

LETTERS TO THE EDITOR

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OSCILLATIONS IN NITROGEN GLOW DISCHARGE

A VERY interesting account of the nature of electrical oscillations produced in the positive column of the discharge tube, has been given by J. J. Thomson (*Phil. Mag.*, Vol. XI, Jan.-June, pp. 697, 1931) and the present work is on the same line as Thomson's. The various types of luminous oscillations which reveal themselves in the rotating mirror as some lines, are called by J. J. Thomson as  $\alpha$ ,  $\beta$  and  $\gamma$  lines. He attributes the origin of the  $\alpha$ -lines to a sort of explosion taking place in the discharge at regular intervals. The  $\beta$ -lines are due to the intermittence in the positive column and the  $\gamma$ -lines represent the ionic vibrations which are set up by the disturbances caused by explosions which give rise to  $\alpha$ -lines.

It is found that the impurities in the gas, increase in the pressure of the gas and current make the discharge highly unsteady. The lower limit of current for a steady discharge is

found depending on the pressure in the discharge tube. The lower the pressure, the smaller is the strength of the current required to maintain a steady glow.

The frequency of the lines was found by a revolving mirror. As the number of lines is usually too large to be counted in the whole field of view, a reviewer with a small field of view was used for observing them. By this method the order of the frequencies of  $\alpha$  and  $\beta$  were found to be  $3 \times 10^2$  cycles and  $10^5$  cycles respectively.

The high frequencies were measured by a Heterodyne wavemeter.<sup>1</sup> The coupling coil is placed near the field of the transmitter and the condenser is adjusted till the heterodyne beat is heard in the telephones. The wavelength of the wavemeter then coincides with that of the transmitter and the actual wavelength is obtained from the calibration chart. The values of the frequencies found were slightly different at different stages. Five