Table 2

Solvents		η_{sp}/c	
First	Second	Immediate	After 4 weeks
Cyclohexanone	Methyl ethyl ketone	7·8	8·0
Methyl ethyl ketone	Cyclohexanone	10·7	7·9
Mixed solvents		7·5	7·8

These results suggest that: (1) Different solvents solvate the polymer to different extents, thus affecting the viscosity of the solution. (2) Cyclohexanone is bound to the polymer in preference to methyl ethyl ketone. (3) When the polymer, solvated with methyl ethyl ketone, is brought into contact with cyclohexanone, the preference for cyclohexanone is not shown immediately, but the solvent exchange takes place slowly. Hence solvent molecules are firmly bound, and not entrapped in the coils of the chain.

We express our thanks for the practical assistance of Miss C. Mayson, and to the "Shell" Refining and Marketing Co., Ltd., for permission to publish this communication.

J. W. Clarke
P. G. Croft-White
P. J. Garner
"Shell" Refining and Marketing Co., Ltd.,
Thornton Research Centre,
P.O. Box 1, Chester.
Feb. 28.

[1] Frith, E. M. *Trans. Farad. Soc.*, **41**, 19 and 92 (1945).

Electrophotography of Internal Discharges in Dielectrics

Electrophotographs of discharges in air inclusions in dielectrics have been used for demonstrating the location and sequence of discharges during the short-time application of alternating and direct voltages[1]. A photographic film was enclosed between two disks of dielectric carrying silver film electrodes, one disk having a small cylindrical cavity adjacent to the photosensitive surface (Fig. 1). The sample was tested in conjunction with a discharge recorder[2]. Alternating voltage was applied for 1/25–1/10 sec.

The enlarged photographs in Fig. 2 show discharges in a cavity 0·5 cm. in diameter, and 0·03 cm. in thickness between polythene disks, for different conditions of applied voltage. The superimposed white circles define the circumference of the cavity.

The discharge sites recorded in the electrophotographs are fewer than the discharges in the corresponding oscillograph records, so that at some sites discharges must have recurred in successive voltage cycles. In the original, about twelve large diameter discharge sites and a similar number of smaller sites are visible in Fig. 2*a*. It is probable that the small areas represent single discharges, whereas the larger areas represent several successive discharges.

The sites occur in clusters, and the formations shown in Figs. 2*a* and *b* support a modified hypothesis of the discharge sequence in dielectrics, in which account is taken of the annular distribution of charge on the surface caused by two successive discharges of opposite polarity.

When an impulse voltage is applied, discharges recorded when the film forms the negative surface of the cavity differ in shape and intensity from

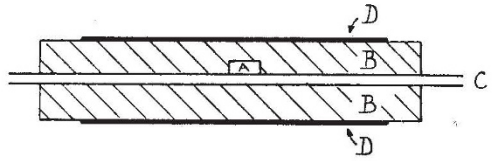

Fig. 1. Section of circular dielectric sample with inserted film. *A*, air-filled cavity; *B*, dielectric disks; *C*, film with sensitive surface adjacent to *A*; *D*, silver electrodes

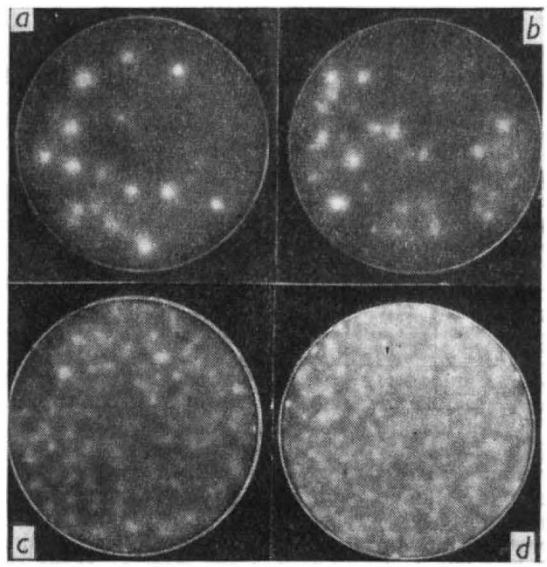

Fig. 2. Records of discharges in a cavity 0·5 cm. diameter and 0·03 cm. depth in polythene. (×7)
(*a*) 3 kV., 4 cycles. (*b*) 3 kV., 5 cycles. (*c*) 4·25 kV., 5 cycles. (*d*) 5 kV., 5 cycles

those recorded when the film is the positive surface. When the specimen forms the cathode, the initial discharge is recorded as a low-intensity glow, occurring over the whole surface of the cavity, and only just visible on the film; in subsequent tests with a new film, the discharge concentrates at one or two sites, indicating a permanent change of the cathode surface. When the films form the cathode, the discharge differs little in successive tests.

Previous authors believe that electrophotographs are caused by (possibly ultra-violet) light from the discharge[3, 4, 5]. The present results are consistent with this since, if the film is inserted with the sensitive surface distant from the cavity, only general exposure with no detail is always recorded. This suggests scattering of the emitted light in the cellulose acetate base.

Under other conditions a photographic effect has been attributed to ionic impacts[6].

J. H. Mason

British Electrical and Allied Industries
Research Association,
5 Wadsworth Road,
Greenford, Middlesex.
March 21.

[1] Mason, J. H., E.R.A. Report Ref. *L/T* 192.
[2] Austen and Hackett, *J. Inst. Elect. Eng.*, **91** (1), 298 (1944).
[3] Gemant, *World Power*, **24**, 8 (1935).
[4] Tsikin, A., *Tech. Phys. U.S.S.R.*, **3**, 947 (1936).
[5] Merril and von Hippel, *J. App. Phys.*, **10**, 873 (1939).
[6] Thomas, A. M., E.R.A. Report *L/T* 74; *World Power*, **24**, 87 (1935).