

per cent and $+ (9.6 \pm 1.1)$ per cent respectively. The scatter of the separate observations for a particular dose was, in all cases, consistent with the estimate of the probable error of a single observation given by Lane and White.

The demonstration of a significant physical effect in a stable colloid by X-radiation amounting to no more than 25 röntgens is, so far as we can ascertain, novel: as is also the peculiar relation between effect and dosage. The experiments, in which we have been aided by a grant from the British Empire Cancer Campaign, are being continued.

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¹ *Phil. Mag.*, 23, 824 (1937).

Determination of Electronic Charge by the Oil Drop Method

WE have eliminated the convection current and the effect of the arc and minimized the variation of time of descent of the drops and the greatest common divisor, by using our new oil.

The battery used was two ampere-hour lead cells, highly insulated, giving constant potential with drop of less than two volts per 10,000 volts per five hours. This high potential enabled us to reduce the number of charges on the drop considerably. The water of the bath was constantly circulated and its temperature controlled to within a few thousandths of a degree centigrade for a period of weeks. The condenser plates, having a diameter of 22 cm. and thickness of 2.5 cm., were of stainless steel, optically polished and separated by the quartz prisms. The air used in the tank was dry and free from foreign matters. The timings were recorded on the Société Genevoise printing chronograph, which was controlled every second by the Riefler master clock of the Institute, the variation of which is less than one hundredth of a second per day.

With these precautions and improvements, and further, eliminating the non-spherical drops, we have determined the electronic charge, using Harrington's value for viscosity, and obtained

$$e = (4.806 \pm 3) \times 10^{-10} \text{ E.S.U.}$$

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Temperature Variation of Magnetic Anisotropy of Organic Crystals

As has been shown by Krishnan¹ and his collaborators, the study of the magnetic anisotropy of organic crystals enables us in many cases to determine the orientation of the molecules in the crystal lattice. A natural extension of this important line of work, suggested to me by Sir C. V. Raman, is the investigation of the effect of temperature on magnetic anisotropy, which may be expected to yield valuable information regarding the character of the thermal

motions (for example, oscillations and hindered or free rotations) of the molecules in the crystal lattice and to elucidate the mechanism of fusion.

I have carried out measurements in the case of resorcinol over a range of temperature from 26° C. up to the melting point (110° C.) of the substance. Resorcinol was chosen because the crystal is stable and does not volatilize easily. The structure of the crystal has been studied by Robertson² by X-ray analysis, and the magnetic anisotropy at room temperature has also been determined by K. Lonsdale³. The method described by Krishnan⁴ was adopted for the measurement of anisotropy, a modified technique being employed for fixing the crystal at the end of the quartz fibre and for making the measurements at the higher temperatures.

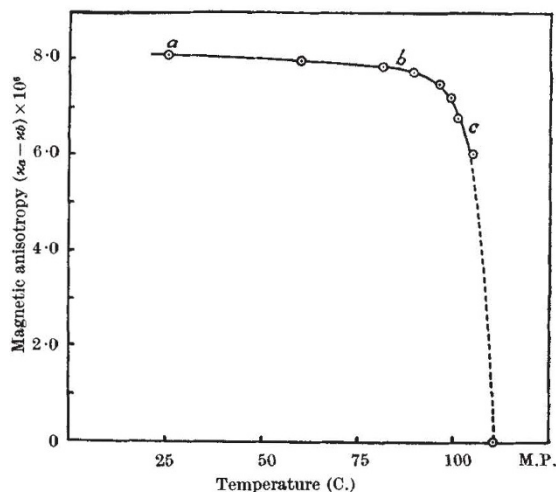


Fig. 1.

The following experimental procedure was adopted. For any setting of the crystal, the magnetic anisotropy in the plane concerned was first of all determined at room temperature. The crystal was then raised to the desired temperature by electrically heating the surrounding tube, the temperature at the region near the crystal being measured by means of a calibrated thermo-element. The magnetic anisotropy at the high temperature was then measured. The crystal was finally allowed to cool down to room temperature and the anisotropy again measured. It was found that when the high temperature did not exceed 105° C., the initial value of the anisotropy was almost fully restored. In all cases the mean of the initial and the final values of the magnetic anisotropy at room temperature was used in the calculations.

The variation of the magnetic anisotropy with temperature when the crystal is suspended with the *c* axis vertical is shown in Fig. 1. Up to about 15° C. below the melting point, the change of anisotropy is comparatively small. From *b* to *c* on the curve the variation is pronounced. From *c* onwards the transition is very rapid, indicating a state of instability. When the crystal was heated until it began to melt, the anisotropy practically disappeared. It is significant that the effect of temperature becomes prominent only in the vicinity of the melting point.

A determination of the magnetic anisotropy of resorcinol at room temperature gave the values: $\chi_a - \chi_b = 8.13 \times 10^{-6}$, $\chi_c - \chi_b = 13.30 \times 10^{-6}$, $\chi_c - \chi_a = 5.22 \times 10^{-6}$, whence assuming Pascal's value