the three directions used as axes of rotation are about 5·1 Å; 13·6 Å; 9·6 Å; respectively.

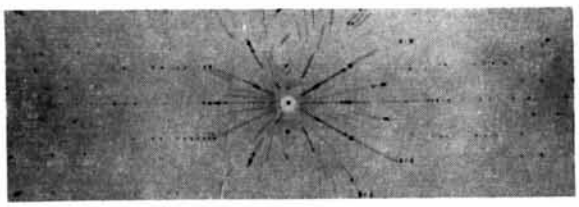

Fig. 4. Oscillation photograph after setting according to case 3; oscillation angle 10°.

Relatively large oscillation angles of 10° (Figs. 1, 2 and 4) or 90° (Fig. 3) were used in order to make it easier to recognize the layer lines. In actual practice smaller oscillation angles suffice.

Experience with the crystal setter shows that in most cases the setting is satisfactory after the first step of adjustment even for relatively large angles of mis-setting. The limit of accuracy in setting a crystal with this instrument lies within the accuracy obtainable in adjusting the goniometer arcs. In a new design of the instrument the measuring range of the arcs has been increased to ±24°.

No sign conventions are required.

Note added in proof.– Laue photographs taken with a film cylinder corresponding to the transparent cylinder of the crystal setter may equally well be used for setting crystals with the help of the setter.

We should like to thank Mr. G. Schulz for his help in the experimental work.

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X-ray absorption coefficients for certain metals.

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The currently available experimental and theoretical values of X-ray mass absorption coefficients have been discussed in some detail in *International Tables for X-ray Crystallography* (1962). It may be concluded that the reliability of experimental values is somewhat doubtful, even in the limited number of cases when a small experimental error is claimed. Empirical methods of calculating absorption coefficients based on the quantized structure of the atoms have been given by several workers (*e.g.* Victoreen, 1949), but the accuracy of these is not better than a few per cent. In particular the parameters involved are chosen to obtain the best overall fit to certain experimental data and so the reliability of the calculated coefficients will depend on any systematic errors in the experimental data.

The determination of accurate X-ray structure factors on an absolute scale is in many cases dependent on the knowledge of reliable values of the absorption coefficients concerned (see *e.g.* Cooper, 1962). For this reason a programme has been carried out by the author to determine accurate values of the mass absorption coefficients (μ_m) for aluminum, copper and certain first order transition metals, for several commonly used characteristic radiations.

Attenuation constants were determined for uniform foils of the metals with monochromatized X-ray beams, and the mass per unit area of each foil was determined by weighing a disc punched from it. The values of μ_m obtained are given in Table 1 together with their experimental accuracy. The value given for chromium and Ag $K\alpha$ radiation is that determined previously (Copper, 1962).

It is to be expected that log μ_a† is a linear function of log Z with a slope of value close to 4. Plots of log μ_a against log Z for the metals from vanadium to copper showed that such straight lines could be chosen to fit almost all the experimental points within the experimental accuracy given. These lines were therefore used to determine certain values of μ_m not determined experimentally. These values are shown in Table 1 in brackets and it is to be expected that the reliability of these will not be much different from that of the associated experimental values, and that they may therefore prove to be useful.

Table 1. *X-ray mass absorption coefficients for certain metals* (cm^2g^{-1})

	Ag $K\alpha$	Mo $K\alpha$	Cu $K\alpha$
Al	2·65 ± 0·01	5·10 ± 0·02	50·40 ± 0·57
Ti	(11·53)	(22·23)	(187·5)
V	13·71 ± 0·08	25·18 ± 0·14	213·9 ± 3·8
Cr	15·18 ± 0·15	(28·84)	(246·6)
Mn	(16·67)	(32·14)	(274·2)
Fe	19·38 ± 0·10	37·61 ± 0·33	314·3 ± 6·9
Co	21·14 ± 0·11	40·40 ± 0·32	(350·0)
Ni	24·45 ± 0·13	46·41 ± 0·36	48·96 ± 0·41
Cu	25·64 ± 0·14	48·88 ± 0·78	51·84 ± 0·43
	Co $K\alpha$	**Fe $K\alpha$**	**Cr $K\alpha$**
Al	76·19 ± 0·85	96·8 ± 1·2	156·0 ± 3·7
Ti			
V	315·6 ± 5·7	387·7 ± 7·0	82·7 ± 2·8
Cr			(88·7)
Mn		(61·1)	(99·1)
Fe	56·45 ± 0·49	69·7 ± 1·1	112·2 ± 1·8
Co	61·56 ± 0·50	78·0 ± 0·6	(126·0)
Ni	72·8 ± 1·2	91·5 ± 1·5	146·5 ± 2·3
Cu	77·2 ± 1·2	96·0 ± 1·5	154·5 ± 2·5

Whilst great care was taken in the present study to avoid systematic errors it is well known that accurate absorption coefficients measured by different workers may vary quite appreciably. It is to be hoped therefore that further determinations may be made by other workers in order to provide a more realistic indication of the reliability of such measurements.

I should like to thank Professor Sir Nevill Mott, F.R.S. and Dr W. H. Taylor for provision of facilities and for their interest and encouragement. I am also indebted to Mr Roger Morley for carrying out many of the weighings.

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† The notation is that used in *International Tables* (1962).