Table 1. *Crystallographic data*

Compound	a (Å)	b (Å)	c (Å)	β (°)	Density (g.cm.$^{-3}$) Obs.	Density (g.cm.$^{-3}$) Calc.	Z	Space group
Delpheline	12·32	13·40	14·13	—	1·29	1·28	4	$P2_12_12_1$
Delpheline hydriodide	9·20	16·40	9·82	115	1·45	1·43	2	$P2_1$
Dehydrodelpheline	8·38	14·52	9·95	105	1·29	1·27	2	$P2_1$
Oxodelpheline	13·05	13·70	13·85	—	1·30	1·29*	4	$P2_12_12_1$
Acetyldelpheline	11·62	14·00	15·40	—	—	1·30	4	$P2_12_12_1$

* $D_{\text{calc.}}$ for $\frac{1}{2}H_2O$ is 1·27 g.cm.$^{-3}$.

served density does not agree with the value calculated for a hemihydrate. The formula $C_{25}H_{37}O_7N.H_2O$ which has been used gives good agreement between observed and calculated densities.

Acetyldelpheline, $C_{27}H_{41}O_7N$

The Laue symmetry is *mmm* and the systematic absences determine the space group uniquely as $P2_12_12_1$. The crystals were of such poor quality that the density could not be measured accurately.

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Double reflexion in aluminium–copper alloys.

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Alloys aged to form the intermediate precipitate θ' were reported by Guinier (1942) to give an anomalous spot on the zero layer line when oscillating single crystals were examined by Mo $K\alpha$ radiation. The spacing was given as 10·1±0·5 Å and Guinier suggested that matching of the eighth $(001)_{\theta'}$ plane (spacing $7\times1{\cdot}45$ Å) with the sixth aluminium matrix {100} plane (spacing $5\times2{\cdot}02$ Å) occurred. The anomalous spot was thus explained as the first-order diffraction from this modulated θ' structure.

Using Guinier's technique, Silcock, Heal & Hardy (1953–4) obtained this spot irregularly and at a spacing of 10·4±0·3 Å. This did not fit in well with Guinier's hypothesis but no alternative explanation was offered.

A second spot of irregular occurrence has been detected on the first layer line of the aluminium matrix (Fig. 1).

The following characteristics of anomalous spots require explanation:

(1) There is no dependence of the occurrence of the spots on ageing treatment.

(2) The first-layer-line spot is never observed on both sides of the equator at once.

(3) The intensity varies and the spots are frequently shorter than other reflexions.

(4) The zero-layer-line spot was not obtained by Gerold (1954) when using Cu $K\alpha$ radiation.

It has now been shown that these spots are due to the 'Renninger effect' (Lipson & Cochran, 1953), i.e. the reflexion of X-rays from *two* sets of strongly reflecting planes. This explains the positions of the spots and the characteristics listed above. It is probably the first example reported in which the co-operating planes (Table 1) belong to different structures so that non-integral indices are obtained for the anomalous spots.

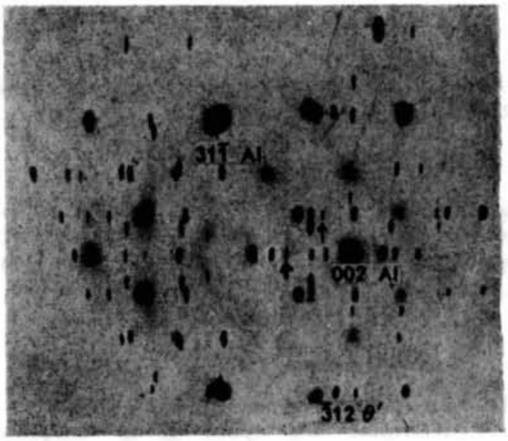

Fig. 1. Al 4% Cu aged 100 days at 190° C. $[100]_{\text{Al}}$ vertical; beam 0–15° from $[010]_{\text{Al}}$; Mo $K\alpha$. Positions of anomalous spots marked by arrows.

Table 1. *Positions of anomalous spots and co-operating planes*

Indices of anomalous spot (all lattice indices)	Co-operating planes: Al matrix reflexion	Co-operating planes: θ' reflexion, θ'_T lattice indices	Co-operating planes: θ' reflexion, Al lattice indices
Zero layer* 0,0,0·39	$31\bar{1}$ $\bar{3}1\bar{1}$	$\bar{3}\bar{1}2$ $3\bar{1}2$	$\bar{3},\bar{1},1{\cdot}39$ $3,\bar{1},1{\cdot}39$
First layer 1,0,1·3	002	$10\bar{1}$	$1,0,\bar{0}{\cdot}\bar{7}$

* Calculated d spacing 10·3 Å.

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