date generally assigned to it, and the St. Frideswyde carving appears to be the earliest known illustration of the sycamore maple in Great Britain.

I am indebted to the Very Rev. the Dean of Christ Church for courteous permission to take the photograph here reproduced (Fig. 1).

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Effect of Temperature on Diffraction of Slow Electrons and its Application

WE have investigated the influence of temperature on the intensity (I_T) maxima due to the diffraction of slow electrons from a cleavage plane of Ceylon graphite, using the method of constant Bragg angle ($\theta = 65°$). The apparatus used in these experiments is described in detail elsewhere[1].

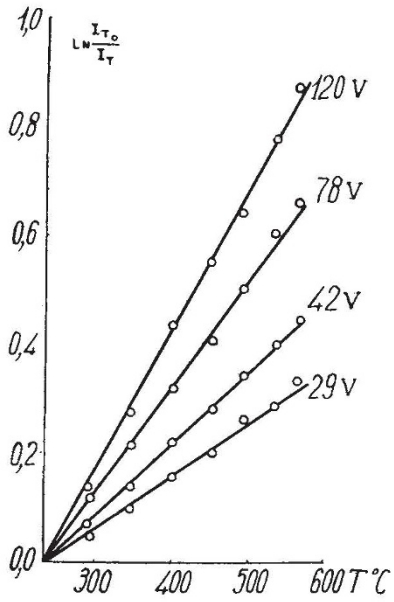

FIG. 1.

Fig. 1 gives graphs of $\ln I_{T_0}/I_T$ against T, the temperature of the experiment. Every straight line corresponds to a definite maximum the value of which in volts is indicated. In Fig. 2 voltages of the maxima are plotted against the values of $1/(T-T_0)$ $\ln I_{T_0}/I_T$. The empirical relation between the intensity of the maxima and temperature is then:

$$I_T = I_{T_0} e^{-q(V+\psi)(T-T_0)} \qquad (1)$$

where the constants have respectively the values

$$q = 2{\cdot}0 \times 10^{-5} \text{ grad}^{-1} \text{ volt}^{-1}, \ \psi = 22 \text{ volts}.$$

It is known that the Debye thermal factor for X-rays has the following form

$$I_T = I_{T_0} e^{-a \frac{\sin^2\theta}{\lambda^2}(T-T_0)} \qquad (2)$$

Moreover, if the refraction of electronic waves is taken into account, the introduction of the value φ of inner potential permits the following transcription of equation (2):

$$I_T = I_{T_0} e^{-a \frac{\sin^2\theta}{150}\left(V+\frac{\varphi}{\sin^2\theta}\right)(T-T_0)} \qquad (3)$$

where V is measured in volts.

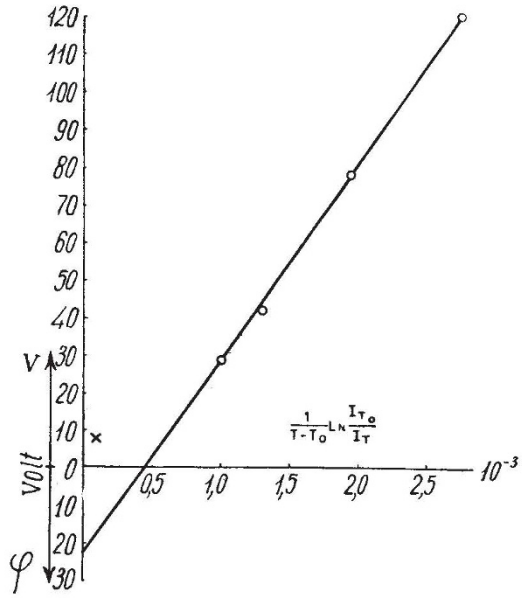

FIG. 2.

The constant a (for X-rays) may be computed for graphite from Bakhurst's data[2], which give the value $a = 0{\cdot}0038$ A.^{2} grad.$^{-1}$. The use of our value for q, obtained from experiments on electronic diffraction, leads to very nearly the same result: $a = 0{\cdot}0036$ A.^{2} grad.$^{-1}$. The constant ψ, multiplied by $\sin^2\theta$, may be easily identified with inner potential, a result which follows from the comparison of formulæ (1) and (3); thus we obtain $\varphi = 18$ volts in good agreement with the value (20 volts) found earlier[2].

We wish to point out that in order to obtain the value of φ by this procedure, a knowledge of the Millerian indices of the maxima is no longer necessary. We may thus propose a method of controlling the correctness of determination of plane indices. The maximum observed at 8 volts (marked by the cross in Fig. 2) has shown an almost negligible temperature effect, in striking contrast with the general results. This fact forced upon us the conviction that this maximum does not arise from the space lattice. In fact, special investigation has shown that this maximum is due to a selective change of the coefficient of reflection on the surface layer of graphite and does not belong to the diffraction maxima.

The detailed account of our research will be published in *Phys. Z.S.U.*

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