Table 1 (*cont.*)

Cubic	Hexagonal	F_c	F_o
963	113 (1)	79	92
	410 (1)		
	321 (1)		
	312 (1)		
12,3,3	303 (1)	42	35
	501 (1)		
	322 (2)		
444	002	100	85
554	301	−51	48
754	131	45	55
844	400	−13	13
774	103	39	35
10,4,4	203	35	29
884	402	−11	17*
11,5,4	322	− 9	17*
10,8,4	241	30	17
855	103	39	40
875	141	−32	32
10,5,5	500	− 9	10
10,7,5	412	46	46
666	003 (1)	81	99
	401 (3)		

* Indicates minimum observable amplitude for unobserved reflection.

In the calculation of the structure factors, account must be taken of the fact that a reflection whose cubic indices are all integral multiples of 3 is composed of four reflections, one from each of the hexagonal cells. These four reflections may or may not all be different. For the calculated structure factor of these degenerate reflections, the square-root of the sum of the structure factors squared of the four reflections is used. In Table 1 the number in parenthesis next to the hexagonal indices indicates the number of cells giving that reflection.

Both the structures proposed in this paper are quite unusual, and certainly further work is indicated. It would be desirable to obtain diffraction data from an untwinned crystal. Such a crystal might be grown by the diffusion of zirconium into uranium at some temperature below the γ region.

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Unit cell and space group of $Eu_2(SO_4)_3 . 8 H_2O$.

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This work was undertaken to provide crystal structure data for Bozorth & Walsh (1957), who have carried out magnetic susceptibility versus temperature measurements on a large single crystal of $Eu_2(SO_4)_3 . 8 H_2O$ (grown by A. N. Holden of these Laboratories). The crystal used for determination of the unit cell and space group was photographed with a Buerger precession camera. The photographs indicate that the crystal belongs to one of two space groups: C_{2h}^6–$A2/a$ or C_3^4–Aa; reflections (hkl) present are those only with $k+l = 2n$ and $(h0l)$ only with $h = 2n$ and $l = 2n$. The lattice constants are

$$a = 18{\cdot}25(\pm 0{\cdot}04),\ b = 6{\cdot}74(\pm 0{\cdot}02),\ c = 13{\cdot}49(\pm 0{\cdot}03)\ \text{Å},$$
$$\beta = 102°\ 15'(\pm 15')\ .$$

With the unit cell containing four formula units, the X-ray density is 3·02 g.cm.$^{-3}$.

It is very likely that $Eu_2(SO_4)_3 . 8 H_2O$ is isostructural with the crystals in which Pr^{3+}, Nd^{3+} or Sm^{3+} is substituted for Eu^{3+} (Ivernova, Tarasova & Umanskii, 1951). The structure of the Nd^{3+} compound is already partially worked out from three-dimensional data by R. E. Rundle and D. R. Fitzwater and therefore no further structure work on the Eu^{3+} compound is contemplated by us.

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