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TAYLORITE DISCREDITED (= AMMONIAN ARCANITE)

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ABSTRACT

Examination of the published chemical, optical and X-ray data of the potassium-ammonium sulfate mineral *taylorite* shows it to be an ammonian arcanite. Taylorite is discredited.

Keywords: sulfate, taylorite discredited, ammonian arcanite.

SOMMAIRE

Une étude de la composition chimique, des propriétés optiques et des données de diffraction X de la taylorite montre que ce sulfate de potassium et d'ammonium est en fait une arcanite ammoniacale. La taylorite est discréditée.

(Traduit par la Rédaction)

Mots-clés: sulfate, taylorite discréditée, arcanite ammoniacale.

INTRODUCTION

Taylor (1859) described a potassium ammonium sulfate from the guano deposits on the Chincha Islands off the coast of Peru; he named this mineral *'glascerite(?)'*, but it was subsequently called *taylorite* by Dana (1868, quoted in Palache *et al.* 1951). The results of a chemical analysis (Table 1) show that this mineral is an intermediate phase in the solid-solution series arcanite [K_2SO_4] - mascagnite [$(NH_4)_2SO_4$], with $x = K/(K + NH_4) = 0.79$. However, no crystallographic or optical data were reported. Frondel (1950) described ammonian aphthitalite [aphthitalite: $(K,Na)_3Na(SO_4)_2$] from the guano deposits of the Guanape Islands, 650 km northwest of the Chincha Islands, and suggested that taylorite was either ammonian arcanite or ammonian aphthitalite. Winchell & Benoit (1951) re-examined what seems to be the original specimen of taylorite, and presented chemical data (Table 1), X-ray powder-diffraction data and optical data; this new chemical data also indicate an arcanite-type formula with $x = 0.83$.

DISCUSSION

There is a complete solid-solution between arcanite and mascagnite. The indices of refraction vary nonlinearly as a function of composition (El-Hinnawi 1963). The indices of refraction reported for taylorite by Winchell & Benoit (1951) are perfectly compatible with the contention that it is an intermediate member of the arcanite–mascagnite series, with the composition given in Table 1. The X-ray powder pattern of taylorite from Chincha, given by Winchell & Benoit (1951), can be indexed on an arcanite cell. Least-squares refinement gives the following unit-cell parameters: orthorhombic; a 7.540(9), b 10.161(8), c 5.770(8) Å; these conform to the standard convention $c < a < b$, the space group of arcanite being *Pnam* in this orientation. Assuming a linear variation of cell parameters as a function of composition in the arcanite–mascagnite series, these values are compatible with the proposal that the reported composition (Table 1) has the arcanite structure.

Optical data are also reported for taylorite by Larsen (1921) and Larsen & Berman (1934). The indices of refraction are beyond the limits for arcanite and mascagnite, but correspond reasonably well with stercorite [$H(NH_4)Na(PO_4)\cdot 4H_2O$]. The sample examined by Larsen (1921) was possibly stercorite (M. Fleischer, pers. comm.).

CONCLUSIONS

Taylorite is an unnecessary name for an intermediate member of the arcanite–mascagnite series. Discreditation of the name has been approved by the International Mineralogical Association, Commission on New Minerals and Mineral Names.

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TABLE 1. CHEMICAL DATA FOR 'TAYLORITE'

	Taylor (1859)	Winchell & Benoit (1951)
SO_3	48.40	45.37
$(NH_4)_2O$	5.37	5.14
K_2O	43.45	47.50
Na_2O	1.68	<0.01
Σ	98.90	97.87
$\frac{K}{K+NH_4}$	0.79	0.83

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