amount of lead detectable by its lubricating action comes out of the alloy, at 100° C. lead is wiped out and considerably reduces the friction to the same order of magnitude as for a film of lead rubbed on to the copper by hand. Since the superior bearing qualities of lead-copper alloys become evident at high loads, speeds and temperatures, it seems probable that their good anti-seizure properties are the result of lubrication by a thin lead film when metal to metal contact occurs under conditions of lubrication breakdown. It is thus important that the structure of the alloy should be such that the lead can flow to the surface from underneath, and that it should not be distributed as isolated aggregates. The importance of the availability of lead in lead-bronze bearing alloys has been emphasized by Wood and Harrison[5], and our experimental results confirm their expressed opinion on the type of structure to be aimed at in a high-duty bearing metal.

The above is a record of work carried out for the Department of Scientific and Industrial Research; it was submitted to the Department on September 3, 1940, but, at that date, publication seemed undesirable. Copies were sent, however, to interested parties at that time.

J. L. HEATON.
J. R. BRISTOW.
G. WHITTINGHAM.
T. P. HUGHES.

Laboratory of Physical Chemistry,
Cambridge.

[1] See, for example, Bassett, H. N., "Bearing Metals and Alloys" (Arnold and Co., London, 1937), Chapter 3.
[2] Kyropoulos, S., *Refiner and Nat. Gas. Mfr.*, **19**, 85 (1940).
[3] Goodman, p. 81 in ref. 1.
[4] Bowden, F. P., and Leben, L., *Proc. Roy. Soc.*, A, **169**, 371 (1939).
[5] Evans, H. L., and Harrison, S. T., *Chem. and Ind.*, **58**, 122 (1939). Wood, E., and Harrison, S. T., private communications.

Electrical Properties of Polystyrene

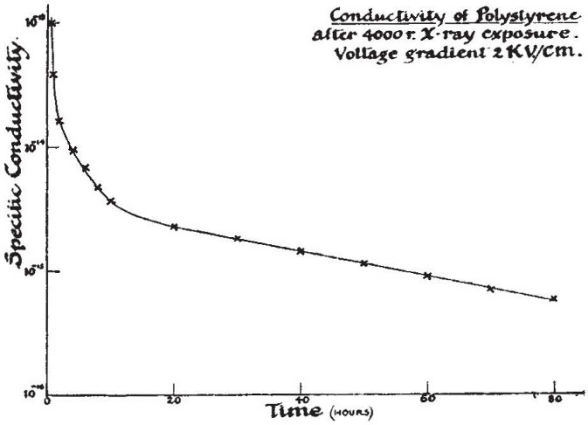
THE value of polystyrene and of certain other organic plastics as dielectrics for high-frequency apparatus is well known. The power factor for polystyrene at frequencies of 10^6–10^7 c./s. is of the order of 0·0002, a figure much lower than that for most insulators.

Other properties of this material render it very suitable for insulating purposes, notably its low water absorption, and resistance to cracking.

We have recently investigated the direct current conductivity of this same substance with a view to its use in instruments for radiological work. A cylindrical condenser was used for this purpose, with a closely fitting cap to exclude air ionized by cosmic rays, and the charge was observed by an electrometer after standing for a period of the order of 1–2 weeks. Great care was taken to keep the surface of the insulator clean and dry.

The result found for an average sample of polystyrene was a specific resistance of 3×10^{20}. Surface leakage could not be eliminated completely, and this figure is, therefore, a lower limit. It is, however, some 1,000–10,000 times the values that have been published from time to time, and greatly in excess of the value for ordinary insulators, such as glass, ebonite, etc.

When X-rays are passed through the substance its resistance falls; the amount of fall depends on the intensity and the duration of the radiation, but may be by a factor of 10^8 or more. Moreover, it has been found that the conductivity so induced lingers for a very considerable time after the X-rays have been cut off. The accompanying curve shows the effect during a period of 80 hours following a brief exposure. At the end of this time the material is still far from back to its original state.



These qualities of a material now used widely for electrical work are likely to become of increasing importance. It is the purpose of this note simply to record the results, but it is clear that they are of decided physical significance, and their full interpretation in terms of the structure of the material is likely to be of great interest.

I am indebted to Dr. J. E. Roberts for introducing this valuable material to radiological work.

F. T. FARMER.

Barnato Joel Laboratories,
Middlesex Hospital,
London, W.1.
Oct. 7.

Influence of Water Vapour on Flame Gas Temperatures

THE influence of water vapour upon the combustion of carbon monoxide is well known, but its influence upon the combustion of hydrogen is not so well known.

It has been shown that flame gases resulting from closed-vessel explosions of moist mixtures of hydrogen and air contain less latent energy than those resulting from explosions of dry mixtures[1]. We have just completed a series of temperature measurements in the flame gases from moist and dry hydrogen - air mixtures which show that this is so also in the case of open flames. These measurements, which were recorded by means of thin quartz-covered platinum wires, are shown in the accompanying figure. It will be seen that for any given hydrogen content the moist flame gas temperature is 40–50° C. higher than the dry flame gas temperature, and this in spite of the fact that the calculated temperature for the moist mixture is about 15° C. lower than that for the dry mixture.

David and Pugh previously reported that the temperature attained by an uncoated platinum-rhodium wire immersed in carbon monoxide flame gases was higher when the mixtures were moist than when dry[2]. As it is now known that an abnormal amount of dissociation obtains in flame gases and that the dissociated gases combine on a platinum