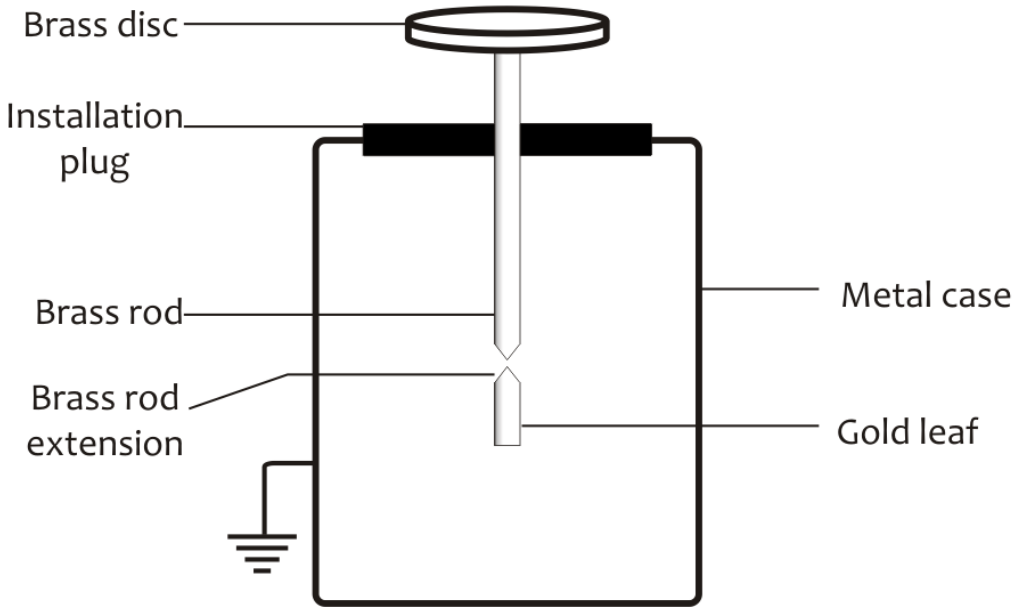
ELECTROSCOPE

An electroscope is an instrument used for the detection and testing of small electric charges. It consists of a flat brass disc or cap and a brass stem or rod with a gold leaf (or leaves) attached to the end of the rod. The brass rod is insulated from the metal case which surrounds the rod and leaf.



An Electroscope

The metal case is made draught proof with two plane glass sides such that the leaf can be clearly visible. The metal case is normally connected to

the earth (or earthed) to prevent the accumulation of charges due to external influence. The flat brass disc is one terminal of the instrument and the earthed metal case is the other terminal. The leaf is the sensitive part of the instrument; its position shows the presence of charges in the disc and rod.

Charging the Electroscope

By Contact: The electroscope can be charged by sliding a charged body on the brass disc of the instrument. Charge passes from the charged body to the disc and stem of the instrument down to the bottom through this contact. The leaf is observed to open when this happens. The leaf is repelled from the metal as both carry similar charges. The degree of divergence of the leaf indicates the amount of charge acquired by the instrument. The leaf remains in the divergence position even after the charging body has been removed showing that a charge has been acquired by the electroscope.

The charge acquired by the instrument is the same as that of the charging body.

By Electrostatic Induction: If a charged rod is brought near the cap of the electroscope without touching it, the leaf is seen to diverge, indicating that the instrument has acquired some charges. When this happens, we say that charge has been induced in the electroscope through the phenomenon of electrostatic induction. Electrostatic induction is the act of charging a neutral body by placing a charged body near it without any contact between the two.

Distinguishing Between Conductors and Insulators

If the brass cap of a charged electroscope is touched with the finger, the leaves of the electroscope collapse showing that the human hand has conducted away some of the charges. The human body is a fairly good conductor of electric charges.

Similarly, when any other body is brought in contact with the metal cap of a charged electroscope, a rapid collapse of the leaves indicates that the body is a good conductor while gradual collapse will indicate that the body is a poor conductor. When there is no charge at all in the divergence of the leaf, then the body is an insulator. In this way, we can distinguish between a good conductor, a poor conductor and an insulator.

Determining the Type and Magnitude of Charge on a Body

Summary of the effect on the gold leaf of a charged electroscope when a charged body and an uncharged body are near its metal cap:

Charge on electroscope	Charge brought near the cap	Effect on leaf
negative	negative body	divergence increases
negative	positive body	divergence decreases

positive	positive body	divergence increases
positive	negative body	divergence decreases
positive	uncharged body	divergence decreases
negative	uncharged body	divergence decreases

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