Electrostatics

1) A conductor differs from an insulator in that a conductor \_\_\_\_\_\_\_\_.

a. has an excess of protons

b. has an excess of electrons

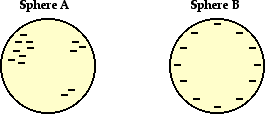
c. can become charged and an insulator cannot

d. has faster moving molecules

e. does not have any neutrons to get in the way of electron flow

f. none of these

2) One of these isolated charged spheres is copper and the other is rubber. The diagram below depicts the distribution of excess negative charge over the surface of two spheres. Label which is which and support your answer with an explanation.



3) Suppose that a conducting sphere is charged positively by some method. The charge is initially deposited on the left side of the sphere. Yet because the object is conductive, the charge spreads uniformly throughout the surface of the sphere. Why?

4) When an oil tanker car has arrived at its destination, it prepares to empty its fuel into a reservoir or tank. Part of the preparation involves connecting the body of the tanker car with a metal wire to the ground. Suggest a reason for why is this done.

5) Draw a diagram that best represents the charge distribution on a metal sphere when a positively charged plastic tube is placed nearby?

6) A physics teacher rubs a glass object and a felt cloth together and the glass becomes positively charged. Which of the following statements are true? Circle all that apply.

a. The glass gained protons during the rubbing process.

b. The felt became charged negatively during this rubbing process.

c. Charge is created during the rubbing process; it is grabbed by the more charge-hungry object.

d. If the glass acquired a charge of +5 units, then the felt acquires a charge of -5 units.

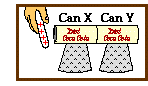
e. This event violates the law of conservation of charge.

f. Electrons are transferred from glass to felt; protons are transferred from felt to glass.

g. Once charged in this manner, the glass object and the felt cloth should attract each other.

h. In general, glass materials must have a greater affinity for electrons than felt materials.

7) Two neutral conducting pop cans are touching each other. A positively charged glass rod is brought near Can X as shown below. Which of the following occur as the glass rod approaches Can X? List all that apply.

a. Electrons jump from the glass rod to can X.

b. Electrons jump from the glass rod to can Y.

c. Electrons jump from can X to the glass rod.

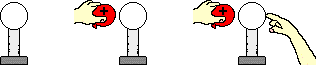
d. Electrons jump from can Y to the glass rod.

e. Protons jump from the glass rod to can X.

f. Protons jump from can X to the glass rod.

g. ... nonsense! None of these occur.

A positively charged balloon is brought near a neutral conducting sphere as shown below. While the balloon is near, the sphere is touched (grounded).



At this point, there is a movement of electrons. Electrons move \_\_\_\_ .

a. into the sphere from the ground (hand) b. out of the sphere into the ground (hand)

c. into the sphere from the balloon d. out of the sphere into the balloon

e. from the ground through the sphere to the balloon f. from the balloon through the

g. .... nonsense! Electrons do not move at all. sphere to the ground