constant pressure the number of surface atoms which are covered by gas molecules will be given by $N' = N . e^{(Q-\phi)/RT} . k$, where k is a constant but slightly affected by temperature. In the above transitional regions, $Q - \phi$ must possess at first a negative value, ultimately becoming zero and then positive. It is unlikely that ϕ will decrease with increase in temperature, therefore Q must become larger as the temperature is raised. There are but few experimental data bearing on this point. The heat of adsorption of oxygen on charcoal, for the same amount of gas adsorbed, increases from 70 to 110 k.cal. as the temperature increases from 20° to 110° C.[3] From 100° to 200° C. the heat is practically constant. These values probably refer to a transitional region between van der Waals and chemisorption, but this is somewhat uncertain. The figures, however, lend support to the above view, that the heat of adsorption in the transitional regions increases with rise in temperature. More experimental work is needed on the effect of temperature on the heat of adsorption.

The activated surface atoms will undoubtedly be mainly singlets at low temperatures, but doublets will increase in number as the temperature is raised. The increase in the heat of adsorption may be due to this fact, for the energy liberated on adsorption will probably be the greater the more activated the group of surface atoms by which the adsorbed molecule is held.

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[1] Cf. Benton and White, *Jour. Amer. Chem. Soc.*, **52**, 2332; 1930; and Taylor and Williamson, *Jour. Amer. Chem. Soc.*, **53**, 2178; 1931.
[2] Garner and Kingman, NATURE, **126**, 352; 1930. *Trans. Far. Soc.*, **27**, 322; 1931.
[3] Garner and McKie, *Jour. Chem. Soc.*, 2455; 1927.

Change of Dielectric Polarisation of Nitrobenzene with Temperature.

RECENTLY one of us (J. M.) has determined the changes of density D and dielectric constant E of nitrobenzene with temperature.[1] In this connexion we would like to repeat here that the freezing point of nitrobenzene lies at 5·5° C. and not at 9° as given in the Landolt-Börnstein tables.

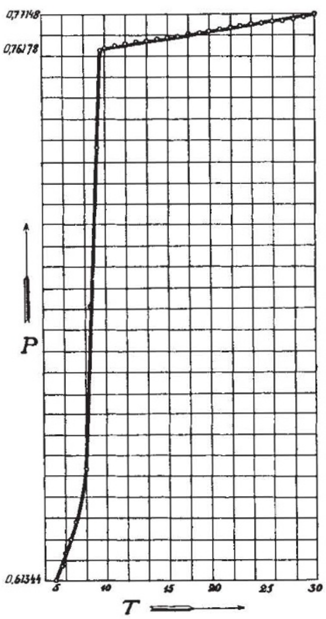

FIG. 1.

On the basis of these data, we have computed the dielectric polarisation P of nitrobenzene, according to the formula of Clausius-Mossotti,

$$P = \frac{E-1}{E+2} \frac{1}{D}$$

The results of this computation for the temperatures between 5·5° C. and 30° C. are represented on the accompanying curve (Fig. 1).

The value of P changes linearly with temperature, varying from 30° down to 9·6°. At 9·6° there appears a sudden drop in the value of P. This suggests that at the point 9·6° (which, as our former studies have shown, is a transition point from one liquid modification of nitrobenzene into another one, also liquid) the structure of the molecule undergoes a change. We have therefore to do here with a phenomenon somewhat different from that appearing in liquid helium, where the structure of the molecule does not undergo a change.[2]

The summary of the results we have obtained with nitrobenzene can be stated as follows: at the point 9·6° there appears to be a jump of the value of dielectric constant, a distinct change of slope in the density curve, and a very distinct change in the value of the refractive index.

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Warsaw, July 20.

[1] J. Mazur, NATURE, **127**, 741, 893; 1931.
[2] M. Wolfke and W. H. Keesom, *Comm. Leiden*, No. 192*a*.

Charged Aerosols and Ball Lightning.

MESSRS. Cawood and Patterson conclude their extremely interesting account of the behaviour of electrified aerosols with the comment:[1] "The existence of such a spherical highly charged assemblage of particles suggests that globular lightning may owe its origin to an analogous effect, in which particulate matter, either liquid or solid, is charged to a very much higher potential".

Is it advisable to consider only liquid and solid particulate matter in this connexion?

Is it not conceivable that gaseous molecules, if charged to a sufficiently high potential, may mutually repel each other so strongly that the properties of the assemblage cease to be that of a similar one subject only to ordinary Maxwellian thermal movements, forming temporarily an unstable expanded mass, perhaps of considerable tenuity, surrounded by normal gas at ordinary pressure?

Puzzling features of ball lightning are the violent explosions which sometimes occur inside a room, without damage to persons present or furniture.[2,3]

If an attenuated electrified mass of gas can suddenly collapse, like an evacuated electric light bulb, it would afford an explanation of this mysterious behaviour.

During the explosion of certain gaseous mixtures, charged molecules which are not subject entirely to Maxwellian thermal movements, temporarily, may complicate the phenomena.

Exceptionally high voltages can now be developed in a few research stations; further research may reveal the conditions under which the charged aerosol behaviour can be extended to gases.

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[1] NATURE, July 25, 1931, p. 150.
[2] Marchant, NATURE, Jan. 25, 1930, p. 128.
[3] Reynolds, NATURE, March 15, 1930, p. 413.