

Ice Tray Battery

Post-visit activity connection to Nickelodeon Play Lab

Grade level: 4th grade NGSS 4-PS3-2, 4-PS3-4; CCSS W.4.9, **5th grade** NGSS 5-PS1-1, 5-PS1-3, 5-PS1-4; CCSS W.5.9, MP.5 **6th grade** NGSS 6-PS3-4, 6-PS3-5; CCSS RST.6-8.3, WHST.6-8.7, MP.2

Concepts: Turning chemical energy into electrical energy; batteries

Materials needed: (per group)

1. Distilled white vinegar
2. 5 pieces of copper wire
3. 5 galvanized nails
4. Ice tray
5. 1 LED light

Procedure:

1. Wrap the area around the head of the nail (not the whole nail) with a piece of copper wire, leaving a section of wire extending from below the head of the nail.
2. Repeat Step 1 with the 4 remaining 4 nails and 4 pieces of wire.
3. Fill 6 wells of an ice tray with distilled white vinegar.
4. Create a circuit by inserting each nail into a well of vinegar while placing the extended wire into the next well.
5. Place one "leg" of an LED light into a well with only the copper wire in it and place the other LED "leg" into a well with only a nail in it. If the bulb lights up, you nailed it! If the light doesn't light up flip the legs around.

What's Happening:

Batteries are comprised of two different metals suspended in an acidic solution. With the Ice Tray Battery, the two metals are zinc and copper. The zinc is in the galvanization of the nail. Copper is found in the copper wire. The acid comes from the vinegar inside the ice tray. More specifically, the acid comes from the 4-8% of the vinegar that is acetic acid.

The two metal components are electrodes, the parts of a battery where electrical current enters and leaves the battery. With a zinc and copper set-up, the current will flow out of the wire and into the nail. The electricity also passes through the acidic solution inside the tray wells.

Once the ice tray battery is connected to the LED, you complete a complete circuit. As the electric current passes through the LED, it lights the LED and passes back through all the components.

Book List:

1. Batteries, Bulbs, and Wires: Science Facts and Experiments by David Glover
2. The Energy Bus for Kids
3. Excited about Energy by Nadia Higgins
4. Charged up-The Story of Electricity by Jacqui Bailey

Extension Activities:

1. Try other liquids such as lemon juice, grapefruit juice, apple juice, and/or water to see which ones work. Have the students make a list of the liquids they want to try and to predict what they think will happen and the basis for their hypotheses.
2. Write a story that incorporates the use of the ice tray battery as a main part of the story.
3. Demonstrate the development of the battery through animation.

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