by the further isolated current pulses which began to occur. In practice, the liquid was conditioned up to 100 kV./cm. or so beyond the maximum stress used during the measurements.

A series of conductivity curves for several gap-distances in the range 300–50 μ have been obtained. These tests show that:

(i) Once conditioning has been carried out for one polarity, no further conditioning is necessary for measurements of the other polarity.

(ii) For symmetrical electrodes with a spacing of about 75 μ there is no polarity effect, and identical conductivity graphs were obtained for stresses up to 1,150 kV./cm.

(iii) For electrodes of different metals, the conductivity curve depends on the nature of the cathode; for example, using chromium and silver for the electrodes, the current for 1,000 kV./cm. was $2\frac{1}{2}$ times greater when silver was the cathode.

(iv) With proper conditioning the consistency of the results was very noticeable, provided the test electrodes remained in the closed system during the tests. In a long test the initial curves could be reproduced at the end of the test; but the purity conditions appeared to be so exacting that slightly different curves were obtained after a rest period of 12 hr.

The impression has been gained that the conductivity may be largely determined by adsorbed layers on the electrodes and hence depends upon the state of purity of the liquid; the two would be expected to be related, and a dynamical equilibrium would be established between them.

It is intended to publish a more detailed account of this work elsewhere.

H. HOUSE

High Voltage Laboratory,
Queen Mary College,
London, E.1. May 6.

A New Thermal Method for Sound Absorption in Liquids

AFTER establishing¹ the equivalence of sonic and thermal energies (given by the relation $I = JH$, where I is the intensity of sound at the source, H is the heat produced by absorption of this sound and J the conversion factor which has the same value of 4.19×10^7 ergs/sec. as the mechanical equivalent of heat) this relationship was utilized in this Laboratory to develop a novel technique for the measurement of ultrasonic absorption coefficient in liquids. It consists of the measurement of heat produced at different points along the path of an ultrasonic beam, and its application in the formula $H = H_0 \exp(-2\alpha x)$ where I in the usual formula for attenuation is replaced by H because of the earlier equivalence relation. A series of measurements of absorption coefficient have been taken with this technique and the results have already been reported² elsewhere along with full experimental details. These results have shown that the accuracy of this method is high and the values of absorption coefficient so obtained are in close agreement with those obtained by other methods of measurement.

Recently, Dutta and Samal³ have reported in *Nature* measurements of absorption coefficients using the same principle. According to them, the absorption coefficients of benzene and carbon disulphide are 75×10^{-17} cm.⁻¹ sec.² and 115×10^{-17} cm.⁻¹ sec.² respectively, as against the values obtained by others

Table 1

No.	Liquid	Observed $a/\nu^2 \times 10^{17}$ cm. ⁻¹ sec. ² at 28° C.	Previous results $a/\nu^2 \times 10^{17}$ cm. ⁻¹ sec. ²	References
	1	2	3	4
1	Benzene	816	900 at 20°–25° 906 „ 30° 812 „ 30°	4 5 2
2	m-Xylene	89	80 „ 27° 76 „ 30°	6 and 7 5
3	n-Propyl alcohol	84	77 „ 26° 75 „ 22°–28°	8 9
4	n-Propyl acetate	138	145 „ 30°	5

which are about 800×10^{-17} cm.⁻¹ sec.² and $7,500 \times 10^{-17}$ cm.⁻¹ sec.².

To check on these results we have repeated our experiments at about 5 Mc./sec., utilizing our thermal technique. The results obtained are given in column 3 of Table 1. For comparison, results of earlier measurements are given in column 4. It may be seen from these values that the reproducibility is good.

It may also be noted that these results compare well with values obtained by other methods in this Laboratory, as well as with the commonly accepted values based on the results obtained by other workers using a variety of refined techniques^{4–9}. Our thermal technique has also been used by Grossetti¹⁰, who reports good results in water. For our experiments by this technique we have used a generator capable of delivering 10 watts radio-frequency power but set to a low output to prevent the crystal from giving rise to violent ripples in the liquid. It has been observed that, with correct matching, only a small amount of electrical power is needed for the work. Again, the sound energy is completely absorbed in the cell containing a long column of highly absorbing liquid and no correction is required to be made for sound energy leaving the system. This feature also gives rise to more heat, with the result that the accuracy of measurement is comparatively high in this method.

As against this, the results obtained by Dutta and Samal are in complete disagreement with those obtained by us by the above technique and confirmed by us here, as also with other results by workers using different methods. The deviation is obviously due to some flaws in the method and in interpretation of observations. A detailed paper on this work will be published elsewhere.

S. PARTHASARATHY
M. PANCHOLY
C. B. TIPNIS

National Physical Laboratory of India,
New Delhi 12.
June 14.

¹ Parthasarathy, S., Chari, S. S., and Srinivasan, D., *Ann. d. Phys.*, **12**, 8 (1953); *J. Acoust. Soc. Amer.*, **25**, 335 (1953). See *Nature*, **173**, 110 (1954).

² Parthasarathy, S., Chari, S. S., and Mahendroo, P. P., *Z. Naturforsch.*, **8a**, 273 (1953); *J. de Phys. et le Rad.*, **14**, 366 (1953). Parthasarathy, S., and Mahendroo, P. P., *Il Nuovo Cimento*, **10**, 1196 (1953). Parthasarathy, S., Mahendroo, P. P., and Mathur, S. S., *J. Sci. Indust. Res.*, **12B**, 457 (1953).

³ Dutta, A. K., and Samal, K., *Nature*, **174**, 976 (1954).

⁴ Markham, J. J., Beyer, R. T., and Lindsay, R. B., *Rev. Mod. Phys.*, **23**, 353 (1951).

⁵ Parthasarathy, S., Tipnis, C. B., and Pancholy, M., *Z. Phys.*, **140**, 156 (1955).

⁶ Willard, G. W., *J. Acoust. Soc. Amer.*, **12**, 438 (1941).

⁷ Pinkerton, J. M. M., *Proc. Phys. Soc.*, **62B**, 129 (1949).

⁸ Parthasarathy, S., Tipnis, C. B., and Pancholy, M., *Z. Phys.* (in the press).

⁹ Pellam, J. R., and Galt, K. J., *J. Chem. Phys.*, **14**, 608 (1946).

¹⁰ Grossetti, E., *Il Nuovo Cimento*, **11**, 250 (1954).