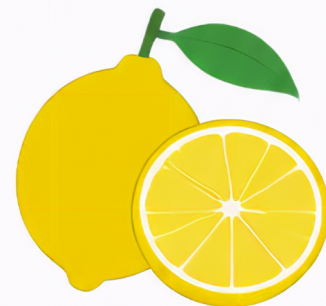




MAKING A LEMON BATTERY



TO POWER AN LED

GOAL: Use lemons and metal electrodes to make a battery that can power an LED.

MATERIALS

- 3-4 lemons (fresh)
- Zinc nails (galvanized nails)
- Copper nails
- LED (any color)
- Connecting wires with alligator clips (or bare ends)
- Optional: multimeter



SAFETY FIRST

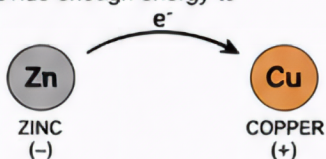
- ✓ This experiment uses safe, household materials.
- ✓ Do not eat the lemons after use.
- ✓ Wash your hands after the experiment.
- ✓ Ask an adult for help if using a multimeter.

PROCEDURE

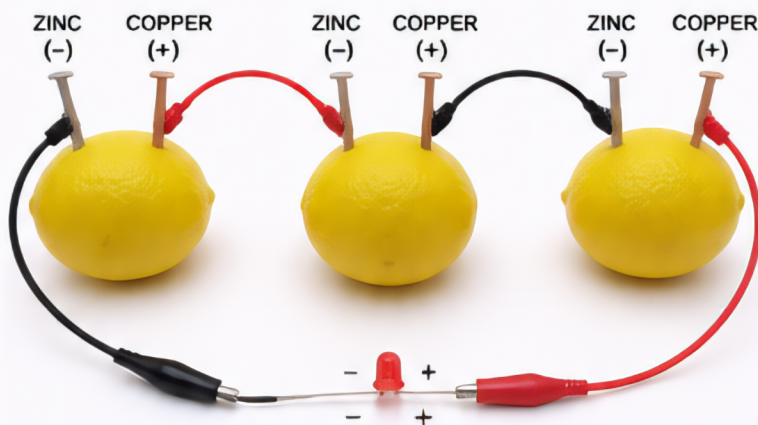
1. Roll each lemon on the table with your palm while pressing down slightly. This helps release juice inside.
2. Insert one zinc nail and one copper nail into each lemon, about 2-3 cm apart. Do not let the nails touch inside the lemon.
3. Use a wire to connect the copper nail in the first lemon to the zinc nail in the second lemon.
4. Connect another wire from the copper nail in the second lemon to the zinc nail in the third lemon. (Repeat if using more lemons.)
5. The remaining zinc nail on the first lemon is the negative (-) end of your battery.
6. The remaining copper nail on the last lemon is the positive (+) end.
7. Connect the LED: attach the LED's longer leg (positive, +) to the copper nail (positive end) and the shorter leg (negative, -) to the zinc nail (negative end).
8. Observe the LED. Does it light up? If not, check your connections and try again.

HOW IT WORKS

The lemon juice is acidic and acts as an electrolyte. Zinc wants to give up electrons, and copper accepts them. This creates a flow of electrons through the wires. Connecting several lemons in series adds their voltage together, which can provide enough energy to light a small LED.



EXPERIMENT SETUP (EXAMPLE WITH 3 LEMONS)



LED longer leg (+) to copper. LED shorter leg (-) to zinc.

OBSERVATIONS

Did the LED light up? ☐ Yes ☐ No

If yes, how bright was it? _____

How many lemons did you use? _____

What happened when you added more lemons? _____

CONCLUSION

What did you learn from this experiment?
