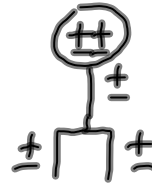


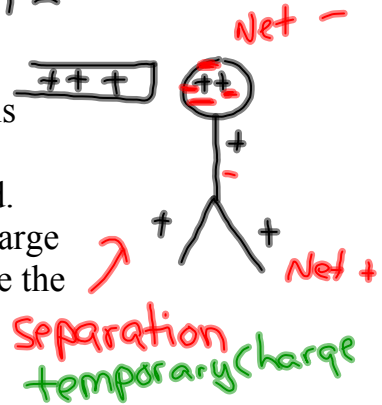
Section 7: Charging by Conduction (Contact)

1. Explain with the use of a diagram(s), how a positive charge may be placed on a gold leaf electroscope using conduction.

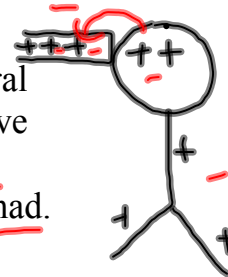
A. Neutral Electroscope



- B. Bring a positively charged glass rod close to the knob of the electroscope. Some of the free electrons on the leaves are attracted up to the knob of the electroscope due to the presence of the positive rod. The knob of the electroscope has a net negative charge and the leaves have a net positive charge. Therefore the leaves repel (separate).



- C. The positively charged rod touches the knob of the electroscope. Some of the free electrons on the neutral electroscope are attracted to the positive rod and move over to the positive rod until the electroscope shares the same deficit of electrons that the rod previously had.

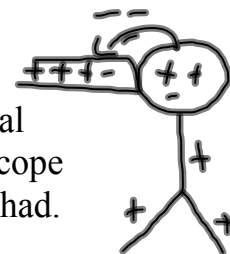


- D. The positive rod is removed from the knob of the electroscope. The electroscope is now positively charged.



Shorter Version

When a positively charged glass rod is touched to the knob of the electroscope, some of the free electrons on the neutral electroscope are attracted to the glass rod until the electroscope shares the same deficit of electrons that the rod previously had. Both now have a positive charge.

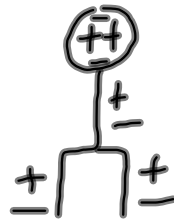


IMPORTANT: General Rule For Charging By Conduction (Contact)

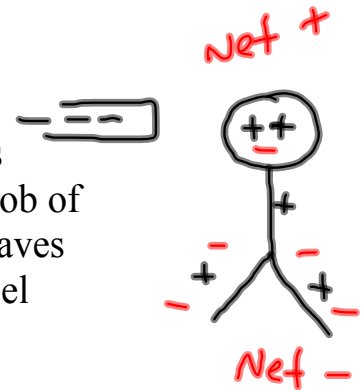
The object that is charged (if neutral to start with) has the same charge as the object that charged it.

2. Explain with the use of a diagram(s), how a negative charge may be placed on a gold leaf electroscope using conduction.

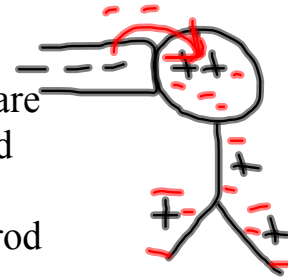
A. Neutral Electroscope



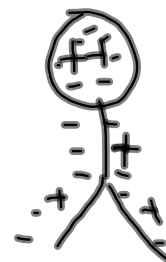
- B. Bring a negatively charged ebonite rod close to the knob of the electroscope. Some of the free electrons on the knob are repelled down to the leaves. The knob of the electroscope has a net positive charge and the leaves have a net negative charge. Therefore the leaves repel (separate).



- C. The negatively charged rod touches the knob of the electroscope. Some of the free electrons on the rod are attracted to the positive knob of the electroscope and move over to the knob of the electroscope until the electroscope shares the excess of electrons that the rod previously had.

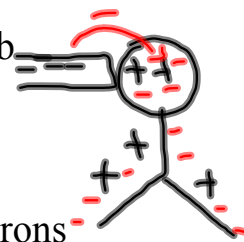


- D. The negative rod is removed from the knob of the electroscope. The electroscope is now negatively charged.



Shorter Version

When a negatively charged ebonite rod is touched to the knob of the electroscope, some of the free electrons on the neutral electroscope are repelled to the leaves. This causes the knob of the electroscope to be positive. As a result, free electrons on the rod are attracted to the knob of the electroscope. Electrons will continue to move to the electroscope until the rod and the electroscope share the excess of electrons that the rod previously had. Both now have a negative charge.



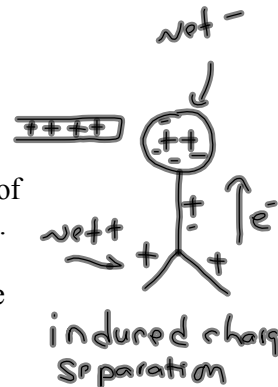
Section 8: Charging by Induction (Grounding) *x must use opposite charge*

1. Explain with the use of a diagram(s), how a negative charge may be placed on a gold leaf electroscope using induction.

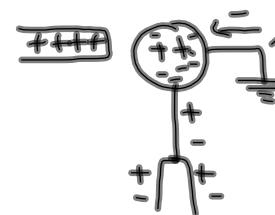
A. Neutral Electroscope



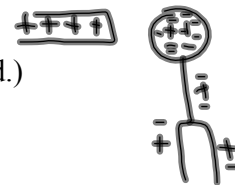
B. Bring a positively charged glass rod close to the knob of the electroscope. Some of the free electrons on the leaves and the shaft are attracted up to the knob of the electroscope due to the presence of the positive rod. The knob of the electroscope has a net negative charge and the leaves have a net positive charge. Therefore the leaves repel (separate).



C. Ground the electroscope while keeping the positive rod near. (Touch it with your finger.) Free electrons are attracted upward from the ground by the positive rod. The leaves of the electroscope fall, indicating a neutral condition as electrons are pushed down onto the leaves.



D. Remove the ground but keep the positive rod near the knob. When the ground is removed, the excess electrons are trapped on the electroscope. (Leaves are still dropped.)

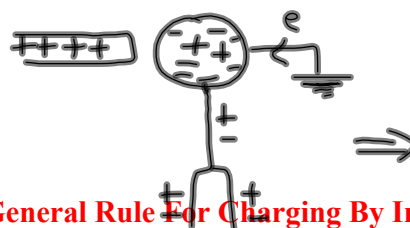


E. Now remove the positive rod. Electrons redistribute themselves on the electroscope. Due to the excess of electrons on the leaves, the leaves repel or diverge again. The electroscope is now negatively charged.



Shorter Version


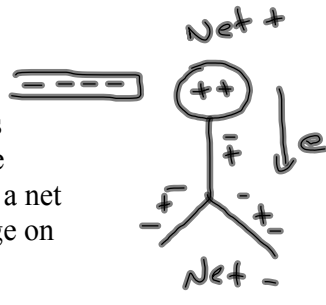
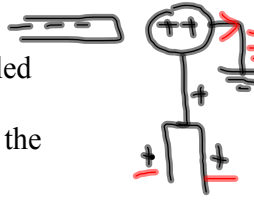
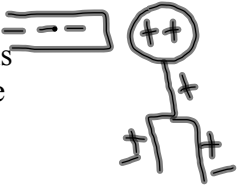

When a positively charged glass rod is held near the knob of a neutral electroscope, free electrons move to the knob of the electroscope. When the electroscope is grounded (touched with a finger), free electrons are induced to move through the finger onto the electroscope. When the ground (and then the rod) is removed, the electroscope is left with an excess of electrons and hence a negative charge.



IMPORTANT: General Rule For Charging By Induction (Grounding)

The object that is charged (if neutral to start with) has the opposite charge as the object that charged it.

2. Explain with the use of a diagram(s), how a positive charge may be placed on a gold leaf electroscope using induction.

- A. Neutral Electroscope 
- B. Bring a negatively charged glass rod close to the knob of the electroscope. Some of the free electrons from the knob and the shaft are repelled down to the leaves by the net negative charge on the rod leaving a net positive charge on the knob and a net negative charge on the leaves. Therefore, the leaves diverge (separate). 
- C. Ground the electroscope while keeping the negative rod near. (Touch it with your finger.) Free electrons are repelled to the ground by the negative rod. The leaves of the electroscope fall as electrons move from the leaves to the ground. 
- D. Remove the ground but keep the negative rod near the knob. When the ground is removed, the excess electrons are trapped in the ground; they cannot move back to the electroscope. (Leaves are still dropped.) 
- E. Now remove the negative rod. Electrons redistribute themselves on the electroscope. Due to the deficit of electrons on the leaves, the leaves diverge again. The electroscope is now positively charged. 

Shorter Version

When a negatively charged ebonite rod is held near the knob of a neutral electroscope, free electrons are repelled to the leaves. When the electroscope is grounded (touched with a finger), the free electrons are induced to move to the ground. When the ground (and then the rod) is removed, the electroscope is left with a deficit of electrons and hence a positive charge.

