



## Curiosity Guide #310

### Electric Batteries

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

#### Air Battery

Investigation #6

#### Description

Can you make this battery out of "fishy" materials?

#### Materials

- Activated charcoal, which is found in pet stores in the fish-supply area
- $\frac{1}{4}$ -cup measure
- Aluminum foil
- Ruler
- Scissors
- Paper towels
- Cup
- Spoon
- Vinegar
- Pipette
- 2 alligator clips
- LED light
- Multi-meter

#### Procedure

- 1) Measure and cut a 6 by 6-inch piece of aluminum foil. Set aside.
- 2) Fill a cup half full of vinegar.
- 3) Fold the paper towel in half, and then fold it again in quarters so that the paper towel is now 4 layers thick.

- 4) Submerge the paper towel in the vinegar.
- 5) Remove the paper towel. Squeeze out the excess vinegar. The paper towel should still be damp.
- 6) Lay the paper towel on the foil.
- 7) Measure and pour  $\frac{1}{4}$  cup of the charcoal onto the paper towel. The charcoal should not touch the foil.
- 8) Crush the charcoal pieces into smaller bits with the back of the spoon.
- 9) Dampen the charcoal by pouring a small amount of vinegar over it.
- 10) Attach the multi-meter lead wires to the alligator clips.
- 11) Clip one alligator clip to the foil.
- 12) Press the second clip into the activated charcoal.
- 13) How many volts did this battery cell produce?

My Results

## Explanation

Batteries are used to change chemical energy into electrical energy through a redistribution of electrons between different metals and a solution. Every battery has three components: an electrolyte, an anode, and a 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. At the point of contact, a chemical reaction occurs, where the anode loses electrons and the cathode receives them. Because the two metals have different voltages, the electrons move from the concentrated negative terminal, or the anode, toward the lower concentrated positive terminal, the cathode. Placing a device that requires electrons between the two electrodes powers the device. For example, an LED light placed between the anode and the cathode will turn on.

In this case, the aluminum anode begins to oxidize when contacted by the vinegar. This chemical reaction flows electrons to the charcoal, which acts as the cathode, and creates a measurable voltage reading. You may need to fold the towel over the contact and press down firmly to get a good contact.

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