

pound already described in the literature⁷. Identification was confirmed by conversion to the dipicrate, m.p. 192° (decomp.), which crystallized from alcohol in orange-red plates with a pronounced green reflex (found: N, 17.7. $C_{12}H_8N_2$, $C_{12}H_8O_{14}N_6$ requires N, 17.6 per cent).

A much-extended account of this work will be published elsewhere in due course. We wish to thank the directors of Messrs. May and Baker, Ltd., for permission to publish this note.

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⁵ McCombie, Scarborough and Waters, *J. Chem. Soc.*, 353 (1928).
⁶ Fischer and Hepp, *Ber.*, **23**, 8141 (1890).
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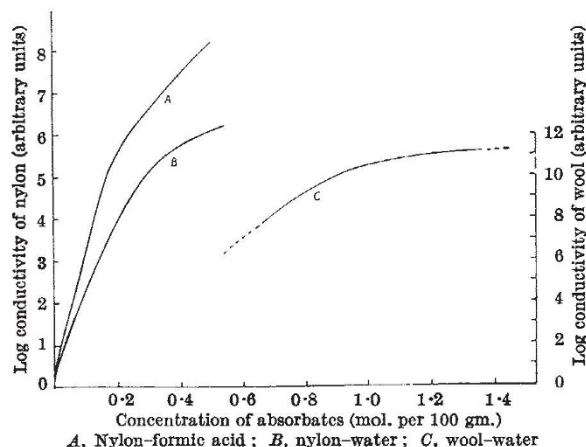
Effect of Polar Vapours on the Direct-Current Conductance of Keratin and Nylon

FUOSS^{1,2} and others have shown that in polar polymer-plasticizer systems there exists some correlation between the frequency of the maximum power-loss absorption, and (a) the elastic moduli, and (b) the conductance. That is:

(a) A decrease in Young's modulus, due to either an increase in plasticizer content or an increase in temperature, is associated with increased freedom of rotation of the polar groups in the polymer chains and in general a shift of the power-loss maximum to higher frequencies.

(b) The direct-current conductance for a given plasticizer-polymer system is the same at the temperature for which different compositions have their loss maxima at a given frequency.

Recent work in these laboratories³ has shown that the first condition is also true for systems such as keratin-water, keratin-formic acid, nylon-water, nylon-formic acid, the formic acid being more effective in promoting chain rotation in each case. It was further shown that these changes are associated with that fraction of the vapour which is adsorbed on to low-energy sites.



This work has now been extended to investigate the second relation by measurements on the direct-current conductivity of nylon-water and nylon-formic acid systems, and the results are shown in the accompanying graph. It is seen that in accordance with (b) the formic acid is more effective in promoting increased conductivity. Furthermore, in both cases the rate of increase in conductivity falls away at an absorbate concentration of about 0.3 mols per 100 gm. A similar turning point has been obtained for the corresponding elastic modulus relations, when it was shown that this corresponds to the saturation of the available low energy sites.

In the case of the wool-water system a similar bend in the conductivity relation was observed by Marsh and Earp⁴, who also suggested a connexion with the corresponding elastic modulus relation. Their results are plotted in the graph, and it is seen that the bend occurs in this case for a molar sorption of about 1.0 mols per 100 gm., which, according to Cassie, corresponds to saturation of the low-energy sites.

FUOSS⁵ suggests that the conductivity in such systems is ionic, the plasticizer facilitating the diffusion of ionizable impurities originally present in the polymer. Such a theory would account for the results obtained with nylon and keratin.

An alternative theory due to Baxter⁶ suggests that the adsorbed molecules act as impurity centres for electronic conduction. In such an event the above results suggest that these impurity centres are to be associated with occupied low-energy sites.

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⁴ Marsh and Earp, *Trans. Farad. Soc.*, **29**, 173 (1933).
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Spread of Detonation in High Explosives

IN a note¹ on the spread of detonation in a mass of high explosive from the point of initiation, Weibull demonstrates that, in a cylindrical cartridge of compressed T.N.T., detonation is propagated with a uniform and constant speed in all directions from the detonator. It may be of interest to record that pressed T.N.T. is not unique in this respect and that other high explosives, under suitable conditions, behave in a like manner. Nevertheless, as has already been shown², a constant rate of detonation from the point of initiation is not a feature common to all high explosives. This is further illustrated in Fig. 1, which is a conventional photograph of detonation traversing a 1½ in. diameter cartridge of granular T.N.T. cartridged at a density of 1.0 gm./c.c. The cartridge was 7 in. long and was initiated with a detonator embedded in the explosive at the end corresponding to the hooked end of the trace. The curvature of the trace shows that the velocity of detonation was still increasing at 4 in. from the end of the detonator. It is interesting to note that this is the same explosive as that used by Weibull, but in a different physical condition, so that the con-