



Curiosity Guide #310

Electric Batteries

Accompanies Curious Crew, Season 3, Episode 10 (#310)

Potato Possibilities

Investigation #4

Description

Can a potato power a clock? Find out!

Materials per group or individual

- 3 alligator clip cables
- 12-gauge copper wire
- Wire cutters
- 2 galvanized nails
- 2 raw potatoes
- Low-voltage LED clock that requires 1 or 2 volts. You could also use a digital watch.
- 2 drywall nails, optional

Procedure

- 1) Remove the battery from the clock or watch. Note which side of the battery is positive and which is negative.
- 2) Cut two lengths of copper wire, each about 4 inches long.
- 3) Insert a galvanized, zinc-coated nail and a piece of wire into each potato. Be sure that the pieces of metal are on opposite ends of the top of the potato, and that the pieces of metal don't touch inside.
- 4) Use an alligator clip to connect the nail in one potato to the copper wire in the second potato.
- 5) Attach a second clip to the remaining nail, and the third clip to the remaining wire, leaving the other ends of the clips loose.

- 6) Touch the loose clips against the positive and negative terminals in the battery case of the timepiece. If this is difficult, use the optional nails. Attach the loose alligator clips to the heads of the two drywall nails. Use the nail points to touch the battery terminals.
- 7) Can you get the clock working?
- 8) What other vegetables or fruits might operate the clock?

My Results

Explanation

Batteries are used to change chemical energy into electrical energy through a redistribution of electrons between different metals and a solution. There are three components in every battery, an electrolyte and two electrodes—the anode and the cathode. A chemical reaction happens when two different metals are connected by an electrolyte, which provides a path for electrons to move from one metal to the next.

In this case, the galvanized nail acts as one electrode. The copper wire is the second electrode. The potato itself is the electrolyte. As soon as the copper wire is inserted in the potato, electrons begin to move through the potato to the nail. That flow is an electric current that is strong enough to power a low-voltage LCD clock or watch.

Find out more: Who knew that potatoes were electrolytes and could be so powerful? But did you know that in 2010, some Israeli students discovered a way to increase that potato power? They found that if they boiled a slice of potato and sandwiched the potato slice between a plate of copper and a plate of zinc, they could attach clips to it and light up a small light. Their boiled potato had less resistance than a raw one, produced half as much power as a double-A battery, lasted quite a while, and was a lot cheaper to make. That's one super spud!

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