a lattice spacing of about 7·07 Å. However, close examination always showed the presence of two weak layer lines positioned in such a way between each pair of strong lines that the pattern could only be indexed by designating the strong layers $k=7n$ and the weak layers $k=7n\pm2$. Thus the observed layer lines follow the numerical sequence $k=0$, 2, 5, 7, 9, 12, 14, ..., and the true repeat distance along the b axis is seven times 7·07 Å, *i.e.* $\sim$49·5 Å. This same effect was seen in Weissenberg photographs obtained from crystals rotated about the a axis, and was especially noticeable at high angles on upper level photographs. However, only two reflections from the weak $k=7n\pm2$ layers appeared in powder patterns, these being the 052 and 223 reflections.

The significance of these unusual diffraction effects is not yet completely understood. Similar effects have been reported for various plagioclase felspars by Chao & Taylor (1940) and Cole, Sörum & Taylor (1951), and have been attributed to layering in the crystal structure. Thus it is believed that the structure of Eu_2SiO_4 may be layered along the b axis, with the layering, and hence the true b parameter, repeating every seven layers. Such a structure would contain 4 formula units of Eu_2SiO_4 in each pseudo-cell layer, and 28 units in the complete unit cell. This leads to a theoretical density of 6·77 g.cm^{-3}, in very good agreement with the value of 6·74 g.cm^{-3} measured from single crystals.

Petrographic analyses of the orange-yellow crystals showed Eu_2SiO_4 to be biaxial positive, having an optic angle $2V=25°$ and refractive indices $N_x=1·89$ and $N_z=1·92$. N_y is approximately 1·90.

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X-ray absorption corrections for single crystals.

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Evans (1952) determined the corrections for absorption for prismatic crystals dividing the cross section into triangular and parallelogram-shaped areas within which can be integrated the original equation:

$$T=\frac{\int^{v}\exp\left(-\mu t\right)dV}{V}\,.$$

Nothing has been said for the special case when the angle between the X-ray beam and a crystal face is equal to θ (Bragg angle).

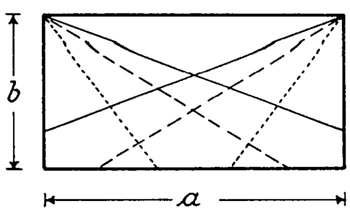

Fig. 1. Case (1) full line; case (2) dashed line; case (3) dotted line.

When such a relation is established between the X-ray beam and the crystal face, and the cross section of the crystal is rectangular (Fig. 1), then there are three possible solutions for the original integral according to: (1) $\cot\theta>a/b$; (2) $\cot\theta>a/2b$; (3) $\cot\theta<a/2b$.

(1) When $\cot\theta>a/b$,

$$T=\frac{1+\mu A+[-1-2\mu A+(2AB-\frac{3}{2}A^2)\mu^2]\exp\left(-\mu A\right)}{2\mu^2AB}\,.$$

(2) When $\cot\theta>a/2b$,

$$T=\frac{1+\mu A+[3+2\mu A-4\mu B+\frac{1}{2}\mu^2(2B-A)^2]\times\exp\left(-\mu A\right)-4\exp\left(-\mu B\right)}{2\mu^2AB}\,.$$

(3) When $\cot\theta<a/2b$,

$$T=\frac{(3-\mu A+2\mu B)\exp\left(-2\mu B\right)+1-4\exp\left(-\mu B\right)+\mu A}{2\mu^2AB}\,,$$

where $A=a/\cos\theta$ and $B=b/\sin\theta$.

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