is then found that the change in optical transmission for light parallel or normal to the magnetic field is a function of $H^2/T$, $H$ being the magnetic field strength and $T$ the absolute temperature.

Stuart[1] tried to find a suitable method of detecting and measuring small quantities of graphite in oil. He observed that a solution of colloidal graphite shows a change in transmission of visible light when a magnetic field is applied, and that this change varies with the concentration.

Experiments have now been carried out to determine quantitatively the dependence of this effect on field strength ($H \leqslant 4{,}000$ oersteds) and concentration, and the results have been compared with those derived from the theory outlined above; they agree well when the particle size is assumed to be approximately 1 μ. This is nearly the same as the known value of the mean size of the particles in 'Aquadag S' which was used here (information kindly supplied by Acheson Colloids, Ltd.).

The mean particle size has since been found by another method: from Einstein's theory[2] of the Brownian movement, an expression can be derived for the relaxation time, that is, the time required to re-establish random orientation when the field is removed. The relaxation time has been measured with a cathode ray oscillograph and is of order 1 sec., from which again an average particle size of 1 μ follows.

It has already been observed by Stuart[1] that the increase in transmission with a magnetic field parallel to the beam also occurs when an alternating field is applied; this is because the change in transmission is a function of $H^2$. It seems as if this may have some application in the measurement of rapidly alternating fields.

A full account of this investigation will be published by one of us (F. D. S.) in the near future.

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## Dielectric Constant of Diamond

The dielectric constant of diamond has been the subject of investigation by a number of workers, among whom particular mention may be made of Robertson, Fox and Martin[1], Whitehead and Hackett[2] and Groves and Martin[3]. The exact value of this constant and whether there is any difference between the values exhibited by the two types, namely, ultra-violet opaque and ultra-violet transparent, appear to be the two main issues involved. The most accurate determination of Whitehead and Hackett gave 5·66 at 800 c./sec. and 27·8° C., whereas Martin and Groves obtained 5·26 by one method and 5·35 by another. Probable reasons for the lower values obtained by Martin and Groves were suggested by them. A significant statement of Robertson and co-workers is that they found no measurable differences for the two types of diamonds.

A special liquid-mixture method useful for the determination of dielectric constants of crystal plates has been developed in this laboratory[4]. In view of the importance of this subject, a determination of the dielectric constant of both types of diamond was undertaken. A type I diamond of oval shape, about 2 sq. cm. in area and 1·42 mm. thick, and a type II diamond of rectangular shape, about 1 sq. cm. in area and 1·27 mm. thick, both kindly lent to us by Sir C. V. Raman, were employed in the investigation. The dielectric constants found were 5·70 and 5·65 respectively for these two plates at a frequency of 1·6 mc./sec. and 26° C. In agreement with Robertson and co-workers, we conclude that there is no measurable difference between the dielectric constants of the two types of diamonds, but the exact value obtained by us is definitely higher than that reported by these authors. The mean of our results, namely, 5·68, is quite close to that obtained by Whitehead and Hackett, and is nearly identical with the extrapolated value of the square of the refractive index, which is found to be 5·67.

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## Delayed Fracture of Glass under Tension, Torsion and Radial Pressure

A plausible explanation[1] of delayed fracture of glass is that cracks initially present in the unstressed material gradually extend when glass is loaded. As the cracks extend, the stress at the ends of the cracks increases, until it becomes equal to the maximum stress which the glass can even momentarily withstand; catastrophic fracture then occurs. Other factors being constant, the rate of crack spreading would be expected to depend on the stress at the end of the largest and most unfavourably orientated crack. Delayed fracture in tension and torsion would therefore be expected to occur in equal times, when the glass is subjected to equal principal tensile stresses.

A simple deduction from the crack hypothesis leads to the conclusion that tensile stresses occur at the ends of cracks in rods subjected to radial fluid pressure (no axial force). The magnitude of these