

Lab 1 – Electric Charge

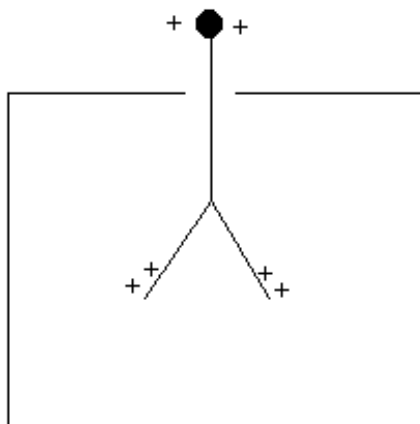
Name _____

Partner's Name _____

I. Introduction/Theory

Electroscope – The electroscope is a simple instrument, which can be used to detect the presence of an electric charge. It consists of a conducting rod that is terminated by two extremely light, movable conducting leaves. Since the leaves are susceptible to air currents, the instrument is enclosed in a metal and glass case (enclosure). The conducting rod is insulated from the enclosure and is charged through a metal knob that protrudes from the top of the enclosure.

When a charged object is placed near the knob, the leaves will diverge because like charges repel. When the charge is removed, the leaves will come together again. When a negative charge is placed near the knob, some of the electrons on the knob's surface are deposited on the leaves. This will cause both leaves to acquire an excess negative charge and the leaves will then diverge. Or, if positive charge is placed near the knob, it will attract some of the electrons from the leaves to repel each other. The divergence of the leaves is directly related to the quantity of charge.



Electroscope

II. Equipment

Electroscope

Glass, Plastic, and Rubber Friction Rods

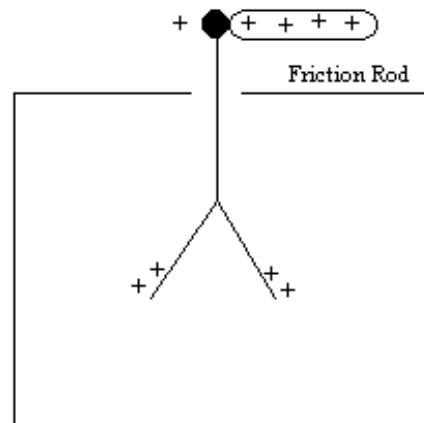
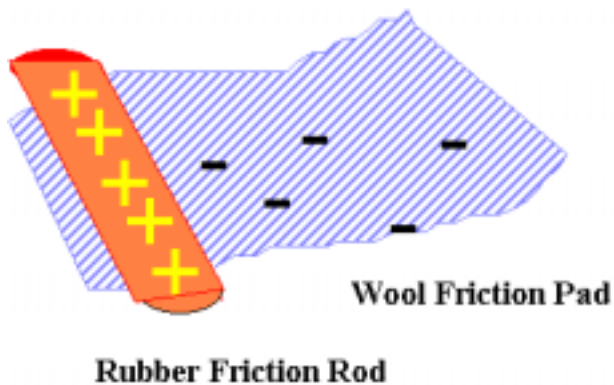
Fur, Silk, and Wool Friction Pads

Van de Graff

Conduction Wire

III. Procedure/Data

1. Using the Van de Graaff with a conducting wire connected to an insulating rod, charge the electroscope and verify the leaves diverge from each other. If you have trouble with this see your instructor.
2. In the space below make a figure of the electroscope with the induced charge produced from step 1. Make sure your figure includes the sign of the used. Before going to the next step, ground the electroscope to remove any excess charge from it.
3. Induced charge can be placed on the rubber friction rod by rubbing it against the wool friction pad. The induced charge can then be transferred to the electroscope by making contact with its conducting rod. This should cause the leaves to diverge from each other. Experiment with this procedure to verify that the friction rod is an insulator. If you have trouble with this see your instructor.



4. Leaving the electroscope charged, ground the rod and pad. Induce charge on the rubber friction rod with the wool friction pad with the stroking motion in the opposite direction. Add this new charge to the electroscope. Did the sign of the charge change? Record result in Table 1. Before going to the next step, ground the electroscope to remove any excess charge from it.
5. Repeat the above procedure to complete Table 1 for all combinations of friction rods with all combinations of friction pads.

+/- change Yes, No, or Null Result (NR)	Wool	Fur	Silk
Rubber			
Plastic			
Glass			

Table 1

IV. Analysis

1. Explain how you know the friction rod is an insulator and not a conductor. Hint: there is room to draw a picture or two!

2. Some combinations in Table 1 likely produced null results. Comment on how friction and humidity could be a factor in the null result(s).

- V. Conclusions (include physical concepts and principles investigated in this lab, independent of your experiments success, and summarize without going into details of the procedure.)