

SNC1D/1P The Characteristics of Electricity/Electrical Applications

Student Activity/Teacher Demo: Spinning Dish

Topics	Timing
static electricity transfer of charge induction	preparation: 3 min demonstration: 5 min

Specific Expectations

SNC1D

- A1.1 formulate scientific questions about observed relationships, ideas, problems, and/or issues, make predictions, and/or formulate hypotheses to focus inquiries or research
- A1.8 analyse and interpret qualitative and/or quantitative data to determine whether the evidence supports or refutes the initial prediction or hypothesis, identifying possible sources of error, bias, or uncertainty
- A1.10 draw conclusions based on inquiry results and research findings, and justify their conclusions
- A1.11 communicate ideas, plans, procedures, results, and conclusions orally, in writing, and/or in electronic presentations, using appropriate language and a variety of formats (e.g., data tables, laboratory reports, presentations, debates, simulations, models)
- E2.1 use appropriate terminology related to electricity, including, but not limited to: *ammeter*, *amperes*, *battery*, *current*, *fuse*, *kilowatt hours*, *load*, *ohms*, *potential difference*, *resistance*, *switch*, *voltmeter*, and *volts* [C]
- E3.2 explain the characteristics of conductors and insulators and how materials allow static charge to build up or be discharged

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- E2.1 use appropriate terminology related to static and current electricity, including, but not limited to: *ammeter*, *ampere*, *battery*, *conductivity*, *current*, *energy consumption*, *fuse*, *kilowatt hours*, *load*, *ohm*, *potential difference*, *resistance*, *switch*, *voltmeter*, and *volts* [C]
- E3.1 compare conductors and insulators, and explain how materials allow static charge to build up or be discharged

E3.2 explain the law of electric charges with reference to common electrostatic phenomena (e.g., charging by contact or by induction)

Introduction

In this demo, two polyethylene strips are charged on one end by rubbing with wool. One charged strip is then mounted on an evaporating dish and the other charged strip is used to make the dish spin. As both strips become negatively charged when rubbed with wool they will repel each other when they are in close proximity.

Materials

2 polyethylene strips
wool (sheep's fleece)

ceramic evaporating dish
modelling clay

Safety Considerations

- None

Procedure

1. Place two small balls of modelling clay on opposite edges of an evaporating dish (Fig. 1).

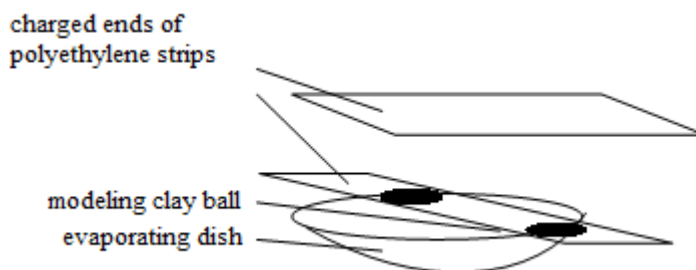


Fig.1 Set-up for demo

2. Charge one end of one polyethylene strip by rubbing it with wool. Place the charged strip onto the clay balls to attach the strip to the dish.
3. **Predict**
Ask students to predict what will happen when a second charged polyethylene strip placed just above the evaporating dish with its attached charged strip.
4. **Explain**
Ask students to justify their predictions.
5. **Observe**
Charge the second polyethylene strip on one end by rubbing it with wool. Hold the second charged strip just above the strip attached to evaporating dish but DO NOT touch anything with the charged strip in your hand.
6. Move the strip around above the dish to try to get the dish to spin.
7. **Explain**
Ask the students to review their predictions and see if they match their observations.
8. Invite students to suggest a model for the charges present in conductors and insulators to help explain their observations.

Disposal

Store the equipment for future use.

What happens?

The charged rod on the dish spins away when approached by the other charged rod.

How does it work?

Rubbing wool on a polyethylene strip transfers electrons from the wool to the strip. Both strips will thus become negatively charged. The negative charges (electrons) in the polyethylene strips repel each other when placed near each other. Since one of the strips is attached to the evaporating dish, and the dish is in contact with the surface it is on at only one point, the dish will spin as the two strips repel each other.

Teaching Suggestions/Hints

1. Prepare the charged strip on the dish just before performing the demo; otherwise the strip will lose its charge.
2. In Step 5 of the Procedure, just touching the strip will not ground the entire charge because polyethylene is an insulator. The variable charge density is stuck where it is applied. It can be wiped off where your hand touches the strip but all of the charge will not be removed.
3. Discuss why it is negative charges that move and connect this to the model of the atom.
4. This model assumes there are only two types of charge. In the millions of observations of this type that have been made, an object with a particular test charge either attracts or repels other charged objects.

Next Steps

none

Additional Resources

none