Lab 32-1d: **Electrostatics - Notes**

There are three main ways to get something charged up: through friction, through contact or through induction. How you charge something largely depends on whether the object is a conductor or insulator, and whether you already have another charged object to use.

Charging by Friction

Explain:

1. Why do electrons get transferred from one object to the other?

2. Why don't any protons get transferred in this process?

3. Why can you not rub two identical objects to charge them by friction?

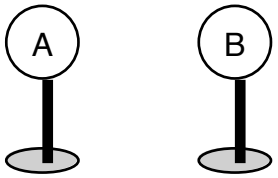
4. Assuming that you started off with two neutral insulators, and you charged them by rubbing them together, what is true about the charges on the two objects?

Charging by Contact

Explain:

5. Why can you not (easily) charge insulators through simple contact?

6. Imagine you have two identical metal spheres on insulating stands, labeled A and B. For each of the questions below, you are given what the charges are on each sphere – tell what will happen to the charges if you touch them together.



   a. A = +4 & B = 0 A = _____ & B = _____

   b. A = 0 & B = –6 A = _____ & B = _____

   c. A = +5 & B = +5 A = _____ & B = _____

   d. A = +2 & B = –2 A = _____ & B = _____

   e. A = +4 & B = –2 A = _____ & B = _____

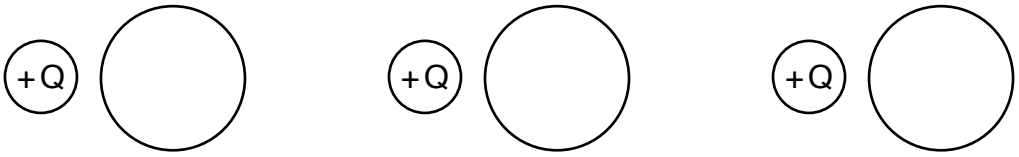
7. If the two conductors are identical, they must have the exact same charge after touching each other. What would happen if one of the conductors was a lot smaller than the other?

Lab 32-1d: **Electrostatics - Notes**

Charging by Induction

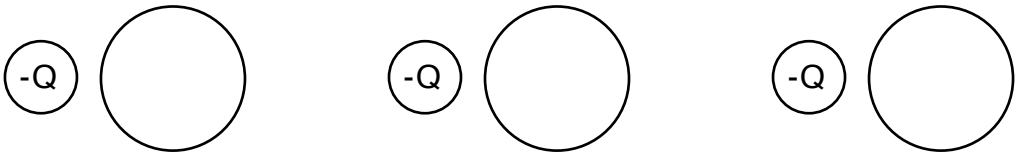
Explain:

8. Imagine you have a large positive charge (labeled +Q in the diagram.) You bring a conductor near the positive charge. The conductor is still neutral, but diagram what happens to the charge distribution in the conductor. Then show what happens when you touch the conductor, and then show the final result.



bring conductor close to charge | touch the conductor | final result

9. Do the same thing, but instead use a large negative charge (labeled –Q in the diagram.)



bring conductor close to charge | touch the conductor | final result

10. In both cases, what charged particles were doing ALL the moving? Why?

11. In both cases, how did the charge of the conductor compare to the original charge you started with?

12. In both cases, did anything happen to the original charge?

13. Only conductors can be charged through induction. Why?

14. From the lab, you actually placed the pie tin on top of the charged styrofoam. Since the styrofoam was negatively charged, why didn't the pie tin simply become negatively charged because of the contact with the styrofoam?

15. What is meant by the following terms:
free electron

charge polarization