

One point which is brought out very prominently by these readings is that for the first half hour the current between P and X, under a potential difference of 80 volts was the same whether a magnetic field, as high even as 1,160 gauss, was applied or not. From this it was manifest that during this interval there was practically no emission of electrons from the newly deposited zinc surface, under bombardment by the alpha rays. It will be noted, too, that during the interval the saturation current was about 165×10^{-5} e.s.u., which was about twice as great as that saturation current obtained in the previous experiment with the ordinary zinc plate without the fresh deposit. This was very probably due to the air pressure in the apparatus being somewhat higher immediately after the deposit had been than it was when the observations were made with the zinc plate in its original condition. Even with the Gaede pump in action the effect of heating the furnace and the charcoal would be to drive off considerable air from the walls of the vessel and the charcoal into the apparatus and as the volume of the apparatus was considerable it would take time to remove this air again. That this interpretation was the correct one is shown by the readings taken in the second period extending from 55 minutes after the deposit had been made up to 85 minutes after that time. These it will be seen show that with increasing positive potentials the current increased and finally reached a maximum of only 78×10^{-5} electrostatic units. This would indicate that during the first half hour the ionisation constituent of the current was very considerable, as it should have been on account of the higher air pressure, while at the end of 85 minutes after the deposit had been made it was much less on account of the removal of the air from the apparatus.

The numbers given in Table VI. and the curves in Fig. 7 are also of interest in this connection for they show not only that the current gradually diminished with the lapse of time owing to the diminution of the ionisation current constituent arising from the gradual reduction of the air pressure but also that there was a gradual increase in the electronic stream from the zinc plate with the lapse of time under the bombardment by the alpha rays.

From what has gone before it is evident that this development of a delta radiation from the zinc plate arose from the gradual occlusion of air into the surface of the zinc.

For, as the vapour was deposited on the zinc plate in a high vacuum the surface would not contain any air at first. It would not, however, in this state be in an equilibrium condition and a tendency towards absorption would exist. The result of this would be that so long as air was present in the apparatus, absorption would take place at least until an equilibrium was established between the air occluded