This then is one type of charge which is nearly always acquired by such an insulated system as that described. It has, however, certain definite characteristics which make it readily detectable. For example, the rapidity with which this charge is acquired depends largely on the degree of conductivity possessed by the intervening gas, and as this conductivity can be increased at will by bringing more or less near to the vessel a small quantity of radium or other radioactive body, it is possible to make the insulated system practically take up at once a charge which will suffice to annul the volta effect.

If, further, now the inner vessel or body in the arrangement described possesses in addition a radiating surface which emits alpha or beta rays, the charging action of these rays can generally be brought into evidence by a reduction of the pressure of the gas between the two bodies. This reduction of the pressure will produce a diminution in the conductivity of the gas, but it will not affect the rate of emission of charged particles from the radiating surface. Consequently as the pressure of the gas is reduced the insulated system should, under the action of its charged radiation, acquire a charge, and so set up a potential difference between the inner and outer vessels.

The actual current through a gas, however, at any particular pressure depends, so long as the saturation current has not been attained, upon the potential difference producing the current, and so it happens that at each pressure a state of equilibrium is brought about by virtue of which the insulated system is maintained at such a potential as will produce a current through the gas of such magnitude as to exactly counterbalance the gain of charge through the emission of the radiation.

But as the pressure of the gas is lowered the equilibrium potential of the insulated system becomes gradually greater and greater, and the sign of the charge on the free system corresponding to this gradually increasing potential difference will be the opposite of that of the emitted radiation which is in excess.

Further, the extent of the equilibrium potential corresponding to any particular pressure will give a measure of the magnitude of this excess radiation.

When applying the method to the investigation of any particular radiation, the earth connection to the insulated system should first be broken and time allowed for the free system to come into equilibrium under the action of the conduction current arising from the volta effect. When this equilibrium has been reached the scale reading corresponding to the position then assumed by the movable system may therefore be taken as the initial reading in considering the charging action due to the radiation itself. Two lines of procedure are then open. If the ra-