NICKEL MINERALS FROM BARBERTON, SOUTH AFRICA: VII. BONACCORDITE, THE NICKEL ANALOGUE OF LUDWIGITE

by

S. A. DE WAAL, E. A. VILJOEN, AND L. C. CALK

I. INTRODUCTION

Bonaccordite was found in the mineral assemblage trevorite-liebenbergite-nepouite-nimite-bunsenite-gaspeite-violarite-millerite.

Trevorite and liebenbergite were described in earlier papers (De Waal, 1972, and De Waal and Calk, 1973, respectively), and this note gives the mineralogical data on the bonaccordite, which is the nickel analogue of ludwigite.

The nickel-rich mineral assemblage occurs in the Bon Accord area in the Barberton Mountain Land. The name *bonaccordite*, which is for the locality, has been accepted by the Commission on New Minerals and Mineral Names of the International Mineralogical Association.

II. THE PROPERTIES OF THE BONACCORDITE

The bonaccordite occurs as (i) clusters of slender prisms (maximum observed length and width 400 and 30 μm respectively) forming veins through the other minerals, and also as (ii) rosette-like radiating groups in liebenbergite and nepouite. Being enclosed in both liebenbergite and trevorite, it is assumed to have formed very early in the paragenetic sequence.

A summary of the chemical data, X-ray powder data, and physical properties of the bonaccordite is given in Table I. The X-ray data indicate that bonaccordite is isostructural with ludwigite.

Table I

Chemical data, physical properties, and X-ray powder data of bonaccordite

A. *Chemical data (mean of 9 analyses)*

Fe_2O	31,9*[1]
NiO	52,7
MgO	0,5
MnO	0,04
CaO	1,5
SiO_2	0,4
B_2O_3 (by difference)	13,1*[2]

*[1] All iron assumed to be ferric

*[2] Presence of boron confirmed by wet-chemical analysis.

Analysts: E. A. Viljoen and L. C. Calk.

Mineral formula (calculated on a basis of 4 cations for 5 oxygen ions).

$Ni_{1,86}\ Co_{0,05}\ Mg_{0,03}\ MN_{0,002}\ Si_{0,02}\ Fe_{1,05}\ B_{0,99}\ O_5$ or, simplified, Ni_2FeBO_5.

B. *Physical properties*

Colour in hand-specimen: reddish brown.

Colour in reflected light (oil immersion): grey with brownish tinge—darker and more brownish against trevorite, and darker and more bluish against bunsenite.

Bireflection in oil: distinct; anisotropism medium to strong.

Reflectivity (dry): $R_{max.}$ = 17,6 per cent
$R_{min.}$ = 14,2 per cent at 546 nm.

Internal reflection in oil: strong, with red-brown colours.

X > 1,9, calculated mean refractive index (Gladstone-Dale equation) = 2,2.

Vicker's microhardness with 15 mg load = 1 200 kg/mm² (range 1 069 to 1 259 kg/mm²).

$D_{calculated}$ = 5,17.

C. *X-ray powder data*

Cell parameters in Å: a^0 = 9,213 ± 0,006, b^0 = 12,229 ± 0,007, C^0 = 3,001 ± 0,002, volume = 338,04(Å)³.

Pbam (assumed).

I*	*d(measured)*	*d(calculated)*	*hkl*
50	5,10	5,09	120
40	4,61	4,61	200
15	3,72	3,73	130
5	3,06	3,06	040
5	2,982	2,979	310
20	2,778	2,778	111
10	2,692	2,693	021
100	2,548	2,547	240
100	2,514	2,514	201
5	2,463	2,462	211
5	2,366	2,364	150
35	2,334	2,337, 2,325	131, 221
15	2,304	2,303	400
10	2,160	2,160	250
15	2,139	2,140	231
25	2,114	2,114	311
7	2,091	2,086	141
35	2,025	2,025	321
5	1,990	1,990	160
50	1,898	1,899	331
5	1,864	1,864	260
5	1,840	1,840	440
10	1,750	1,751	421
5	1,715	1,716	170
5	1,659	1,658	161
5	1,602	1,613	351
20	1,569	1,568	441
7	1,530	1,529	080
7	1,520	1,521	521
15	1,516	1,500	002
20	1,490	1,489	620
20	1,466	1,465	531
15	1,373	1,372	640
7	1,355	1,355	371
15	1,292	1,293	242

*Visual estimation

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S. A. de Waal and E. A. Viljoen, National Institute for Metallurgy, Johannesburg.

L. C. Calk, U.S. Geological Survey, Menlo Park, California, U.S.A.

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