

Answer 10

(a) When a glass rod is rubbed with silk, the rod gets positively charged due to loss of electrons to the silk.

i. The leaves diverge as the positively charged glass rod is brought near the cap of a neutral electroscope. The leaves collapse as the rod is taken away.

The positively charged glass rod attracts the electrons of the leaves to the cap. Hence, due to deficit of electrons on the leaves, they get positively charged and diverge because of repulsion between like charges. When the rod is removed, the electrons redistribute themselves. The cap and the leaves become neutral again. Therefore, the leaves collapse.

ii. On touching the cap with the finger momentarily, the leaves collapse and then diverge again as the rod is moved away. On touching the cap (with the rod kept near the cap), the free electrons at the cap cannot flow to earth as they are bound (by the force of attraction of the positive charge of the rod). But the deficit of electrons in the leaves of electroscope is compensated by the flow of electrons from the earth to the leaves. As the leaf system becomes neutral, the leaves collapse. When the rod is removed, the free electrons at the cap spread throughout the cap, stem and leaves. Therefore, the leaves diverge due to the repulsion between the like charges on the leaves.

iii. The leaves diverge when the cap is touched with the rod and it remains diverged on removal of the rod. When the positively charged rod is touched to the cap of the neutral electroscope, the sharing of positive charge takes place i.e. electrons from the leaves, stem and cap move to the rod. Hence, the electroscope gets positively charged. The leaves diverge due to repulsion between the like charges on the leaves. On removing the rod, the leaves remain diverged because the electroscope remains positively charged.

(b)

i. The potential difference between points A and B is 1.5 V as the voltage in parallel combination of the cells remains the same.

ii. In series combination, e.m.f. of cells is added i.e. 3 V which is twice the effective voltage in parallel arrangement of two cells.

iii. The cells in a conventional flash light are connected in series.

(c) Suspend each of the three bars separately by means of a thread. We will observe that one bar sets itself in a particular direction even after being disturbed and the other two can stay in any direction. The one having a fixed direction will be a permanent magnet. Remove this bar and bring it near the other bars. One of them will be attracted by the magnet bar at both the ends. This is the soft iron bar. The third bar will be of a non-magnetic substance.