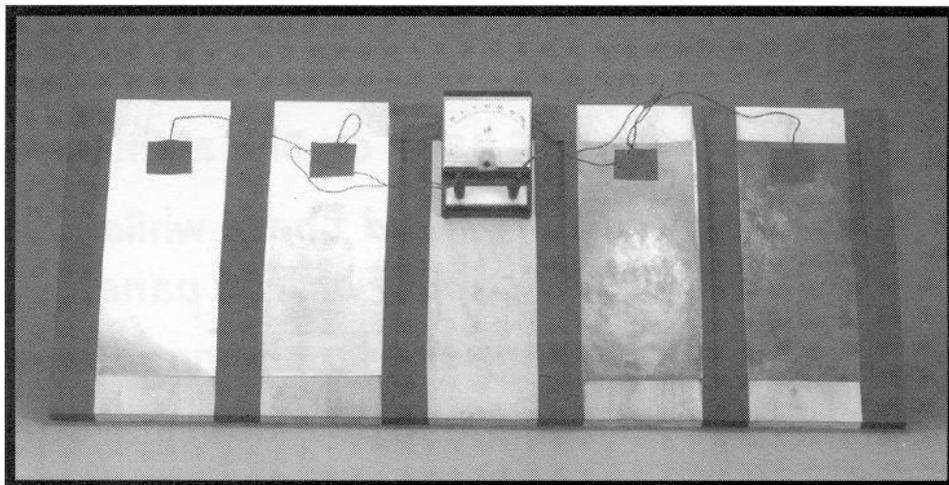


Human Battery

Visitors place their hands on different metals to test the flow of electricity from one metal to another as evidenced by an ammeter.



OBJECTIVES:

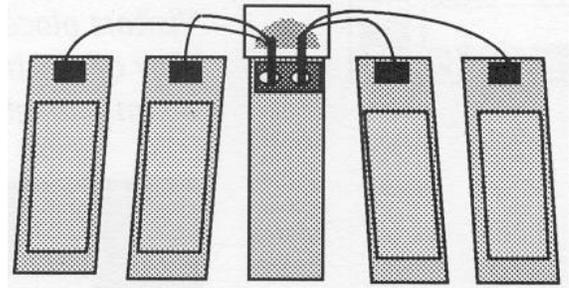
Visitors learn that different metals have different electrical properties and that this principle is used in the making of batteries. They also learn that the human body will conduct electricity.

SCIENCE TOPICS	PROCESS SKILLS	VOCABULARY
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Electricity	Observing	Electron
Conductivity	Investigating	Metal
Properties of Metals	Comparing/Contrasting	



Human Battery



To notice:

1. Put your left hand on the aluminum or zinc panel.
2. Keep your left hand there while you put your right hand on the copper or iron panel.

What happens to the needle on the meter?

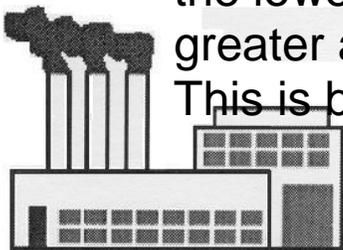
(The meter measures electrical current, or amperage.)

3. Try other combinations of metals.

What combination makes the needle move the farthest?

What is going on?

Each metal has a different level of attraction for electrons. An electron is a very, very small particle that has a negative electrical charge. When two metals are connected in a circuit by electrically conducting materials, such as a wire and, in this case, a human body, electrons will flow along the wire between them. The electrons flow from the metal with the lower attraction for electrons to the metal with a greater attraction. This produces an electrical current. This is basically how batteries work.



MATERIALS**(with amounts to have on hand)**

- One 6 in. by 12 in. sheet of Fe (iron)
- One 6 in. by 12 in. sheet of Cu (copper)
- One 6 in. by 12 in. sheet of Al (aluminum)
- One 6 in. by 12 in. sheet of Zn (zinc)
- One micro-ammeter (Central Scientific, 1-800-262-3626)
- 6 ft insulated electrical wire
- One 1¼-ft by 3-ft wooden board
- Heavy-duty cloth tape, 2 in. wide

Setup/Takedown Procedures**ORIGINAL SETUP**

- Using the cloth tape, attach the micro-ammeter in the center of the board. Cut four lengths of wire each about 18 in. long.
- Punch a hole near one end of each metal sheet and attach one end of an 18-in. piece of wire to the metal sheet by threading it through the hole.
- Attach the metal sheets to the wooden board by taping the sides onto the board. Place Al (aluminum) and Zn (zinc) on the left of the micro-ammeter, and Cu (copper) and Fe (iron) on the right. The metal sheets should not touch each other.
- Connect the wires from the Al (aluminum) and Zn (zinc) to the negative terminal of the meter.
- Connect the wires from the Cu (copper) and Fe (iron) to the positive terminal of the meter.
- Label the appropriate metal sheets “Al (Aluminum),” “Zn (Zinc),” “Cu (Copper),” and “Fe (Iron).”

WEEKLY SETUP

- Set out the human battery assembly.
- Set out the visitor instructions in a Plexiglas holder.

DAILY SETUP

- Check that all metals are secure and that the micro-ammeter has been zeroed. (Zero the ammeter by turning the black plastic screw in the center of the meter’s face.)

WEEKLY TAKEDOWN

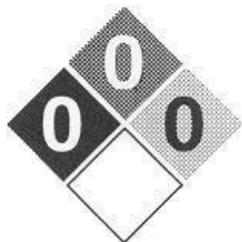
- ❑ Return the human battery assembly to the storage area.

**RUNNING SUGGESTIONS**

- ◇ More current will be produced when hands are very sweaty. Different people will get different results as to which combination works the best. Cu (copper) and Al (aluminum) should produce the most current.

**EXTENSIONS**

In a battery, the metals are connected by some sort of salt bridge. A salt bridge allows the passage of a charge to complete the electrical circuit but does not allow the flow of the electrons. The electrons are then forced to travel through the wire, thus creating a current. In this display, the visitor becomes the salt bridge.

SAFETY & DISPOSAL

No special precautions are needed; follow standard lab safety procedures.