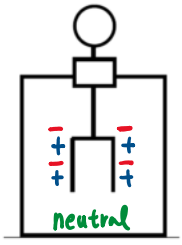
3-2 Note 3 Electroscope

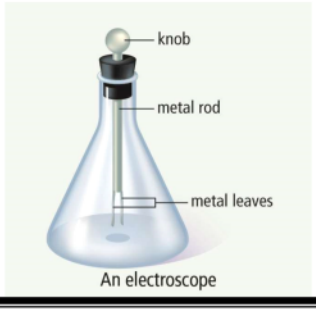
September 19, 2023 1:19 PM

Science 9 – Ch 3-2 Static Electricity Note 3: Electroscope (Not in Book)

A Metal-Leaf Electroscope

- Used to determine the presence of electric Charge.
- In a neutral electroscope the leaves are not separated.
- Number of proton (+) equal to the number of electrons (-) on the leaves. --> Neutral!!

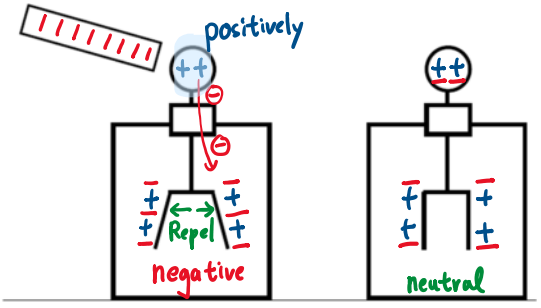




An electroscope

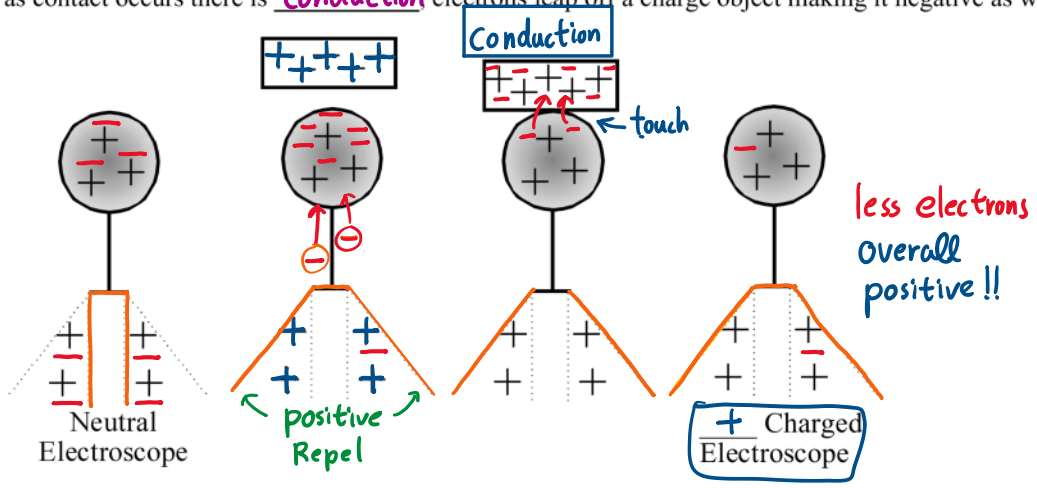
Charging an Electroscope by induction - Temporary

- When a negatively charged strip is brought near the electroscope, it induces a separation of charge.
- The ball on the top of the electroscope becomes positively charged and the two leaves become negatively charged.
- Since the two leaves have the same charge, they repel each other and spread out.
- When the charged object is removed, there is no longer an induced separation of charge and the leaves return to their original position.



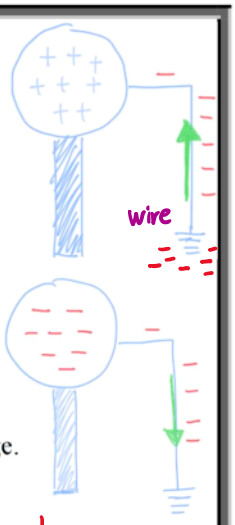
Charging an Electroscope by Conduction

- We can make the static charge stay on the leaves for longer if the charged object comes into contact with the metal knob on the electroscope.
- As soon as contact occurs there is conduction electrons leap off a charge object making it negative as well

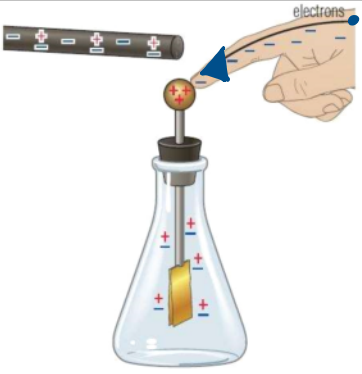


Grounding

- You can reset a charged electroscope by touching the metal knob with your finger to ensure all excess charges are removed or discharged to the ground.
- When a charged object touches a large neutral object such as Earth, the charged object becomes grouned and loses its net charge. ex) An object is **grounded** if it is connected to Earth by a conductor.
  - If the charged object was positively charged, electrons from the Earth move toward the charged object.
  - If the charged object was negatively charged, electrons move away from the charged object toward the Earth
- If a conductor has a sharp point, that area receives a greater concentration of charge.
- This is why lightning rods placed on the top of buildings have a pointed end.
- A conductor goes from the rod to the ground which prevents the lightning from going through the building.



3 Steps for Permanent CHARGING BY INDUCTION

Step 1: charged object induce a charge separation in the neutral object	**Step 2: the neutral object is grounded (i.e. electrons move to/from ground)**	**Step 3: object now has the opposite charge to the charged object used**
		
Like we've seen, when a negatively charged object comes near a neutral electroscope, it repel the electrons in the neutral electroscope downward. This causes the leaves to repel one another.	When the neutral electroscope is grounded, its electrons are provided with a path away from the repulsive influence. As a result, some electrons enter the electroscope. The leaves now return to their neutral position.	When the ground and charged object are removed, the electroscope is left with a negative charge because it has extra electrons. The leaves once again repel each other.

HW: Work Book P. 120-121