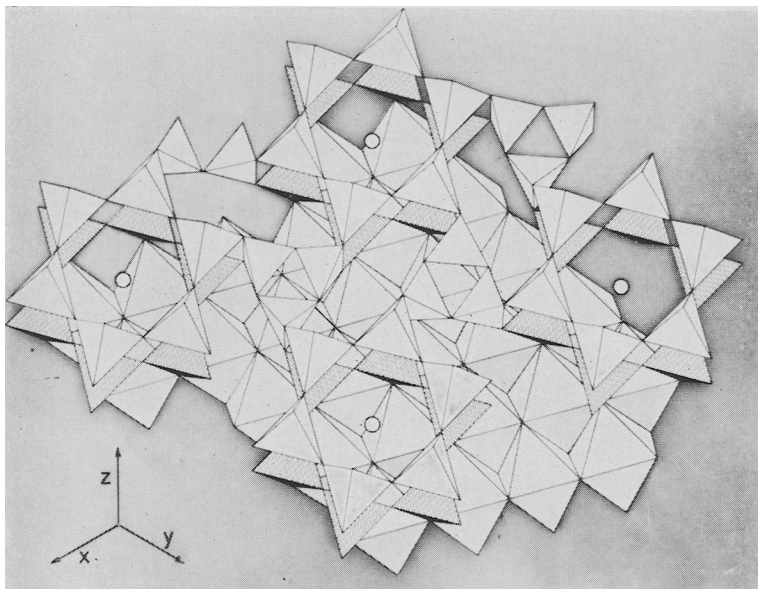


FIG. 1. Perspective diagram of part of the structure of zussmanite. For simplicity, the rings of Si tetrahedra are shown attached to only one side of the octahedral layer.

hydroxyl groups. Three such composite layers, suitably staggered, are required to give the complete unit cell. Further details of this structure will be published later.

Acknowledgement. One of us (A.L.-V.) is grateful to the Gulbenkian Foundation for a Scholarship, during the tenure of which the above work was carried out.

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References

- AGRELL (S. O.), BOWN (M. G.), and MCKIE (D.), 1965. *Min. Mag.*, vol. 35, p. liv; *Amer. Min.*, vol. 50, p. 278.

*The Lake Bonney and Nora Creina meteorites,
South Australia*

A GROUP of five stony meteorites discovered in 1961 in the Millicent area of south-eastern South Australia have been described and named the Lake Bonney meteorite (Corbett, 1964). Four of the five stones were found within an area of half a mile radius; the fifth was collected at