PLTW Engineering

10-12/Basic Potato Powered Circuit

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10-12/DE

Lesson: **5/6/2020**

Students will be able to set up a basic circuit that can power a small light bulb with a potato.

Organic powered light

Since being stuck at home you are probably using a lot of electricity for things like your computer, esports games, or just watching television.

Did you know that some fruits and vegetables can be used to make electricity. Its true. Crazy, but true.

Potato powered light

Today we are going to show you how to create a simple circuit using a potato to power a light bulb.

Here are the materials you will need:

- 2 large potatoes
- Two 2" pieces of thick copper wire
- Three 4" pieces of thin copper wire
- Two galvanized nails (nails covered in zinc)
- 6 alligator clips
- Small knife
- 1.5 volt light bulb –like the size in a night light

Potato vs Battery

Before we get started with building, lets take a look at how a potato can act as a battery.

Batteries are made of three main parts: an anode, a cathode and an electrolyte.

A potato has similar properties: If you provide the electrons with a solution (called an *electrolyte*) to help them move to the copper, and you give the electrons a wire in which they can move from the copper back to the zinc, you can produce a circuit and a flowing path of electrical energy.

Steps to create the circuit

1. Make two slits about 1" deep on each end of each potato.
2. Next, insert the thick copper wire into one slit and the nail into the other slit. Do this for both potatoes.
3. Connect the alligator clips to each end of the three pieces of thin copper wire. (if you don’t have clips just wrap the wire tightly around the nails.
4. Connect one alligator clip on the first piece of wire to the heavy copper wire in the first potato, and attach the other clip to one end of the light bulb.

Steps to create the circuit

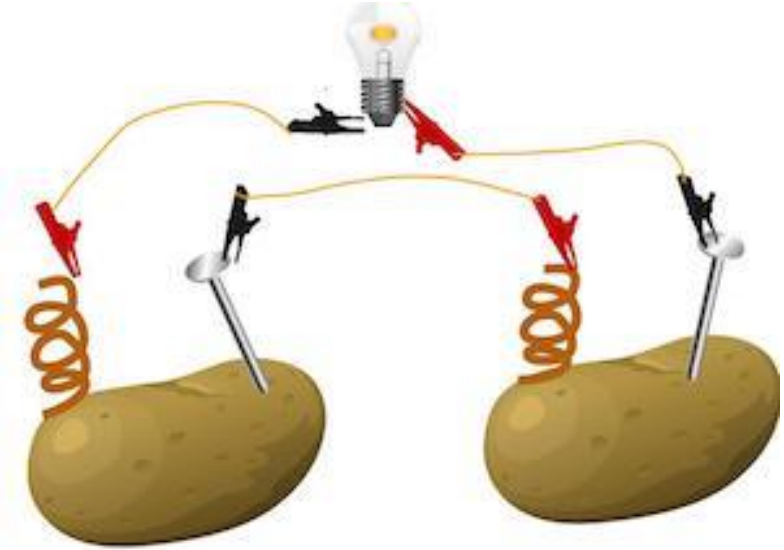
5. Then, attach one alligator clip on the second piece of wire to the other end of the light bulb, and attach the other clip to the nail on the second potato.

6. Finally, attach one alligator clip on the last piece of wire to the thick copper wire on the second potato, and attach the other clip to the nail on the first potato.

7. Observe what happens to the light bulb.

Steps to create the circuit

Your circuit should look something like this:



Troubleshooting

Is your circuit working? How bright is the light? Here are something things to look for if your circuit is not working as desired:

Make sure all your wires are securely connected to the alligator clips and then to the metal.

The metal in the potatoes must be copper and a nail covered in zinc.

A steel nail will not work and other wire won't conduct electricity as well.

Reflection questions

1. If a lemon produces 1 Volt of energy, how many lemons would you need to light a 2 Volt light bulb?
2. If a potato produces 0.8 Volts of energy, how many potatoes would you need to light a 1.5 Volt light bulb?
3. If a potato produces 0.8 Volts of energy, how many potatoes would you need to light a 3 Volt digital clock?
4. If you have a lemon that produces 1 Volt of energy and an apple that produces 1 Volt of energy, can you light a 3 Volt clock?

Helpful Links

Youtube video of the steps needed to create a potato powered light bulb

Step by step instructions to create a potato powered light