

Charts for Obtaining Geometrical Corrections Directly from Anti-Equi-Inclination Photographs

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IT has been found that the anti-equi-inclination method is superior to the normal beam method for recording certain zones of reflections when the crystal used is in the form of needles or plates and a chart for applying the Lorentz and polarization corrections to the diffraction spots thus recorded has also been given.¹ In that chart curves of constant corrections were given for use with a reciprocal lattice net drawn to a suitable scale. However, a separate reciprocal lattice net will have to be drawn for each crystal used. In many cases it may be advantageous to present the corrections in a form suitable for direct application to the x-ray diffraction photographs. Such a chart would contain curves of constant corrections in (γ, μ) space where γ is the film coordinate of the spot giving its distance from the direct beam trace and μ is the anti-equi-inclination angle used in recording the photograph. Using such a chart the corrections could be directly obtained from the position of the diffraction spots on the film without having to draw the reciprocal lattice net for every photograph.

In the anti-equi-inclination case if L and P are the Lorentz and polarization factors, then the correction factor $D = (LP)^{-1}$ can be shown to be given by the expression

$$D = \cos^2 \mu \sin \gamma / 1 - 2 \cos^2 \mu \sin \gamma \{1 - \cos^2 \mu \sin(\gamma/2)\}.$$

From this equation the variation of the correction D with γ and μ could be calculated and the result of the calculations are represented in the chart in Fig. 1.

The chart can be used directly on the photograph taken in a Weissenberg camera of standard diameter 57.3 mm (i.e., $\frac{1}{2}$ mm for 1° in γ) and having inclination angles up to 50° . It consists of curves of constant corrections, the values of which are indicated at the bottom. The ordinate gives the value of the anti-equi-inclination angle μ in degrees. The abscissa is the value of the film coordinate γ , i.e., the distance of the diffraction spot from the

central line where the direct beam strikes the film. The steps in applying the correction using this chart are as follows:

1. If the camera used to obtain the photograph is of a diameter different from 57.3 mm, then an enlargement of the chart is made so that the length of the γ axis is half the circumference of the camera.

2. A straight line ruled on a sheet of transparent paper is laid over the chart so as to coincide with the corresponding values of μ on either side of the chart and the points at which this line meets the various D values are marked. Parallel lines of constant correction D are drawn through the marked points, at right angles to the line mentioned above.

3. The transparent sheet with the ruled lines of constant D is then placed over the Weissenberg photograph so that the central-line corresponding to $\gamma=0$ coincides with the trace of the direct beam on the photograph. The correction D_{hkl} for each spot (hkl) is read off directly from its position relative to the lines of constant D by simple interpolation.

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¹ G. Kartha, Acta Cryst. 5, 549 (1952).

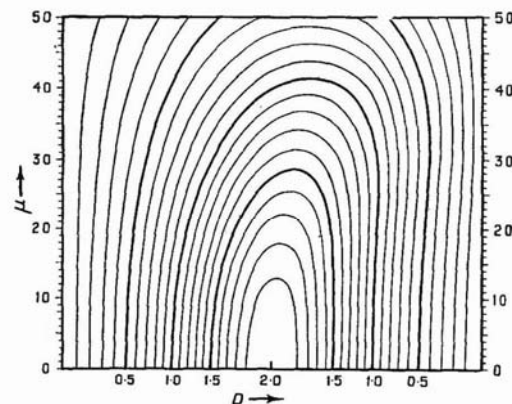


FIG. 1.