plot obtained in each case indicates that a single activation energy is involved, and hence that the decay of charge may be described by diffusion of electrons through the volume of the material via the defect traps. An electron trapping and diffusion process has been shown to be operative in the alkali halides[4], the traps being vacant cation sites (Schottky defects) which capture electrons, forming $F$-centres. The electron traps in the plastic materials remain to be identified.

A surface charge is effectively a space-charge (in the absence of conducting films on the surface) and so the procedure described above affords a direct method of determining the thermal energy of the traps active in space-charge-limited solid state devices[5].

It is noted that for a positive frictional charge obtained in an experiment with polythene, by pressing a brush on to the surface while the plate was rotating, the decay parameters were the same as those obtained for the negative, electrically produced charge.

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## Propagation of Stress Pulses across a Liquid – Steel Boundary

Experiments have been carried out in which pressure pulses, of about 40-μsec duration, are propagated across a plane liquid–steel interface. For this purpose a slightly modified form of the apparatus described by Bull[1] was used.

The liquid was contained in a vertical steel cylindrical tube fitted with a steel piston at its lower end and the upper end open. The tube was of length 3 ft., internal diameter $\frac{7}{8}$ in. and external diameter $1\frac{1}{4}$ in.

A pressure pulse was generated in the piston by firing a lead bullet of 0·22-in. calibre so as to strike the lower end of the piston normally at its centre. As a first approximation it was assumed that the (pressure, time) curve of this pulse was rectangular in shape, of amplitude $P$, and of duration $T$ (the time of impact of the bullet); in these experiments $P$ was about 600 atm. and $T$ about 40 μsec. When the front of this rectangular compression pulse reached the upper surface of the piston a fraction $\alpha$ was reflected and a fraction $(1 - \alpha) = \beta$ transmitted into the liquid. Since the incident pulse was in the steel, this was a case of reflexion at a rarer medium because the acoustic impedance of the liquid was less than that of the steel. Thus the pulse, of amplitude $\beta P$, transmitted into the liquid was of the same sign as the incident pulse while the reflected pulse, of amplitude $-\alpha P$, in the steel was a pulse of tension. When this reflected pulse, of tension reached the lower surface of the piston it was reflected as a compression pulse of the same amplitude, and on its arrival at the liquid–steel interface a fraction $\alpha$ of it was reflected as a wave of tension and a fraction $\beta$ transmitted into the liquid. The cycle was then repeated and so on. In this way a number of successive pulses of compression of amplitudes $\beta P$, $\alpha\beta P$, $\alpha^2\beta P$, etc., was propagated upwards through the liquid column. Each was of duration $T$ in time and the fronts of the pulses followed one another at time intervals of $\tau = 2L/c$, where $L$ is the length of the piston and $c$ the velocity of the pulses in the steel. If $L < c\tau/2$ the individual pulses in the liquid would overlap in time. If, however, $L > c\tau/2$ the individual pulses would be propagated upwards without overlap in time; this was arranged to be the case by using a piston of length 13 cm.

The behaviour of these pulses was studied by means of a steel pressure bar of length 6 ft. and diameter $\frac{1}{2}$ in. inserted into a 'porthole' about 2 ft. above the bottom of the liquid column. The recording technique was the condenser method developed by Davies[2], in which the (displacement, time) curve of the motion of the outer end of the bar was determined as an oscillogram; differentiation of this curve then gave the (pressure, time) curve of the events occurring in the liquid.

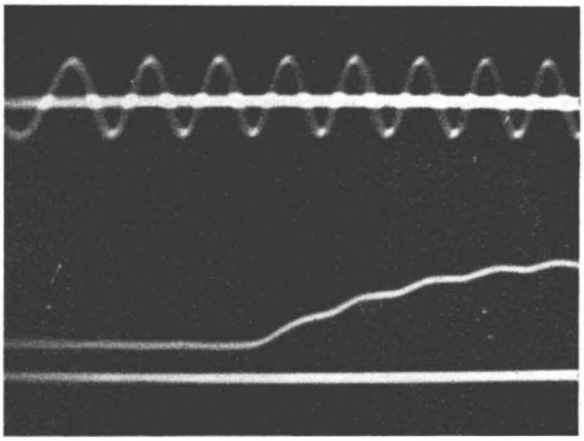

Fig. 1. Upper trace, timing wave, period = 50 μsec.; middle trace, condenser unit signal; lower trace, datum line

An example of the type of oscillogram obtained using water is shown in Fig. 1. The separate displacements due to the successive pulses are clearly shown on the 'staircase' type of trace obtained; the timing wave is of frequency 20 kc/s. An analysis of this trace enables two results to be obtained. First, the time of impact $T$ of the bullet may be obtained by averaging over four pulses; this turns out to be 39·1 μsec, which agrees well with other methods of determination. Secondly, the velocity $c$ of the pulses in the steel may be obtained by measuring the time lag $\tau$ between successive 'knees' on the oscillogram; averaging over four pulses it is found that $\tau = 51{\cdot}9$ μsec and thus:

$$c = \frac{2 \times 13}{51{\cdot}9 \times 10^{-6}} = 5{\cdot}01 \times 10^5 \text{ cm/sec}$$

which is in good agreement with the accepted value.

The next step which suggests itself is the use of calibrated strain gauges mounted on the pressure bar so that the (pressure, time) curves of the individual pulses may be obtained directly; this procedure should then enable a value of $\alpha$, the reflexion coefficient between steel and the liquid, to be obtained.

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## RADIATION CHEMISTRY

### Effect of γ-Radiation on Deoxynucleoprotein acting as a Primer in RNA Synthesis

It has been found[1] that on irradiation of calf-thymus deoxynucleoprotein (DNP) the major part of the radiation damage occurs on the protein moiety of the DNP and that, in fact, the DNA itself is largely protected from the effects of radiation. This would be in agreement, for example, with the structure of DNP as proposed by Wilkins[2]. Since it has been suggested that the protein

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