the rhenium dioxide structure ($a:b:c$ = 1·045:1·226:1) and that of the ideal model ($a:b:c$ = 0·944:1·155:1) is probably related to the short Re–Re distance within the strings (2·61 Å), which suggests the presence of Re–Re bonds. This is likely to force the oxygen atoms of shared edges apart; this will widen the structure in the a and b directions and more so in the former. Similar deformations due to metal–metal interaction in chains of metal–oxygen octahedra have previously been observed in molybdenum dioxide (Magnéli, 1946).

The investigation forms part of a research programme on metal oxides and related compounds financially supported by the Swedish Natural Science Research Council.

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Unit cell and space group of some amino acids.

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As part of the work in this laboratory on the structure of proteins, the structure analysis of some crystalline amino acid derivatives has been undertaken. Preliminary results are reported here for L-tyrosine HCl, L-tyrosine HBr, L-cystine HCl, L-cystine HBr and L-lysine monohydrochloride dihydrate. The first two compounds are isomorphous, and their structures have been worked out by the author using the difference-Patterson technique (Kartha & Ramachandran, 1955) and are now in the final stages of refinement. Detailed examination of the lysine derivative is in progress but the work on the cystine compounds has been discontinued as they are being investigated elsewhere (Steinrauf & Jensen, 1956).

The X-ray data were collected from rotation and Weissenberg photographs, using Cu $K\alpha$ radiation, and morphological investigations were carried out where possible. The densities of the crystals were determined by flotation in bromoform and benzene. The results are summarized in Table 1. The accuracy of the numerical data is of the order of 1%.

L-Tyrosine hydrochloride

Crystals were obtained by treating L-tyrosine with concentrated hydrochloric acid and leaving the solution to evaporate at room temperature. The needle-shaped crystals were unstable when exposed to air and had to be enclosed in a quartz tube during irradiation.

L-Tyrosine hydrobromide

The crystals were obtained in a manner similar to the hydrochloride. The two compounds were found to be isomorphous.

L-Cystine hydrochloride

Crystals were obtained from a slightly warmed solution of L-cystine in hydrochloric acid, and were found to be unstable. The systematic absences indicate a C-centred lattice, and the space group $C2$ is compatible with the morphological data of Becke (1891), which indicate that the point-group symmetry of the crystal is C_2–2. The space group has fourfold general positions but the observed number is two. This suggests the presence of diad-axis symmetry in the molecule and indicates that the –S–S– bridges lie across diad axes in the crystal.

The choice of the axes by Becke (1891) is different from ours, but his data agree closely with those reported here. The angle β was determined from goniometric studies.

The cell dimensions for both the cystine compounds agree well with those reported by Steinrauf & Jensen (1956).

Table 1

						Density (g.cm.$^{-3}$)			
Compound	Space group	a (Å)	b (Å)	c (Å)	β (°)	Obs.	Calc.	Z	Morphology
L-Tyrosine hydrochloride	$P2_1$	11·03	9·10	5·00	90·7	1·42	1·44	2	Needles along [001] bounded by the form {011}
L-Tyrosine hydrobromide	$P2_1$	11·41	9·11	5·17	91·0	1·64	1·62	2	Needles along [001] bounded by the form {011}
L-Cystine hydrochloride	$C2$	18·63	5·26	7·28	103·7	1·52	1·50	2	Needles along [010] bounded by the form {101}
L-Cystine hydrobromide	$P2_122_1$	17·91	5·35	7·48	—	1·87	1·86	2	Needles along [010] bounded by the form {101}
L-Lysine monohydrochloride dihydrate	$P2_1$	7·48	13·31	5·85	97·8	1·25	1·26	2	Slightly elongated along [001] showing faces (010), (110), ($\bar{1}10$)

L-Cystine hydrobromide

The crystals were prepared by the same process as described for the hydrochloride and were found to be slightly deliquescent. They are not isomorphous with the hydrochloride. Here again the X-ray data suggests that the –S–S– bridges of the molecules lie across diad axes in the crystal.

L-Lysine monohydrochloride dihydrate

On account of the high solubility of the compound in water, crystals were obtained with some difficulty, and seeding was necessary to initiate the process. The crystals were quite stable and a good goniometric study was possible which provided an accurate value of the monoclinic angle β.

In conclusion the author wishes to express his thanks to Prof. G. N. Ramachandran for his helpful guidance during the investigation. He is also grateful to the University of Madras for providing a studentship during the tenure of which this work was carried out.

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Notes and News

Announcements and other items of crystallographic interest will be published under this heading at the discretion of the Editorial Board. Copy should be sent direct to the British Co-editor (R. C. Evans, Crystallographic Laboratory, Cavendish Laboratory, Cambridge, England).

International Union of Crystallography

The Commission on Crystallographic Apparatus has published an *Index of Manufacturers of Apparatus and Materials used in Crystallography.* The *Index* is in two parts: Part I, an alphabetical list of apparatus and materials, giving the names of manufacturers throughout the world; Part II, a list of addresses of the manufacturers quoted in Part I.

Copies of the *Index* have been sent to the Secretaries of National Committees (see *Acta Cryst.* (1956), **9**, 692), to whom all enquiries should be addressed.

Acta Crystallographica

Readers are reminded that current subscriptions expire with the appearance of the present issue. Subsequent issues will be sent only to those whose subscriptions have been renewed. To ensure continuity of supply, orders for Volume 10, with remittance, should be placed through the usual channels as soon as possible, and in any case in time to reach the publishers in Copenhagen not later than 31 December 1956.

Book Reviews

Works intended for notice in this column should be sent direct to the Editor (P. P. Ewald, Polytechnic Institute of Brooklyn, 99 Livingston Street, Brooklyn 2, N.Y., U.S.A.). As far as practicable books will be reviewed in a country different from that of publication.

Tables for the Evaluation of X-ray Powder Diagrams (Debye–Scherrer Diagrams). By H. K. Dettman and H. Kircher. Pp. viii+94. (Title and text in German and English.) Weinheim: Verlag Chemie. 1956. Price DM. 50 (about £4.6.0.)

The table gives $\sin\theta$, $\sin^2\theta$ and d values for Cu, Co, Fe and Cr $K\alpha_1$ radiations as functions of 4θ. This argument is chosen as it is equivalent to the distance in millimetres between corresponding lines on a photograph taken with the Bradley–Jay arrangement in a camera having the fairly common circumference of 360 mm. A blank column is provided so that another argument, suited to the user's own camera, can be written in. 'It was calculated in Farbenfabriken Bayer by means of the IBM 604 electronic calculating punch and written with the IBM 420 tabulator', and is reproduced photographically from the tabulator output.

The book is an excellent example of the misuse of computing facilities. The wavelengths are inserted to four significant figures, and the d values are tabulated to three decimal places throughout, i.e. five significant figures for low values of θ, where the accuracy is inherently low, reducing to four and then three significant figures as the value of θ increases and greater accuracy of d measurement is possible. A check of the first line, the last line, and three lines in the body of the table (20 spacings in all) showed nine errors of one unit and two errors of two units in the last digit tabulated. Why α_1 is used instead of the weighted mean of α_1 and α_2 is not apparent.

German publications are notoriously expensive (see, for example, *Nature*, (1952), **170**, 446), but the price of this slim book is high even by German standards, thus destroying what value it might have as rapid means of determining rough spacings. The *Charts* of Parrish & Irwin (*Acta Cryst.* (1953), **6**, 877), give greater accuracy for \$2·00 (about 14*s.* 6*d.*)!

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