Static Electricity Lab:

Name: _____
Date: _____ Period:____

Apparatus:

1. Electroscope
2. Plastic Strip (clear and opaque)
3. Cat's Fur
4. Cloth/Silk pad

The Investigation:

Objects can acquire static electric charges by either gaining or losing electrons. A body that gains electrons has a net negative charge: a body that loses electrons has a net positive charge.

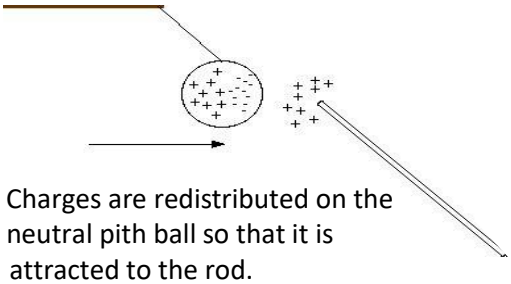
Any object can acquire a static (at rest) electric charge. However, only those objects that are separated from ground by non-conductors will retain their charge for any length of time. During this investigation you will use the apparatus provided to experiment with the bodies having static electric charges.

*** Bear in mind three rules:

1. Electrons are highly mobile – they can be easily moved around within a body or can be moved from one body to another.
2. Rubber rods when rubbed with wool or fur acquire electrons from the fur and thus become charged negatively.
3. Plastic strips when rubbed with plastic gloves lose electrons to the gloves and thus become charged positively.

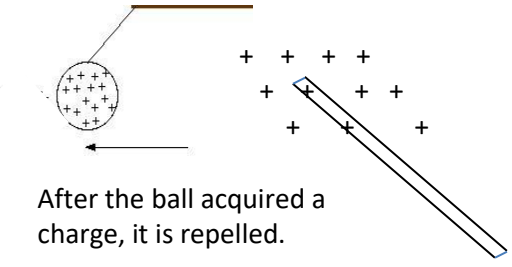
If a positively charged object (clear plastic strip) is brought close to a suspended pith ball, electrons in the side of the pith ball facing the charged object (clear plastic strip) will be attracted to this strip. This will leave the other side of the pith ball facing away from the strip positively charged. The pith ball will be attracted to the clear plastic strip. See diagram "a" below. (Unlike charges attract one another). If the bodies make contact, the positive clear strip will draw electrons out of the pith ball. This results in a deficit of electrons on the pith ball. Thus, the pith ball acquires a net positive charge. It is then repelled by the positively charged strip. See diagram "b" below. (Like charges repel one another).

a. Neutral Pith Ball — Positively Charged strip



Charges are redistributed on the neutral pith ball so that it is attracted to the rod.

b. Positively Charged Pith Ball — Positively Charged strip



After the ball acquired a charge, it is repelled.

Procedure: Record your observations in the spaces provided in this section of the investigation.

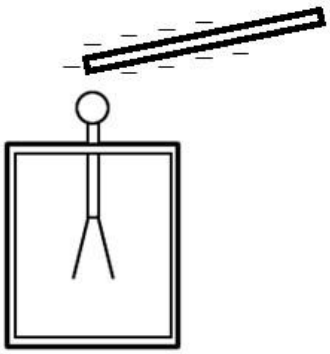
A. Charging a Pith Ball:

1. Rub the white plastic strip with fur or wool, and then bring this strip close to a suspended pith ball. The charged white plastic strip first _____ and then _____ the pith ball.
2. Ground the pith ball by touching it with your finger.
3. Rub the clear plastic strip with a silk cloth. The clear plastic strip will then be charged positively. Bring the clear plastic strip close to the neutral pith ball. The charged clear plastic strip first _____ and then _____ the pith ball.

B. The Electroscope:

Charge the white plastic strip. Hold the white plastic strip NEAR the top of the electroscope.

1. The leaves of the electroscope _____(diverge, converge).



Electroscope

The leaf electroscope is useful for detecting static charge and indicating whether it is positive or negative. As the leaves acquire either to many or are made deficient of electrons, they repel and stand away from one another.

2. Move the white plastic strip away from the electroscope after being NEAR the electroscope.

   a. The leaves of the electroscope _____ (diverge, converge)

   b. Touch the white strip to the top of the electroscope. The leave of the electroscope _____(diverge, converge) .

   c. Bring the negatively charge white plastic strip near the top of the electroscope again. The leaves _____(diverge, converge).

   d. Touch the top of the electroscope with your finger. The leaves _____ (diverge, converge) .

3. Charge the clear plastic strip with the silk cloth. Bring this plastic strip NEAR the top of the electroscope.
    a. The leaves of the electroscope _____(diverge, converge).

    b. Touch the clear plastic strip to the top of the electroscope. The leaves of the electroscope _____(diverge, converge).

    c. Bring the clear plastic strip close to the top of the electroscope again. The leaves _____(diverge, converge).

    d. Touch the top of the electroscope with you finger. The leaves _____ (diverge, converge).

4. Charge the white plastic strip with wool or fur. Bring this plastic strip close to the electroscope without touching it or allowing a spark to jump.

    a. The leaves of the electroscope _____(diverge, converge).

    b. While holding the white plastic strip close to the electroscope, have your partner briefly touch the electroscope knob, the leaves _____(diverge, converge).

    c. Now have your partner release the electroscope knob, and then move your white plastic strip away from the electroscope, the leaves _____(diverge, converge).

5. Charge the clear plastic strip with silk cloth. Bring this plastic strip close to the electroscope without touching it or allowing a spark to jump.

    a. The leaves of the electroscope _____(diverge, converge).

    b. While holding the clear plastic strip close to the electroscope, have your partner touch the electroscope knob, the leaves _____(diverge, converge).

    c. Now have your partner release the electroscope knob then move your clear plastic strip away from the electroscope, the leaves _____(diverge, converge).

Post-Lab Questions:

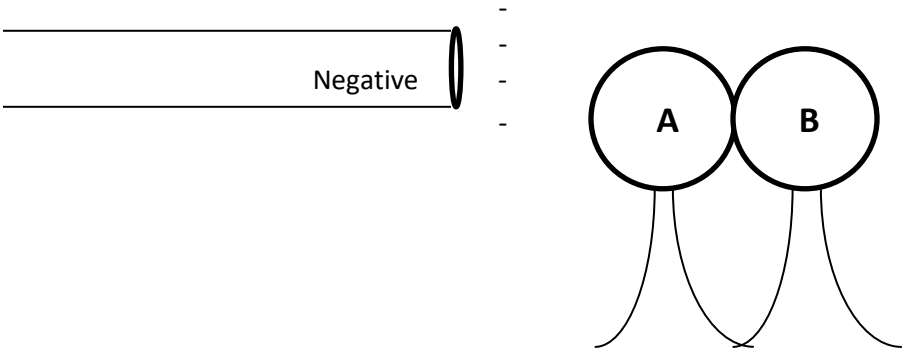
1. The action between the clear plastic strip and the pith ball was explained in the first part of the procedure. The action between the white plastic strip and the pith ball was not explained. Using the theory that only electrons move, write a paragraph explaining what you think caused the pith ball to behave the way it did when the white plastic strip was brought close to it. Use a picture to help explain this situation. 3 pts.

2. Why did the leaves of the electroscope diverge when the negatively charged white plastic strip was brought close to it? 2 pts.

3. Why did the leaves of the electroscope diverge when the positively charged plastic strip was brought close to it? 2 pts.

4. Like static charges _____ while unlike static charges _____ 2pts.

5. Study the diagram below. **Explain** what charges you think will exist on Ball A and on Ball B if the two balls are FIRST separated and then the charge is removed? 3 pts.



6. Diagram the steps to procedure #4 using pictures. Show how electrons move in each step. 3 pts.

7. Diagram the steps to procedure #5 using pictures. Show how electrons move in each step. 3 pts.

8. In procedure #4 and #5, why must your partner release the electroscope knob before removing the charged rod. 2 pts.

9. What charge remains on the electroscope in procedure #4. ? _____1 pt.

10. What charge remains on the electroscope in procedure #5.? _____1 pt.

Name: _____

Date: _____ Period _____

Score Weight
_____18 procedure
_____ 22 postlab
_____ 40 Total