

ELECTRICITY DAY 4: LAB L10.1 - CHARGING & ELECTROSCOPE INQUIRY

CED 10.2 · Skills 3.A/3.C · FRQ: ED · bounded inquiry record

RETRIEVAL - NO DEMO

In one line each, define charging by **friction**, **conduction**, and **induction with grounding**.

QUESTION AND VARIABLES

Question: Which observed electroscope behaviors distinguish polarization, conduction, and induction with grounding?
Independent variable: action sequence and rod sign. **Dependent observations:** leaf separation during the action and after the rod is removed.

SUPPLIES AND SAFETY

Electroscope; PVC and acrylic/glass rods; fur or wool; balloon and tape as alternates. Hold rods by the uncharged end. Keep charged rods away from outlets and sensitive electronics. Discharge the electroscope before each new trial.
No-equipment fallback: use teacher-provided PhET *Balloons and Static Electricity* observations. Record it as a simulation investigation, not a physical electroscope trial.

PREDICTIONS - COMPLETE BEFORE TESTING

Rod sign	Action	Leaves during?	Leaves after rod leaves?	Predicted final sign
negative	approach only			
negative	touch			
negative	approach + ground			

PROCEDURE

- 1. Discharge the electroscope and verify that the leaves hang together.
- 2. Charge a rod by friction. Record the rod sign supported by the material pair.
- 3. **Approach trial:** bring the rod near the knob without touching; record leaf behavior; remove the rod.
- 4. Discharge. **Conduction trial:** touch the knob with the charged rod; remove the rod; record the final leaf state.
- 5. Discharge. **Induction trial:** hold the charged rod near the knob; touch the far side/knob with a grounded finger; remove the finger first; then remove the rod.
- 6. Repeat with the other available rod/material sign. Run at least two trials per sequence.

Sequence checkpoint: for induction, remove ground before removing the charged rod.

RESULTS

Trial	Rod sign	Action	Leaves during	Leaves after	Repeat agrees?
1					
2					
3					
4					
5					
6					

Qualitative scale: closed / slight / medium / large separation. Use the same viewing angle for all trials.

ANALYSIS

Evidence pattern	Mechanism claim	Charge explanation
Leaves separate only while rod is near		
Rod touches; leaves remain apart afterward		
No source contact; ground used; leaves remain apart afterward		

1. Draw the electroscope charge distribution for a negative rod held near the knob. Label the induced sign on the knob and leaves.

2. For the negative-rod induction trial, identify the direction electrons moved through ground and the final sign after the rod left.

3. Explain why leaf separation by itself does not identify the charging mechanism.

4. Identify one control or procedural change that improves comparison across trials.

CLAIM-EVIDENCE-REASONING

Prompt: Use one conduction trial and one induction trial to answer: *Can the same final leaf separation be produced by different charging mechanisms?*

Claim: State a direct answer that names both mechanisms.

Evidence: Cite the action sequence and final leaf state from two trials.

Reasoning: Explain electron motion and the final sign for each mechanism.

Uncertainty: State one limitation of using leaf angle as evidence and how you reduced it.

Required lab record: predictions, raw results, analysis sketches, and CER remain together.