## Radioactivity of Lead and other Metals.

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was almost exactly the inverse of the preceding, the ionization due to the primary rays being nearly twice that due to the corresponding secondary radiation.

It will be remembered, too, that the radium from which the gamma rays were obtained was surrounded by a block of lead 3 cm. in thickness, so that the radiation which issued from it must have been of a very penetrating nature, and therefore similar in its characteristics to the penetrating radiation which has its source in the earth, and contributes to the natural ionization observed in air or other gases onfined in metallic vessels.

It seems fair to conclude then, that in natural or spontaneous ionization in air confined in metallic vessels a proportion should hold between the ionization due to the primary and that due to the secondary rays, similar to the one which was found to hold experimentally with the gamma rays from radium, and the secondary rays emitted by them.

Assuming this relation to hold, it is possible to establish a connexion between the conductivity of air confined in a vessel of one metal with that of air enclosed by a second of the same dimensions but of different material, provided neither metal contains any radioactive impurities.

With this relation established it is possible then to check the results obtained experimentally in particular cases, and by so doing arrive in a measure at a knowledge of the relative importance of the different factors which determine the ionization.

In Section I. of this paper it has been shown that with the lead cylinder No. 1 there was generated on the average 23 ions per c.c. per second. Assuming that no part of this was due to any impurity in the metal, it follows from the numbers given in Table V. that one-third of this number was due to the penetrating radiation which entered the cylinder, that is 7.67 of the 23 ions were generated by the penetrating radiation which traversed the air in the vessel. Allowing for the absorption by the cylinder of 15.36 per cent. of the penetrating radiation, it follows that 9.06 ions were generated per c.c. per second in free air by the penetrating radiation from the earth. Turning now to the aluminium cylinder No. 10, it is fair to assume, since its absorption of the gamma rays has been shown to be negligible, that 9.06 may be taken, without sensible error, to be the number of ions generated per c.c. per second by the penetrating radiation which entered it. The number produced per c.c. per second by the induced secondary radiation would then, according to Table V., be 57 per cer . of this number, that is 516, and

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