PHYSICS | Modern Physics

Millikan Oil Drop

General Aim

To verify the quantization of the electric charge.

Method

Oil Drop Method

Learning Objectives (ILOs)

- Explain the effect of the electric field on the motion of charged particles within it.
- Analyze the motion of charged oil drop within an electric field in terms of the different factors affecting its motion.
- Demonstrate that electric charge only comes in discrete units – "the quantization of charge".
- Measure the intrinsic charge of the electron (the smallest discrete unit of charge).

Theoretical Background/Context

Oil drops are sprayed into a region between two plates where an electric field is applied. The oil drops acquire some charge from an ionizing source. Thus the oil drop's motion between the plates is affected by its mass and the amount of charge it has acquired from the ionizing radiation. The motion of the charge is controlled by the value of the applied electric field and its polarity, thus it may fall, rise, or even remain stationary between the plates.

Principle of Work

By measuring the fall and rise speed of the oil drops in the presence of the electric field for oil drops, we can determine the amount of charge it has acquired. Hence, it can be proved that the amount of charge carried by each drop is an integer multiple of the electron charge.