of the radiations emitted. This was done with the air in S at a number of different pressures. A set of these results for 25·6 mm., ·95 mm. and ·001 mm pressure is given in Table I and curves which illustrate them are shewn in Fig. III.

At the pressure 25·6 mm. and 5·6 mm. the charge acquired was negative and in the two cases limiting potentials of approximately ·318 and ·202 volts respectively were reached.

The explanation of this acquisition of a negative charge by the electrode N was taken to be the existence of a volta difference of potential between the copper plate and the silver lining of the vessel S. At the lower pressures, however, as may be seen from the curves, the system acquired a positive charge which as Sir J. J. Thomson* has shewn is due to the delta rays carrying a negative charge from the polonium coated plate in excess of the positive charge carried from the same plate, by the α rays.

To get an accurate measure of the charge thus carried off by the delta rays the pressure was reduced in the vessel S until the McLeod gauge attached to the pump indicated a pressure of ·001 mm. of mercury. An observation was then made on the rate at which the plate N acquired a negative charge. By means of the trap R the vessel was then cut off from the pump, and the liquid air was placed round the vessel M. After it was certain that the charcoal had absorbed as much of the remaining air as possible a set of readings was again taken on the rate at which the plate N charged up.

This rate, however, was found to be practically the same as that obtained just before the liquid air was applied, and from the similarity in these two sets of readings it was considered that any current in the gas at ·001 mm. pressure due to ionization was negligible.

The numbers given in Table I and the graph representing them may therefore be taken to represent a measure of the rate at which the plate N emitted particles carrying negative electricity in excess of those emitted which carried positive charges.

Since the number of α particles leaving N per second was determined in the first part of the investigation it was a simple matter to calculate the rate at which the delta particles were emitted and so deduce the number shot off per α particle. The calculation is as follows:—

Calculation I.—Determination of number of α particles emitted per second.

* J. J. Thomson, Proc. Can. Phil. Soc. 13, 49, 1905.