observed if the O–H distance found in KH_2PO_4 was maintained. It does appear that the difference is

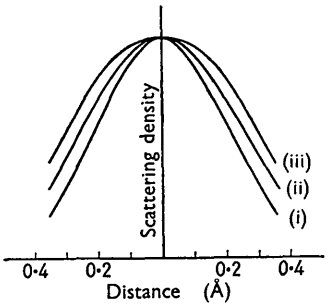

Fig. 3. Curves (i), (ii) show the variation of neutron-scattering density at right-angles to and along the O_2–O_2' bond, for the hydrogen atom at the centre of symmetry. Curve (iii), which is to be contrasted with (ii), shows what the distribution along the bond in projection would be if the O–H distances were the same as in KH_2PO_4.

significant when the possible experimental errors are considered. However, it is clear that data must be collected on a series of compounds before any general conclusions can be drawn about the existence, or otherwise, of a position of minimum energy on each side of a centre of symmetry. We are at present studying potassium hydrogen bis-phenylacetate by neutron diffraction as a further example: here the O–O bond is believed to be a little longer, 2·55 Å (Speakman, 1949).

We are grateful to Mr R. Brooks, of Imperial Chemical Industries Limited (Alkali Division), Winnington, who provided us with the crystals of sodium sesquicarbonate, and to Mr R. F. Dyer, of the Atomic Energy Research Establishment, who carried out much of the experimental work.

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Short Communications

Contributions intended for publication under this heading should be expressly so marked; they should not exceed about 500 words; they should be forwarded in the usual way to the appropriate Co-editor; they will be published as speedily as possible; and proofs will not generally be submitted to authors. Publication will be quicker if the contributions are without illustrations.

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Crystallographic data for certain alkaloids. V. Some *delphinium* alkaloids.

By F. M. Lovell, *Viriamu Jones Laboratory, University College, Cardiff, Wales*

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The cell dimensions and space groups of the *delphinium* alkaloids given in Table 1 were obtained from oscillation and Weissenberg photographs (Cu $K\alpha$ radiation). The densities were determined by flotation. The accuracy of the cell dimensions is of the order of 1% and β angles are accurate to within 1°.

Delpheline, $C_{25}H_{39}O_6N$

The Laue symmetry is *mmm* and the only systematic absences are those with odd indices along each axis. The space group is therefore uniquely determined as $P2_12_12_1$.

Delpheline hydriodide, $C_{25}H_{39}O_6N \cdot HI$

The Laue symmetry in $2/m$ and the systematic absences indicate that the space group is either $P2_1/m$ or $P2_1$. There are two molecules in the unit cell and the molecule is optically active (Henry, 1949). The space group is therefore $P2_1$.

Dehydrodelpheline, $C_{25}H_{37}O_6N$

The Laue symmetry is $2/m$ and the systematic absences indicate that the space group is either $P2_1$ or $P2_1/m$. The optical activity of the molecule requires that the space group be $P2_1$.

Oxodelpheline, $C_{25}H_{37}O_7N \cdot H_2O$

The Laue symmetry is *mmm* and the systematic absences determine the space group uniquely as $P2_12_12_1$. The empirical formula given for this material was $C_{25}H_{37}O_7N \cdot \frac{1}{2}H_2O$ (Cookson & Trevett, 1954). There are no twofold general positions in $P2_12_12_1$ and the ob-

Table 1. *Crystallographic data*

Compound	a (Å)	b (Å)	c (Å)	β (°)	Density (g.cm.$^{-3}$) Obs.	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	$P2_12_12_1$

* $D_{calc.}$ 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:

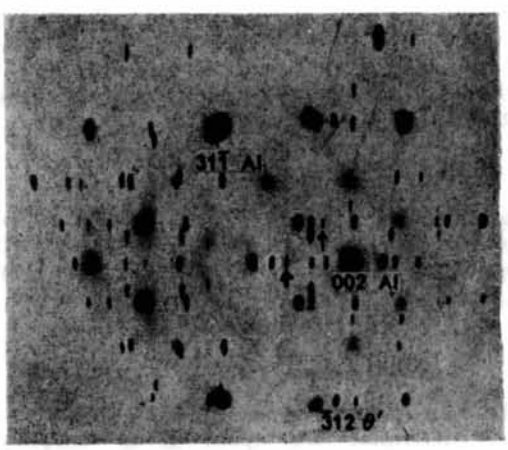

Fig. 1. Al 4% Cu aged 100 days at 190° C. $[100]_{Al}$ vertical; beam 0–15° from $[010]_{Al}$; Mo $K\alpha$. Positions of anomalous spots marked by arrows.

(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.

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

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