fibre axis, and to be so few molecules thick as to give no side arcs. The absence of side arcs in this case is an argument against attributing their presence in the case of Cotswold wool to a gelatinous cell content.

Fuller details of the work and the remaining photographs will be published elsewhere. The examination of other wools is in progress.

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Condensible Gas Modifications formed under the Influence of Electrodeless Discharges.

WHEN a liquid air trap is maintained in a gas subject to an electrodeless discharge, condensible products are frequently formed, and these are often recondensible over long periods. With hydrogen, oxygen, nitrogen, in well baked-out apparatus such products are formed. They have been variously attributed to atomic modifications, ozone, active nitrogen, and the like. Doubtless such modifications may be formed and be condensed in the liquid air traps, but in cases where repeated recondensations can be effected, such hypotheses cannot be readily adopted. So far as I know, no attempt has been made to find out whether these products are not simply water, carbon dioxide, or oxides of nitrogen. The lack of such an attempt arises apparently from the fact that in a discharge in pure hydrogen there is no obvious source of oxygen, and so on.

I have recently investigated electrodeless discharges in the common gases, using a seven-metre wave oscillator (for method see, *e.g.*, J. and W. Taylor, *Proc. Camb. Phil. Soc.*, **24**, 2, 259; 1928). Standard spectrograms of discharges in hydrogen, oxygen, nitrogen, carbon dioxide, water, and air were taken (pressures 2 mm. downwards), both with (where possible) and without liquid air traps on the apparatus.

The 'clean up' effects were then investigated both with 'cold' electrodeless discharges and with such discharges as those described in a previous letter (NATURE, May 5, 708; 1928), in which electrolytic currents were maintained, by suitable means, across the glass walls of the discharge vessel. In hydrogen, as 'clean up' occurred, a condensible product was formed when a liquid air trap was included in the apparatus. This product was of long life and capable of repeated recondensations. Moreover, its volume was approximately the same as that of the hydrogen that had been 'cleaned up.' In order to examine the product that had been condensed out, the whole apparatus was evacuated whilst the liquid air traps were still functioning. The liquid air was removed after the apparatus had been evacuated and closed, and the spectrogram of the condensible product itself was then obtained.

On again putting on the liquid air, it was found that part of the gas content was now not condensible, but became condensible after continued discharge. Its spectrogram was taken. In all cases the spectrogram of the condensible product was identical with the standard spectrogram for water at low pressure (in both cases the carbon dioxide bands were in evidence), and the spectrogram of the part of the gas that was not recondensible after running the discharge was identical with the non-condensible product formed after running a discharge in water vapour, and further, both of these latter were almost identical with that given by hydrogen. There can remain little doubt, then, but that the condensible product formed from hydrogen is water which partially breaks up to form hydrogen and oxygen under the influence of the discharge when there is no liquid air trap in the apparatus.

With oxygen a condensible product was formed, and this product yielded an exactly similar spectrogram to that obtained from a discharge in carbon dioxide (sometimes there were also weak hydrogen lines in the spectrum, but there was no evidence that any considerable portion of the condensible product was water).

The amounts of gas disappearing in these experiments, especially where electrolytic currents were passed through the glass, were considerable, being as much as 0·7 c.c. of gas at N.T.P. in certain cases, consequently, it is at once obvious that any products formed in minute quantity are not detectable.

The question arises as to the origin of the water and carbon dioxide. In a previous letter (loc. cit.) I have described results on the disappearance of gas under the action of an electric current passing through the glass walls of the containing vessel, and shown that laws similar to Faraday's Laws of Electrolysis are valid. Further work has confirmed the result that the quantity of gas disappearing is directly proportional to the electrical quantity that has traversed the walls. The number of atoms disappearing per electronic charge is, however, variable according to conditions. For example, at the beginning of a run with hydrogen, H_2 disappeared for every electronic charge transferred in many cases, but with continued running, H disappeared for every electronic charge transferred.

The results show that glass must be regarded as an electrolyte and the gas disappearance under the action of the discharge is consequently due to the chemical interaction of the gaseous ions with the electrolytic products and ions of the glass. In the simplest picture glass is to be regarded as a solution containing Na_2SiO_3 as electrolyte. For every two electronic charges transferred across the glass 2Na is liberated at the cathode. The SiO_3 radical at the anode breaks down into SiO_2 and O, which unites in the case of hydrogen discharges with one hydrogen molecule to form one molecule of water.

This simple picture may represent some of the facts, but it does not explain, for example, why under certain conditions H_2 disappears for every electronic charge, and why oxygen disappears even more readily than hydrogen. We must consider then that glass is a complex electrolytic solution probably containing peroxides (until they are reduced by continued discharge with hydrogen), and certainly containing compounds of carbon which produce chemical reactions with the gas ions impinging against the glass surface.

It must also be borne in mind that condensible products are formed when a liquid air trap is on the apparatus, but gas 'clean up' occurs also when there is no liquid air trap, when the products must be retained in the glass structure or absorbed in the walls.

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Aug. 6.

New Type of Interference Fringes.

IF a pair of optically flat plates, making a wedge angle of a few seconds, be placed in the beam from a collimator with a cross slit (to obtain effectively a point source) and the eye be placed at the focal plane of the telescope objective (without eyepiece), straight fringes are seen which are localised at the plates. Essentially they are the fringes observed by Fizeau, who used a back reflection method.

When the plates are half-silvered, the comparatively broad and feeble transmission fringes now become very narrow and clear, the multiple reflection in the silver films producing the same sharpening