with acetic acid, and finally cooling it, I found that small crystals appeared on the surface of the solution. These formed a regular arrangement more striking than those described above and reminded me of the famous experiment of Meyer's floating magnets; for example, when seven crystals were present, they arranged themselves in a right hexagon, one of them placing itself in the centre.

The crystals thus had a fair amount of *free* charge, the charge being positive. When they were small (for example, 0·8 mm.), the crystals thus crystallised out of the saturated solution would separate themselves from each other by mutual repulsion. When, however, the crystals were larger, they would not separate if they were once brought into contact. Moreover, they would attract one another and come into contact though they were separated by a small distance from one another. This is due to the capillary effect.

According to Perrin's explanation of the phenomena of electrical endosmose (Perrin, *J. Chim. phys.*, **2**, 601; 1904), crystals of naphthalene and other compounds acquire positive charges by the adsorption of hydrogen ions in acidified water. When they are in alkaline solution, by the adsorption of hydroxyl ions they acquire negative charges. In the case of acetanilide also, a layer of the ions is produced on the surface of the crystals by selective adsorption, and at the same time a diffusion layer of the ions with the opposite charge is also produced outside of the former layer. If the latter layer of ions can slip in the electric field, it is clear that the crystals move towards one direction in the field.

It was ascertained that the crystals of acetanilide deposited from the pure aqueous solution have negative charges. Using the same apparatus as was adopted by Perrin when he examined electro-endosmose, and putting a porous diaphragm made with melted acetanilide between the cathode chamber and anode chamber, ordinary distilled water saturated with acetanilide was poured into these two chambers and a D.C. source of 120 volts was applied. Then it was observed that the solution of the cathode chamber rose, while the level fell when the polarity of the electrodes was reversed. From this it is clear that the wall of acetanilide is charged negatively.

When some acetanilide was put into distilled water, heated until the solution became saturated, and cooled, the first crystals produced were polygonal plates, and had a free charge of negative sign. When acetic acid was added to this solution, the crystals that had negative charges acquired positive charges, for they were easily attracted by a sulphur rod rubbed with wool.

In experiments in other solvents than water, for example, chloroform, benzene, toluene, and water containing ethyl alcohol, no charged crystals were found.

The origin of the large quantity of *free* charge on the crystals and the electrical phenomena of crystals other than acetanilide are under investigation.

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High-frequency Discharge in Organic Vapours.

WHILE studying the rectification effect in some organic vapours, when ionised by electrodeless discharge, striations unlike the general type obtained by McCallum and Perry (NATURE, Jan. 12, p. 48) were observed to fill the whole tube. The diameter of the tube was different at different parts, varying from 0·5 cm. to 2·5 cm., but there was observed no essential difference in the pattern anywhere excepting their increased luminosity in the narrower portion.

The pattern appeared like a helix, with five or six rings per centimetre and would rotate rapidly about its axis. All these rings are not parallel to one another, and during their rotation they get inclined owing to the non-uniformity of the field in its proximity. They present a wave-like appearance, as has been observed by K. A. MacKinnon and J. K. Robertson (NATURE, July 13, p. 55). It has also been observed in some cases that on prolonged working, the striations separated themselves into groups, presenting the appearance of nodes and antinodes in Kundt's tube phenomena. This happens only when the slip electrodes which are the seat of damped oscillations are brought close together.

Striations in the vapours were observed at a lower wave-length than in the case of air; and also at the same wave-length they would come out quicker in

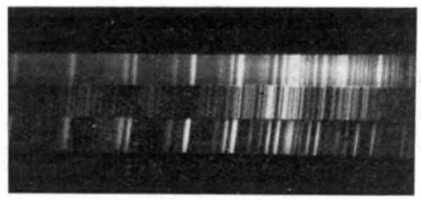

FIG. 1.

vapours than in air, as is expected from the non-ionising collision and absorption of energy in the case of heavy molecules (J. J. Thomson, *Phil. Mag.*, July 1929).

The glow of the striations may be made to extend beyond the electrodes, whether an internal or external electrode is used, provided there is a chance of stray capacity effect. This is very clearly shown when an earthed tin-foil is wrapped over the tube at any remote part of it.

Incidentally, it was also observed that these vapours when ionised give rise to band spectra. The accompanying photograph (Fig. 1) shows such an effect when propyl bromide was used, but we are not yet sure of the emitter of these bands. Investigations in this laboratory are being carried on to study the band spectra of some simple molecules when ionised by this method of electrodeless discharge.

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Dr. Augustus Waller and Patents.

IN the "Calendar of Patent Records", page 562, NATURE, Oct. 5, it is stated that Dr. Augustus Waller patented, in 1852, a means for measuring the quantity of alcohol in liquors; "but" (quoting from the paragraph in NATURE) "his most important invention —the cardiograph . . . was not patented".

The Dr. Augustus Waller who is reported to have obtained this patent, and who in 1852 was engaged on his neurological researches, was the father of Dr. Augustus Désiré Waller, who first observed and recorded the human electrocardiogram.

The patent may well have been the result of some hobby of his spare time, but neither my grandfather nor my father patented any results of the researches through which they are now remembered by physiologists.

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