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**Bond-valence summation for borates: errata.** By GABRIELLE DONNAY and J. D. H. DONNAY, *Department of Geological Sciences, McGill University, P.O. Box 6070, Station A, Montreal, Quebec, Canada H3C 3G1*

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In Table 1 of Donnay & Donnay [*Acta Cryst.* (1973), B29, 1417–1425], (O–H) should read (B–O); on p. 1424,  $L \leq \bar{L}$  should read  $L \geq \bar{L}$ .

The following errata should be corrected in Donnay & Donnay (1973): p. 1418, Table 1: in the title and first column heading, instead of (O–H), read (B–O); p. 1424, 1st column, line 14 from bottom of page: instead of  $L \leq \bar{L}$  read  $L \geq \bar{L}$ .

#### Reference

DONNAY, G. & DONNAY, J. D. H. (1973). *Acta Cryst.* B29, 1417–1425.

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**New compounds of  $\text{Yb}_3\text{Fe}_4\text{O}_{10}$  and  $\text{Yb}_4\text{Fe}_5\text{O}_{13}$ .** By NOBORU KIMIZUKA, KATSUO KATO, ISAMU SHINDO and ISAO KAWADA, *National Institute for Researches in Inorganic Materials, Sakura-mura, Niihari-gun, Ibaraki 300-31, Japan* and TAKASHI KATSURA, *Faculty of Science, Tokyo Institute of Technology, Ookayama, Meguroku, Tokyo 152, Japan*

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New compounds of  $\text{Yb}_3\text{Fe}_4\text{O}_{10}$  [ $(\text{YbFeO}_3)_3\text{FeO}$ ] and  $\text{Yb}_4\text{Fe}_5\text{O}_{13}$  [ $(\text{YbFeO}_3)_4\text{FeO}$ ] have been found in the  $\text{YbFeO}_3$ – $\text{FeO}$  pseudo-binary system and their crystallographic data determined. The structural relations of  $\text{Yb}_3\text{Fe}_4\text{O}_{10}$  and  $\text{Yb}_4\text{Fe}_5\text{O}_{13}$  to the previously determined  $\text{YbFe}_2\text{O}_4$  and  $\text{Yb}_2\text{Fe}_3\text{O}_7$  are presented.

#### Introduction

In the pseudo-binary system of  $(\text{A/B})\text{FeO}_3$ – $\text{FeO}$ , the  $(\text{AFeO}_3)\text{FeO}$  and the  $(\text{BFeO}_3)_2\text{FeO}$  types of compound ( $\text{A} = \text{Y, Ho, Er, Tm, Yb}$  and  $\text{Lu}$ ;  $\text{B} = \text{Yb}$  and  $\text{Lu}$ ) have so far been synthesized under controlled oxygen partial pressures at  $1200^\circ\text{C}$  (Kimizuka, Takenaka, Sasada & Katsura, 1975*a, b*; Tannières, Evrard & Aubry, 1974) and crystal structure analyses have been performed on  $\text{YbFe}_2\text{O}_4$  (Kato, Kawada, Kimizuka & Katsura, 1975) and  $\text{Yb}_2\text{Fe}_3\text{O}_7$  (Kato, Kawada, Kimizuka, Shindo & Katsura, 1976). The crystal structure of  $(\text{Yb, Eu})\text{Fe}_2\text{O}_4$  has been independently determined by Malaman, Evrard, Tannières & Aubry (1975). The present paper reports the existence of the new compounds of  $\text{Yb}_3\text{Fe}_4\text{O}_{10}$  and  $\text{Yb}_4\text{Fe}_5\text{O}_{13}$  along with their crystallographic data and their structural relations to the compounds of  $\text{YbFe}_2\text{O}_4$  and  $\text{Yb}_2\text{Fe}_3\text{O}_7$ .

#### Sample preparation

99.99% purity grade  $\text{Yb}_2\text{O}_3$  (Shinetsu Chemical Co.) and guaranteed reagent grade  $\text{Fe}_2\text{O}_3$  (3/4 in mole ratio) were thoroughly mixed in an agate mortar under ethyl alcohol and heated at  $1200^\circ\text{C}$  in air for two days. The mixture was then placed in a crucible ( $10 \times 10$  mm  $\phi$ ) of 20% Rh–Pt alloy and heated at  $1650 \pm 1^\circ\text{C}$  in a  $\text{CO}_2$  gas (99.99%) atmosphere using a vertical Mo-wire wound furnace. Reaction time was 30 min and the sample was rapidly cooled to ice temperature.

X-ray powder diffraction by a counter diffractometer (Mn-filtered  $\text{Fe K}\alpha$  radiation and Si standard) revealed that

the polycrystalline material thus obtained was a mixture of  $\text{Yb}_2\text{Fe}_3\text{O}_7$ ,  $\text{Yb}_3\text{Fe}_4\text{O}_{10}$  and  $\text{Yb}_4\text{Fe}_5\text{O}_{13}$ . The crystals of the former two phases were grown large enough to be examined by single-crystal methods.

Table 1. *Spacings and relative intensities of  $\text{Yb}_3\text{Fe}_4\text{O}_{10}$*

	<i>h</i>	<i>k</i>	<i>l</i>	<i>d</i> <sub>obs</sub> (Å)	<i>d</i> <sub>calc</sub> (Å)	<i>I</i> <sub>obs</sub>
1	0	0	3	19.8	20.3	1
2	0	0	6	10.07	10.13	15
3	0	0	9	6.726	6.754	80
4	0	0	12	5.055	5.066	80
5	0	0	15	4.054	4.053	30
6	0	0	18	3.359	3.377	5
7	0	0	21	2.8929	2.8948	100
8	1	0	10	2.7013	2.7063	20
9	1	0	13}	2.5377	2.5383	10
10	0	0	24}		2.5329	
11	0	0	27	2.2548	2.2515	2
12	$\bar{1}$	0	20	2.1411	2.1432	3
13	1	0	22	2.0419	2.0394	5
14	1	0	25	1.8933	1.8945	3
15	$\bar{1}$	0	26	1.8474	1.8493	10
16	1	1	0	1.7452	1.7450	20
17	1	0	31	1.6430	1.6451	3
18	$\bar{1}$	0	32	1.6086	1.6084	3
19	1	0	34	1.5407	1.5388	3
20	$\bar{2}$	0	1	1.5110	1.5107	5
21	1	1	21	1.4963	1.4955	10
22	$\bar{2}$	0	10	1.4659	1.4666	8
23	0	0	42	1.4467	1.4474	30
24	$\bar{1}$	0	38	1.4141	1.4139	3

