

Table 1. *X-ray diffraction data for Nb<sub>2</sub>Al*

<i>hkl</i>	<i>d</i> <sub>o</sub> (Å)	<i>d</i> <sub>c</sub> (Å)	Relative intensity
101	4.599	4.599	<i>w</i>
210	4.448	4.447	<i>w</i>
111	4.171	4.174	<i>vw</i>
220	3.520	3.515	<i>vw</i>
211	3.376	3.376	<i>vw</i>
310	3.145	3.144	<i>w</i>
301	2.792	2.793	<i>w</i>
002	2.591	2.593	<i>w</i>
410	2.412	2.412	<i>vs</i>
330	2.342	2.344	<i>s</i>
202	2.305	2.299	<i>s</i>
212	2.238	2.240	<i>vs</i>
411	2.187	2.187	<i>vs</i>
331	2.137	2.136	<i>m</i>
222	2.083	2.087	<i>w</i>
312	1.998	2.001	<i>w</i>
432	1.577	1.578	<i>w</i>
522	1.503	1.504	<i>m</i>
532	1.425	1.425	<i>m</i>
710, 550, 413	1.404	1.406	<i>m</i>
333	1.389	1.391	<i>w</i>
720, 423	1.366	1.366	<i>m</i>
622	1.344	1.344	<i>vw</i>
542	1.334	1.332	<i>vw</i>
721	1.321	1.321	<i>vw</i>
513	1.292	1.294	<i>vw</i>
304	1.206	1.206	<i>w</i>
324	1.174	1.173	<i>w</i>
414	1.139	1.142	<i>m</i>
812, 742	1.114	1.114	<i>w</i>
553, 713	1.089	1.091	<i>vw</i>

alloys, obtained with Cu *K*α radiation ( $\lambda=1.5418$  Å) showed that the 24.4 atomic per cent aluminum alloy consisted of Nb<sub>3</sub>Al with a small amount of Nb<sub>2</sub>Al, the 28.8 atomic per cent aluminum alloy consisted of nearly equal amounts of Nb<sub>3</sub>Al and Nb<sub>2</sub>Al, and the 34 atomic per cent aluminum alloy consisted of Nb<sub>2</sub>Al. The diffraction pattern of Nb<sub>3</sub>Al was identical to that reported by Wood *et al.* (1958).

The observed X-ray diffraction data and calculated interplanar spacings for the Nb<sub>2</sub>Al phase are shown in Table 1. The pattern could be indexed as tetragonal with  $a_0=9.943$  Å,  $c_0=5.186$  Å,  $c/a=0.522$ . The cell dimensions and relative intensities of the diffraction lines suggest a structure of the sigma type, which has 30 atoms per unit cell (Bergman & Shoemaker, 1955). The calculated density of the 34 atomic per cent aluminum alloy, assuming 30 atoms per unit cell, is 6.85 g.cm.<sup>-3</sup>, in good agreement with the measured density of 6.87 g.cm.<sup>-3</sup>.

This preliminary survey established the existence of the intermediate phase Nb<sub>2</sub>Al. The structure is tetragonal and appears to be of the sigma type. If so, this niobium-aluminum phase should be of exceptional theoretical interest since all presently established binary sigma phases are composed of two transition elements from the Long Periods (Knapton, 1958).

#### References

- BERGMAN, G. & SHOEMAKER, D. P. (1955). *Acta Cryst.* **7**, 857.  
 BRAUER, G. (1939). *Z. anorg. Chem.* **242**, 1.  
 CORENZWIT, E. (1959). *J. Phys. Chem. Solids*, **9**, 93.  
 KNAPTON, A. G. (1958). *J. Inst. Metals*, **87**, 28.  
 WOOD, E. A., COMPTON, V. B., MATTHIAS, B. T. & CORENZWIT, E. (1958). *Acta Cryst.* **11**, 604.

#### Books Received

*The undermentioned works have been received by the Editors. Mention here does not preclude review at a later date.*

**Vector Space and Its Application in Crystal Structure Investigation.** By M. J. BUEGER. Pp. XIV+347. With many figs. and tables. New York: John Wiley & Sons. 1959. Price \$12, £4.16.0.

**Dendritic Crystallization.** By D. D. SARATOVKIN. Pp. 126 with many figs. and six tables. New York: Consultants Bureau Inc. 1959. \$6.00.

**Cristalofísica.** By JOSÉ LUIS AMOROS. Part 1: Propiedades continuas. Pp. XIII+233. Madrid: Aguilar. 1958.

**The Determination of Molecular Structure.** By P. J. WHEATLEY. Pp. VI+263 with many figs. and tables. Oxford: Clarendon Press, Oxford University Press. 1959. Price 35s.

**Materialprüfung mit Röntgenstrahlen.** By R. GLOCKER. Pp. VII+530. 4th ed. Berlin: Springer-Verlag. 1958. Price DM. 61.50.

**Applications of Finite Groups.** By J. S. LOMONT. Pp. XI+346. New York & London: Academic Press. 1959. Price \$11.00.