

Hand It to Chemistry!

Find out if you and a special someone have chemistry by thinking of the person as you place your hands on two metal plates. Can your feelings move the needle? Explore to find out how to make the needle move more, less, or not at all. You will discover that this device gives you good feelings toward chemistry!

Questions to Investigate

- How can you make the needle point to a higher number? Lower number?

Science Content

- A battery is made of 2 electrodes and an electrolyte.
- The electrodes are made of two different metals.
 - Copper must be connected to the plus sign on the back of the microammeter to be the cathode.
 - Zinc or aluminum must be connected to the minus sign on the back of the microammeter to be the anode.
- Having sweaty hands or using hand sanitizer is the electrolyte that moves electrons by
- Batteries store energy within chemical bonds and release it as electrical energy.

Materials

- 6 copper plates
- 6 zinc plate
- 6 aluminum plate
- 12 wires with alligator clips at both ends
- 6 microammeters
- 2 digital voltmeters
- Electrical tape
- Hand-sanitizer

Safety Requirements

- Use caution when taping the edges of each metal plate with electrical tape.
- Require the use of hand sanitizer prior to touching the metal plates. The role of hand sanitizer is to reduce the spread of germs on these high-touch surfaces as well as to serve as an electrolyte.

Preparation

Prior to the activity

1. Carefully cover the edges of the metal plates with electrical tape.
2. Add extra tape around the corners of the plates to lift them slightly so that you can later fit an alligator clip onto each plate

Prepare on-site

1. Use an alligator clip to connect the copper plate to the positive terminal on the microammeter.
2. Use an alligator clip to connect either the zinc or aluminum plate to the negative terminal on the microammeter.

Onsite activity		
Step	Details	Ask participants
Introduce the activity	<ul style="list-style-type: none">• Ask participants if they would like to find out whether they and a special someone “have chemistry.”	<ul style="list-style-type: none">• Can your <i>feelings</i> move the needle?
Have one participant lay a hand on the two metal plates that you connected to the microammeter.	<ul style="list-style-type: none">• Invite the willing participant to put on hand-sanitizer because there have been many people touching these metal plates today.• Instruct the person to lay each hand on one of the two metal plates.	<ul style="list-style-type: none">• What do you think the movement of needle could mean?
Invite participants to explore touching the metal plates in different ways and change the arrangement of the metal plates.	<ul style="list-style-type: none">• Have participants touch the metal plate with just one finger.• Try having two different people touch the metal plates.• Conclude which methods seem to make the needle go higher and lower.	<ul style="list-style-type: none">• Is there a way to make the needle move higher?• Is there a way to make the needle move lower?• What happens if you use a lot of hand sanitizer?• How is this arrangement like a battery that you have made at another station? (<i>it's similar to three other activities</i>)

Chemistry Details

All batteries contain key parts that make them work—two electrodes and an electrolyte. The electrodes cannot be made of the same metal. They must be made of one metal that gives up electrons easily and another metal that accepts electrons easily.

Zinc gives up electrons. This type of chemical reaction is called **oxidation** and this process is why the zinc end of your battery has a negative charge. The electrode that gives up electrons is called the **anode**.

At the copper electrode, protons from the acids or salts in the drink accept the electrons and react to form hydrogen gas. This type of chemical reaction is called **reduction** and this process gives the copper end of your battery a positive charge. This makes the copper electrode the **cathode**.

The microammeter measures the flow of electricity in microamps.

The hand sanitizer acts as an electrolyte. Electricity doesn't really run through your body in this activity. Your hands are not the battery. Instead the electrolyte is on the palms of your hands!