

## Electric Charge experiment - ABRIDGED

*Note: Below is an abridged version of the Electric Charge lab, in which you have the opportunity to experiment with electric charge and the electric properties of materials. Please do Parts 1, 2, and 3 before switching to the Coulomb's Law lab. Part 4 is optional, in case you have time after finishing the Coulomb's Law lab and are curious.*

### Part 1 – Introduction

In this experiment, you have two types of rods (gray and clear) available to you. You can place one rod at a time on a rotating stand, and you can also use an electroscope to test for the presence of electric charge.

Without doing anything to any of the rods, try the following.

- Bring a rod close to, but not touching, the top metal plate of an electroscope. What do you observe?
- Place a couple of very small pieces of paper (about the size of the paper circles you get if you use a hole-punch on a sheet of paper) on the table. Bring a rod close to, but not touching, the small pieces of paper. What do you observe?
- Place a rod on the rotating stand so that the rod is balanced and at rest. Bring a second rod close to, but not touching, the first rod. What do you observe?

Now, repeat all three experiments above, but, this time, rub each rod with one of the fabrics (silk or felt) before you bring it close to something else. In at least some cases, you should notice a different outcome from what you observed above. What do you observe?

What do you think the act of rubbing an insulating rod with a material does?

## Part 2 – Charging insulating materials

Here, you should do a systematic study of the different materials you have available to you. The basic method is as follows. Select one of the rods (gray or clear) and one of the materials (silk or felt). Rub the rod with the material, and then place the rod on the rotating stand so that the rod is balanced and at rest. Take a second rod, and, using either the same material as before or a different material, rub the second rod with the material you select. Bring the second rod close to, but not touching the first rod, and observe what happens. What do you observe?

Carry out a detailed study of the various combinations of 2 rods and 2 materials you have available to you. You should be able to organize the rod-material combinations into at least two categories (according to whether the second rod after rubbing attracts or repels the first rod, for example). Use the space below to write down your observations. Suggestion – creating a table might help.

### Part 3 – Soda can attraction and/or repulsion

Prediction 3.1 – Before actually doing the experiment below, read what you will be doing and then use this space to predict what you think will happen.

Take one rod-material combination from part 2 (which provides a strong charge to the rod), and rub the rod with the material to charge the rod. Place an empty soda can on its side on a flat surface, and bring the charged rod close to, but not touching the side of the can. What do you observe? Draw a picture to explain your observations.

Prediction 3.2 – Before actually doing the experiment below, read what you will be doing and then predict what you think will happen in this space.

Now use a second rod-material combination from part 2, one in which the second rod attracted the rod you used above. Place an empty soda can on its side on a flat surface, and bring the second charged rod close to, but not touching the side of the can. What do you observe? Draw a picture to explain your observations.

#### Part 4 – Using an electroscope – OPTIONAL

*Note: This part is optional and should only be tried AFTER you have completed the Coulomb's Law lab.*

You should have predicted the outcomes of the following experiments on the pre-lab assignment.

Take one rod-material combination from part 2 (which provides a strong charge to the rod), and rub the rod with the material to charge the rod. Bring the charged rod close to, but not touching, the electroscope. What does the electroscope do?

Take the rod away. What does the electroscope do?

Use a second rod-material combination from part 2, one in which the second rod attracted the rod you used above. Rub the rod with the material to charge the rod. Bring the charged rod close to, but not touching, the electroscope. What does the electroscope do?

Take the rod away. What does the electroscope do?

Return to the first rod-material pair. Rub the rod with the material to charge the rod, and then charge the electroscope by rubbing the rod on the top of the electroscope. The electroscope should register that it is charged when you take the rod away. Rub the rod with the material again to charge the rod again, and now bring this rod close to, but not touching, the electroscope. What does the electroscope do?

Use your second rod-material combination from part 2, rubbing the second rod to charge it. Bring the charged rod close to, but not touching, the electroscope. What does the electroscope do?