Curiosity Guide #604
Bubble Science

Accompanies Curious Crew, Season 6, Episode 4 (#604)

Battery-Powered Bulb

Investigation #1

Description

How many batteries will get the light-up job done?

Materials

- 30 D-cell batteries
- 2 meter sticks
- Tape
- 60-watt bulb
- Goggles
- Gloves
- Long 14g or 12g insulated wire
- Wire strippers
- At least 3 friends
- An adult to supervise

Procedure

1) Have a friend guess how many D-cell batteries will be required to light an incandescent bulb.
2) Lay the meter sticks on the table parallel to one another, the width of the D-cell batteries.
3) Put on goggles and gloves.
4) Cut two 4-foot lengths of wire and remove the last inch of insulation on each end.

5) While one friend holds the meter sticks in place, arrange several D-cell batteries end-to-end, positive to negative. The meter sticks can also be taped in place on the table.
6) Have another friend firmly connect a wire to one end of the line of batteries and to the bottom of the light bulb.
7) Have another friend connect the second wire from the other end of the line of batteries to the side of the light bulb.
8) What do you notice?
9) Keep adding batteries and retesting the connection.
10) How many batteries do you need before you see something?

My Results

Explanation

This activity should be done with adult supervision. Each time another battery is added, the total voltage of the line of batteries is increased by another 1.5 volts. Eventually, there is enough energy to get the filament wire hot enough to emit light.

Electricity enters and exits the bulb through two contact points. One of the contact points is at the bottom of the bulb and is called the electrical foot contact. The other contact point is on the side of the battery and is called the screw thread contact. Electricity from the batteries flows across the filament, collides with the atoms, and creates heat. At first, the bound filament electrons vibrate faster. When the electrons slow down, the energy is transferred into a released light photon that is visible. Even if the base is removed from the bulb, if the filament isn't broken, the bulb will still work by touching the battery wires to the side and base contact that lead to the filament. As the voltage increases, so does the brightness of the bulb.

Parents and Educators: use #CuriousCrew #CuriosityGuide to share what your Curious Crew learned!

Curious Crew is a production of Michigan State University.
Learn more at WKAR.org.