Injury to Plaster due to Osmosis.

FROM time to time, it has been suggested that osmosis plays a part in the weathering of building materials. A note on a failure of plaster work for which osmotic action is directly responsible may therefore be of interest.

Brick walls are sometimes found to which lime plaster cannot be made to adhere permanently. Some time after the plaster is applied it commences to bulge and finally is pushed off the wall. Immediately behind the face of the brick is found a columnar crystalline growth which, in all cases so far examined, proves to be magnesium sulphate ($\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$) in a practically pure condition.

FIG. 1.—(a) Lime plaster; (b) magnesium sulphate; (c) brick.

It now appears that, when lime plaster is applied to bricks containing a proportion of magnesium sulphate, a semi-permeable membrane is precipitated in the face of the bricks. As the plastered wall dries out, magnesium sulphate is drawn from the body of the bricks, concentrates behind the membrane, and then crystallises, forcing the plaster and a thin shell of brick away from the wall.

It has been found possible to precipitate membranes of magnesium hydroxide in the walls of porous pots. Using a half-saturated solution of magnesium sulphate, osmotic pressures so high as 100 cm. of water were developed in three days.

In Fig. 1 is shown the magnesium sulphate growth (b) between the plaster (a) and the main body of the brick (c). To the left of the layer of magnesium sulphate the thin layer of brick which supports the osmotic membrane may be seen.

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The Zeeman Effect and the Absorption Coefficients of the Hyperfine Structure Components of the Mercury Resonance Line.

THE investigations of McNair (*Phys. Review*, **31**, 986; 1928) have shown the complicated behaviour of the Zeeman patterns of the mercury resonance line, 2537 Å., in emission. Some observations made in absorption five years ago by Wood appear to be in contradiction with the results of McNair. To clear up this difficulty I have made a more systematic study of the Zeeman effect of the mercury resonance line in absorption for magnetic fields from zero to 8 kilogauss and have obtained the following results:

The parallel components in absorption behave similarly to those in emission, with the exception of moderate intensities of the magnetic field, 1.3 kg., when, besides the five components, the light of intermediate wave-lengths is also absorbed. The scheme of McNair does not quite suffice to explain the be-

haviour of the components perpendicular to the field, because the -10.4 and $+21.5$ mÅ. components (transmitted through the absorbing vapour in the magnetic field) show for certain intensities of field an anomalous behaviour, not understandable from the point of view of McNair. However, generally speaking, the results of my investigations can be reconciled with the results of McNair rather than with the eventual existence of a Paschen-Back effect, and they lead to fairly good interpretation of the curve giving the intensity of transmitted light as a function of the field intensity, which was obtained two years ago by Schein.

These investigations have further shown that, for certain intensities of the field, the vapour transmits: (a) only the outer short wave-length component, -25.4 mÅ., or (β) one inner and one outer component, -10.4 and $+21.5$ mÅ., or (γ) two inner components, 0 and $+11.5$ mÅ. The absorption coefficients of the radiation, which was monochromatised in this way, was estimated by means of the decrease of the intensity of the resonance radiation along the beam. The measurements were made for the temperatures 0° and $16\frac{1}{2}^\circ$ C.

and have given the results: $\frac{\beta}{\alpha} = 1.25$; $\frac{\gamma}{\alpha} = 1.60$; which

are in agreement with the estimates of intensity in emission lines made by Miss Schrammen. The estimated values of the absorption coefficients, which are less certain than the relative ones, computed in the ordinary way for the temperature 20° C. from the measurements made at 0° C., are: $\alpha = 3.3$; $\beta = 4.0$; $\gamma = 5.1$ cm.⁻¹. The estimated value for all five components, $k_{20} = 4.2$ cm.⁻¹, which differs only little from the average of these values, $\frac{\alpha + 2\beta + 2\gamma}{5}$, is less than

that obtained from the photoelectric measurements (Kunze, Kopferman and Tietze, Zemansky), probably because I was not able to extend my measurements close enough to the window through which the exciting light enters into the resonance vessel.

A full report of these investigations will appear in the *Bulletin de l'Académie polonaise* (Cracow).

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Two Modifications of Liquid Ethyl Ether.

THE changes of the dielectric constant of liquid ethyl ether with temperature studied by one of us (J. M.), and described in a recent communication in *NATURE*, suggest that at the temperature 105.4° C. the liquid undergoes some transformations analogous to that found for liquid helium by W. Keesom and M. Wolfke (*Comm. Leiden*, 1906). To confirm this supposition

FIG. 1.

we have made a study of the change of temperature with time during the gradual heating of carefully purified ethyl ether.

Ethyl ether cooled to a temperature lower than -105.4° C. was contained in a Dewar vessel provided with a nickel covered refrigerator cooled with liquid air. We have studied the change with time of gradually increasing temperature of the ether, which was