

I. Electrophorus

In the early days of electrical investigations (about the time of the American revolution), it was difficult to accumulate significant quantities of unbalanced electric charges for experiments. A device to produce an unbalanced charge relatively consistently was the *electrophorus* (invented by Volta). A device to measure fairly small amounts of unbalanced charge was the *electroscope* (invented by Nollet). Modern versions of these are shown in the picture at the right.

The electrophorus consists of a plate of insulating material (Teflon or Lucite – originally it was of wax), and a metal disk attached to an insulating rod. When the Teflon is rubbed by a flannel cloth it becomes charged. (You can tell by bringing the back of your arm up near it and feeling the little hairs move.) The metal disk, held by the insulating rod, is placed on the plastic plate and a finger lightly touched to the back. The finger is then removed and the disk lifted away from the plate. The metal disk now has a charge which can be easily transferred to other conducting objects by touching.

On a dry day (!), the charge on the plastic plate will remain on the plate for a very long time. The process of charging the metal disk can be repeated many times without “using up” the charge on the plastic plate.

Explain clearly how the electrophorus works, being careful to include in your explanation a clear description of why the charge on the plate is not used up in the process of charging the metal disk.

