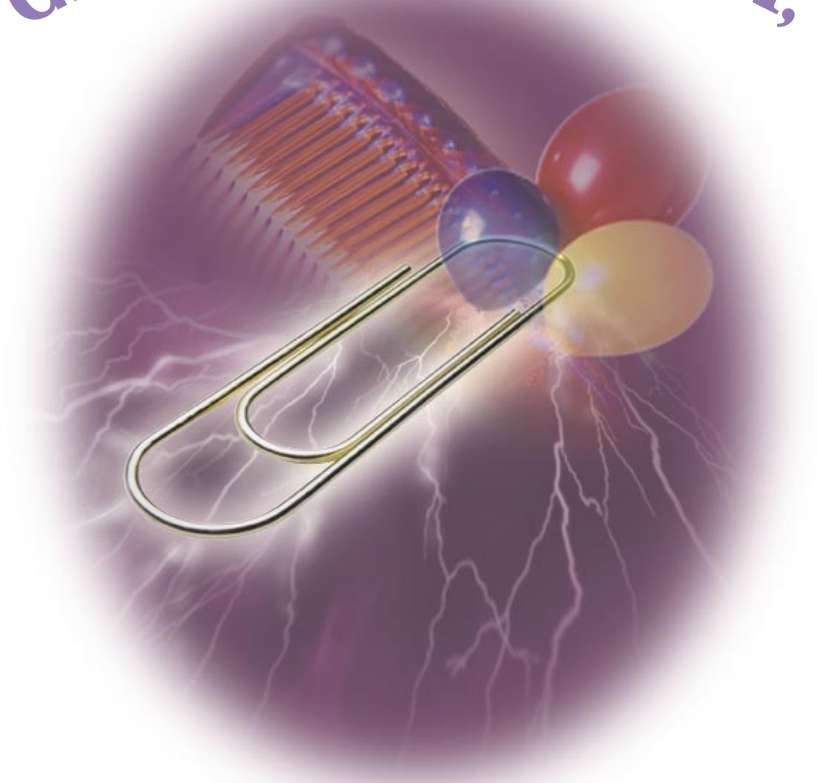


GET READY, GET SET,



CHARGE!

GRADES 3 - 5



Energy to Serve Your World®

GET READY, GET SET, SNC - Plant Farley LESSON PLAN CHARGE!

Lesson Title: Get Ready, Get Set, Charge!

Lesson Description: Students will apply concepts related to electrochemistry by constructing an electroscope. They will then use the electroscope to conduct exercises with static electricity. The exercise is designed to complement/reinforce discussion of concepts regarding static electricity.

Grade Level: 6-8 (modify as needed for each grade level)

Subject Area(s): Physical Science

Objectives: Students will:

- construct a simple electroscope
- observe static electricity
- use electroscopes to detect electrical charge
- analyze and discuss observations and data with other students
- relate findings to principles of static electricity (insulators, conductors, charge, induction, etc.)

Materials:

- narrow mouth glass jars with cork stoppers to fit
- jumbo metal paper clips (not covered with plastic)
- strips of aluminum foil
- balloons
- scissors
- plastic combs or nylon rods
- pencils
- wool cloth
- activity sheets

Correlations (NSES):

- Content Standard A – Science as Inquiry
 - develop abilities to do scientific inquiry
 - develop understandings about scientific inquiry
- Content Standard B – Physical Science
 - develop an understanding of properties and changes of properties in matter
 - develop an understanding of transfer of energy
- Content Standard E – Science and Technology
 - develop abilities technological design
 - develop understanding about science and technology
- Content Standard F – Science in Personal and Social Perspectives
 - develop understanding of science and technology in society

Curriculum Integration:

- Vocational Education (electricity)

Process Skills:

- Observation
- Comparison
- Collection of data
- Measurement
- Counting
- Research
- Inference
- Investigation/experimentation
- Interpretation of data
- Analysis of data
- Description of findings
- Communication of ideas
- Construction of model

Background Information:

- Main ideas
 - Principles related to static electricity such as:
 - the flow of electrons through a conductor
 - protons have a positive charge and electrons are negatively charged
 - objects with equal amounts of +/- (protons and electrons) have a neutral charge
 - additional principles such as voltage, amperes, Ohm's Law, etc. may be discussed if so desired
 - static electricity is similar to magnetism due to concepts of attraction and repulsion
 - An electroscope is a simple device used to detect static electricity
 - Static electricity results from the transfer and accumulation of electrons
- Secondary ideas
 - Lightning is static electricity

Teacher Activities:

- Assemble/organize all materials needed for activity.
- Present background material to students.
- Issue instructions on how to construct electroscopes for this exercise.
- Depending on the size of the class, the teacher may wish to divide the class into groups of 2-4 students. Each student in the group should have a specific task in the exercise. Issue instructions to students regarding experiment.
- Distribute Activity Sheets to students and give instructions on how to complete them.
- Stress lab safety (glass).
- Monitor/assist students as needed during exercises.
- After students complete exercises and assemble back into a group, allow students to show their work and describe their observations.
- After students have shared their work, engage students in post-activity discussion. Stress main points of lesson during discussion.

Student Activities:

- Listen to background information given by teacher
- Obtain all materials needed to complete the exercise (refer to Activity Sheet)
 - Record preliminary data on Activity Sheets
- Construct electroscopes as directed in Activity Sheets
- Observe results and record data
- Interpret/analyze data and share it with other students
- Participate in post-activity discussion

Evaluation:

- Activity sheets
- Direct observation
- Oral reports from students

Extension/Enrichment:

- Have students utilize different materials for strips in their electroscopes (e.g. silver or gold foil).
- Use a variety of sources for generation of charge.
- Construct other types electroscopes.
- Do a study on lightning.
- Study how static electricity affects various types of industries.

Safety Considerations:

- Caution students not to place metal strips in their mouths.
- Caution students to handle glass containers with care to prevent breakage.

GET READY, GET SET,

ACTIVITY SHEET ONE

CHARGE!

(READ THIS ENTIRE SHEET BEFORE BEGINNING THE EXERCISE)

Introduction

In this lab activity, you will construct an electroscope and use it to detect static electricity. You will also be using various materials to generate static electricity. Your teacher has discussed static electricity with you prior to this exercise. You will now be able to apply some of the concepts discussed in class.

Follow the directions on this Activity Sheet and record your data carefully and accurately, as you will be called upon to relay your findings to the rest of the class after the lab is completed.

Procedure

GET READY

- Obtain the following materials as directed by your instructor:
 - 2 small strips of aluminum foil
 - a narrow mouth jar with a small tight-fitting cork stopper
 - a jumbo paper clip
 - balloons
 - nylon comb or rod
 - scissors
 - wool cloth
 - pencil
- Answer the first two questions on Activity Sheet 2. Then proceed as directed below.

GET SET

- Use the scissors to cut the aluminum foil into two small strips about 4 inches wide and about 1 inch long.
- Open up the paper clip and straighten one end so that you have a hook; see Figure 1.
- Insert the straightened end of the paper clip into the small end of the cork; push it all the way through so that a small part of the clip projects through the cork top; see Figures 2 and 4.
- Stack the two small strips of foil atop one another and then punch a small hole through both strips about 1/16" from one end; see Figure 3.
- Thread both strips onto the hook; the two strips should be close together on the hook but not quite touching; see Figure 4
- Answer questions 3 and 4 on Activity Sheet 2.

CHARGE!!!!!!

- Inflate the balloon and rub it gently with the wool cloth; then bring the balloon very close to the paper clip on the electroscope without touching it; observe what happens.
- Now go ahead and touch the balloon gently to the tip of the clip on the electroscope; observe what happens.
- Answer question 5 on Activity Sheet 2.
- Repeat this process using the nylon comb or rod and make observations.

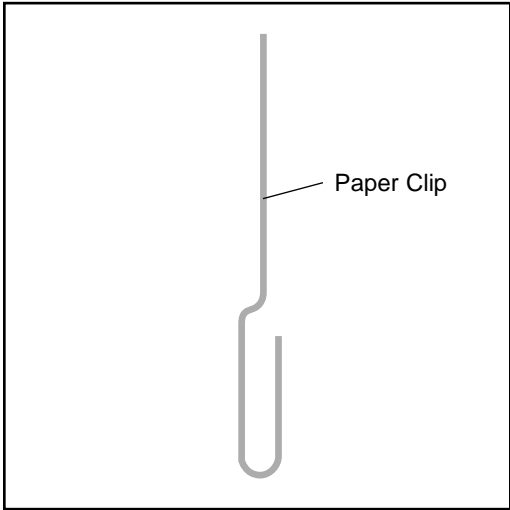


Figure 1

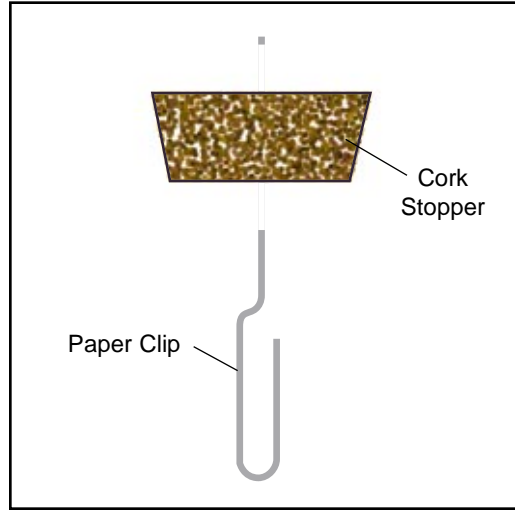


Figure 2

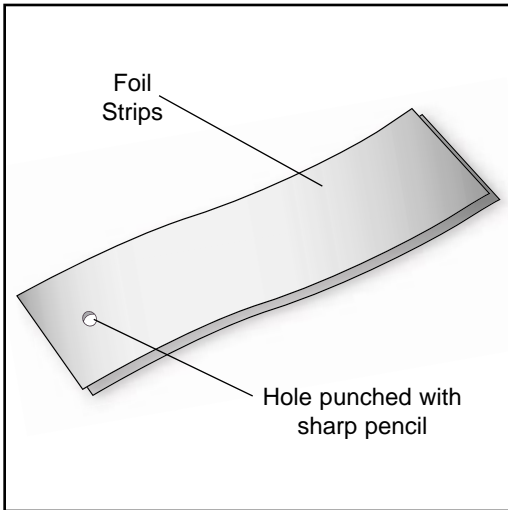


Figure 3

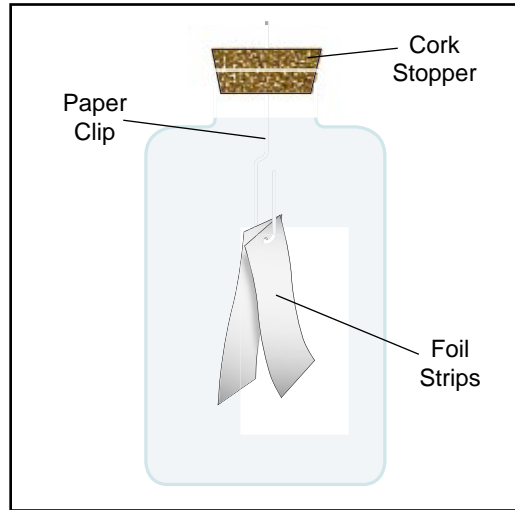


Figure 4

GET READY, GET SET,

ACTIVITY SHEET TWO

CHARGE!

1. What is static electricity? List some examples of static electricity that one might encounter in everyday life.
2. Do you think your electroscope will work? Why or why not? Formulate a principle of how an electroscope functions.
3. How does a balloon and a wool patch produce static electricity?
4. Do you think that the nylon comb will also produce static electricity? Name some other items that you believe will produce static electricity. Name some items that will not produce static electricity. Why do some items produce static electricity while others do not?

5. Describe what happened when you brought the balloon near the electroscope. Why did this occur?

6. Describe what happened when you touched the balloon to the electroscope. Why did this occur?

7. Describe what occurred when you used the nylon comb in place of the balloon. Were the reactions the same as with the balloon or different?

8. Compare your results with those of others in the class.