portion of the air between GH and CD was confined to a very thin layer close to the latter plate.

The experiment consisted in measuring the current between CD and GH with various positive and negative voltages applied to AB at the different pressures. The formula for determining the mobilities which is applicable to the present case is that given by Rutherford[1] and Child.[2]

Expressed in electrostatic units the mobility of an ion is given by:

$$K = \frac{32.\pi.d^3.i}{9V^2} \text{ cm. a second per 300 volts a cm} \quad \ldots\ldots(1)$$

where i is the current between CD and GH in e.s.u. per square cm. cross section, d the distance in cm. between GH and CD and V the potential difference between them in electrostatic units.

Expressed in practical electromagnetic units:

$$K = \frac{3200.\pi.d^3.i}{3V^2} \text{ cm. a second per volt a cm} \quad \ldots\ldots(2)$$

where d is in cm., V is in volts, and i is in electrostatic units and is the current per square cm. cross-section between CD and GH.

As d was 1 cm. in the apparatus used by us the relation (2) reduces to:

$$K = \frac{3200.\pi.i}{3V^2} \quad \ldots\ldots(3)$$

From equation (3) it will be seen that for a selected pressure the current i should be proportional to V^2.

Table I.

Air

Pressure = 145·35 atmospheres.

P.D. in Volts, V.	Square of P.D.	Current in e.s.u. per cm.^{2}
Positive		
4·11	16·89	$4{\cdot}51 \times 10^{-5}$
6·16	37·95	11·51
8·21	67·3	21·51
10·26	105·27	33·87
12·3	150·69	48·71
14·35	206·27	67·24
16·4	268·0	84·89
Negative		
4·1	16·8	$7{\cdot}09 \times 10^{-5}$
6·16	37·95	16·42
8·2	67·0	29·83
10·26	105·27	45·32
12·3	150·69	66·25
14·36	206·2	91·56
16·4	268·0	122·9

[1]Rutherford, Phys. Rev., Vol. XIII (6), p. 321, 1901.

[2]Child, Phys. Rev., Vol. XII (3) p. 137, 1901.