

*Noonkanbahite, a potassic batisite from the lamproites
of Western Australia*

By REX T. PRIDER

Department of Geology, University of Western Australia

THE coarse-grained wolgidite variety of lamproite from the Wolgidee Hills of the West Kimberley District of Western Australia has previously yielded three new minerals. Two of these, wadeite and magnophorite (Prider, 1939), were discovered and described by the author when working as a research student under Professor Tilley's supervision and the third, priderite (Norrish, 1951), resulted from an X-ray study of material previously considered by the author to be rutile. During the examination of a more recently collected suite of specimens (Prider, 1960) another unusual mineral was noted which appeared to be different from any previously described. A chemical analysis shows it to be essentially a potassium-barium-titanium silicate related to batisite which was described about this time (Kravchenko *et al.*, 1960). It is a potassic variety of batisite which differs so much from it in composition that it is considered to warrant a new name and that here proposed for it is noonkanbahite from the name of the sheep station (Noonkanbah Station) on which most of the leucite lamproites occur. Its formula is $\text{NaK}(\text{Ba},\text{K})\text{Ti}_2\text{Si}_4\text{O}_{14}$ whereas that of batisite is $\text{Na}_2\text{BaTi}_2\text{Si}_4\text{O}_{14}$, and the other closely related mineral of this group, shcherbakovite, has the formula $\text{NaK}(\text{Ba},\text{K})(\text{Ti},\text{Nb})_2\text{Si}_4\text{O}_{14}$.

Noonkanbahite occurs as an accessory in the very coarse-grained wolgidite at approximately one-half mile north of the southern margin of the Wolgidee Hills intrusion. It is of striking appearance because of its very strong pleochroism from colourless to yellow. Like the wadeite in this rock it is extensively replaced by a carbonate mineral, and former prisms of the order of several mm long are represented by isolated smaller grains in optical continuity in a carbonate matrix. The larger grains are reddish brown and the powdered mineral is rose coloured. It has one good cleavage and the mounted grains show a common orientation with the optic axial plane lying in the plane of cleavage. It has very strong pleochroism with α , β colourless, γ strong golden yellow; α 1.714, γ 1.769, $2V_\gamma = 64^\circ$; S.G. 3.34.

TABLE I

d (Å)	I	d (Å)	I	d (Å)	I
8.395	m	2.191	ms	1.396	vw
8.283	w	2.102	ms	1.363	vw
4.200	vw	2.026	m	1.349	vw
4.054	w	1.868	wb	1.316	w
3.630	vw	1.759	w	1.296	vw
3.503	w	1.739	w	1.279	vw
3.399	s (3)	1.680	ms	1.258	w
3.201	s (2)	1.661	vw	1.233	vw
2.911	vs (1)	1.599	wb	1.221	vw
2.691	vw	1.568	ms	1.202	w
2.634	s (4)	1.531	m	1.192	vw
2.372	vw	1.490	vw	1.179	w
2.299	w	1.461	vw		
2.246	w	1.417	vw		

v = very, s = strong, m = medium, w = weak, b = broad.
Philips 114.6 mm camera. Fine collimator. Filtered Cu radiation.

TABLE II. Analysis of noonkanbahite and comparison with related batisites

	Noonkanbahite			
	Batisite	Metal ions on basis		Shcherbakovite
	wt. %	wt. %	14(O,OH)	wt. %
SiO ₂	39.00	43.25	4.211	40.61
Al ₂ O ₃	0.90	0.07	0.012	0.76
TiO ₂	22.00	21.15	1.552	17.91
(Nb + Ta) ₂ O ₅	0.36	*	—	10.44
Fe ₂ O ₃	1.80	1.70	0.129	1.80
FeO	—	0.61	0.047	0.47
ZrO ₂	1.90	0.85	0.041	1.23
MgO	tr.	Nil	—	0.26
BaO	22.00	14.47	0.551	6.22
CaO	0.27	1.77	0.182	0.82
MnO	0.09	n.d.	—	0.04
Na ₂ O	8.40	4.50	0.843	5.82
K ₂ O	2.60	10.83	1.357	12.29
H ₂ O ⁺	0.50	0.94†	0.609	0.54
Cl	n.d.	n.d.	—	0.30
Others	0.13	—	—	0.10
	<hr/>	<hr/>		<hr/>
	99.95	100.14		99.61
				<hr/>
				0.14
				<hr/>
				99.47

—O = Cl

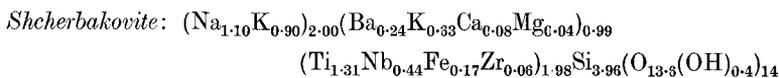
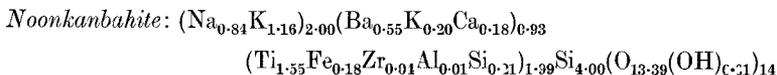
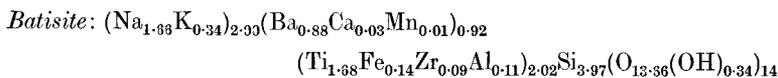
* Confirmed spectrographically in a mixture of 50 % of this mineral + 50 % diopside at less than 1000 ppm by J. R. Butler.

† Determined by loss on ignition on dried sample. Allowance was made for the presence of ferrous iron. Analyst: M. B. Costello.

The powder diffraction data are given in table I. The four strongest lines correspond with those of batisite (Kravchenko *et al.*, 1960) but thereafter there is no correspondence.

The mineral is non-magnetic and has a specific gravity almost the same as the accompanying diopside. 0.65 gm was separated pure for analysis which was made in the Western Australian Government Chemical Laboratories, after a spectrographic examination of a less pure sample to determine the analytical scheme. This analysis is given in table II where it is compared with those of batisite and shcherbakovite (Kravchenko *et al.*, 1960).

The formulae of these three minerals are:



In the potassium-rich minerals shcherbakovite and noonkanbahite, potassium replaces both sodium and barium, and in this respect noonkanbahite is more closely related to shcherbakovite than to batisite. The formula of the noonkanbahite member of this isomorphous group of batisites may be best written as



References

- KRAVCHENKO (S. M.), YLASOVA (E. V.), and PINEVICH, 1960. Doklady Akad. Nauk, U.S.S.R., vol. 133, p. 657.
 NORRISH (K. R.), 1951. Min. Mag., vol. 29, p. 496.
 PRIDER, R. T., 1939. *Ibid.*, vol. 25, p. 373.
 ——— 1960. J. Geol. Soc. Aust., vol. 6, p. 71.