Science Experiment

FULTON FRESH KITCHEN SCIENCE

Fruit Batteries

Did you know that fruit is brimming with electrical potential?

SAFETY FIRST! Youth should always have parent supervision when performing science experiments.

MATERIALS

- Pennies
- Galvanized (zinc-coated) nails
- Citrus fruit (lemons, oranges, limes)
- Alligator clips
- Mini LED light
- Optional: Voltmeter

PROCEDURE

The following steps can be used to make a successful fruit battery, but try experimenting with different types of fruit and different metals for electrodes.

1. Give your lemon a quick roll to make sure the insides are extra juicy.
2. Carefully use a knife or scissors to cut two slots/holes in in opposite ends of the lemon.
3. Insert the copper penny and the zinc nail into the pre-made holes.
4. Connect the nail and the coin (your electrodes) with the alligator clips. Make sure that one end is attached to the nail and the other to the coin.
5. Once you've joined up the lemon battery you should be left with two free clips at either end – one coming from the nail and the other coming from the coin.
6. To complete the circuit, attach the clips to the LED.
7. ***Tip:*** If you hook up the LED and it doesn't glow, switch the alligator clips attached to its legs.

Visit our website or social media channels for a follow-along video of this experiment.
www.ugaextension.org/fulton

UNIVERSITY OF GEORGIA EXTENSION
FULTON FRESH
FULTON COUNTY
Healthy GEORGIA

FULTON FRESH KITCHEN SCIENCE

Fruit Batteries

What do you give a sick lemon? Lemon Aid!

DID YOU KNOW?

See more information about this experiment from the 4-H Stem Lab:

- Bio batteries work because two different metals suspended in an acidic solution create a chemical reaction that generates electricity.
- All batteries (including bio batteries, like the one you've just made) consist of three key parts: a cathode (the positive end of a battery), an anode (the negative end of a battery), and an electrolyte solution (the medium that allows the electric charge to flow between the cathode and anode).
- With the fruit-powered battery, the copper penny serves as the cathode; it goes through a chemical reaction called reduction when it interacts with the citric acid solution that exists inside a lemon. This reaction creates an excess of electrons.
- Electrons repel one another, so as they build up they begin moving through the electrolyte solution (the lemon) to find free space away from other electrons. At the other end of the lemon where the zinc nail is – the anode – another chemical reaction, oxidation, is taking place.
- Oxidation makes the nail lose electrons. This means that the nail now doesn't have enough electrons and is primed to receive more. So, once you connect the nail (anode) and the penny (cathode) to an LED, you're completing a circuit allowing the electrons to flow in a continuous loop through the wire and the lemons, powering the LED.

CAREER CONNECTION

There are many electrifying careers that work with energy and electricity, from electrical, civil, and mechanical engineers, construction managers, gas and nuclear power plant operator, physicist, and more!

Share a picture of your experiment with us on social media with the hashtag #localfoodmadefun.

This lesson was adapted from activities from the 4-H Stem Lab https://4-h.org/about/4-h-at-home/fruit-batteries/.

CONNECT WITH US ON SOCIAL MEDIA!

YouTube: Fulton County 4-H UGA Extension

Facebook: UGA Extension Fulton County

Instagram: @uga_fulton_extension

Twitter: @uga_fulton_ext