Potato Battery

Did you ever think that you could use a vegetable as a battery? Batteries produce electricity by passing electrons back and forth between two metal plates. What if you didn't have a battery around, but had a potato? Well, potatoes contain phosphoric acid which can serve as the chemical solution necessary to transfer electrons back and forth between the metal plates. By adding some metal to a potato, you can make a battery using just a few household items! Let's get started!

What is the Battery and how does it work?

The simple answer is that **the battery** is the storage for energy which is then used to produce electricity.

Batteries have three parts:

- **Anode** (negatively charged, usually marked with -). The most commonly used anode is **Zinc**. Zinc is a metal that has a lot of electrons and likes to give its electrons.
- **The cathode** (positively charged, usually marked with +). The most commonly used cathode is **copper** since it lacks electrons and likes to receive them.
- **Electrolyte** (liquid or a paste between them). Without the electrolyte, the electrons would just simply pass from the anode to cathode and that would be it. But electrolyte helps the electrons to flow back to the anode and to create an electrical circuit.

How does a Potato Battery work?

Potato batteries work in a similar way. It consists of all 3 parts:

- **Zinc** nail is an anode (has a surplus of electrons),
- **Copper** nail is a cathode (wants some electrons) and
- **Potato** or other fruit is an electrolyte.

When we put a zinc nail in the potato, a chemical reaction occurs and it produces a surplus of electrons. Copper, which now has fewer electrons, attracts them. When we connect those nails

with the wire, we create an electrical circuit in which electrons are flowing and producing enough electricity to light up a lamp or a clock. Potato energy!

One potato can produce around **0.5 Volt** of electrical energy. That means we need around 3 potatoes to power up a **LED lamp of 1.5 Volts**. But if we cut the potato in half, each half will generate the 0.5 Volts so we can use only one and a half of the potato to create the potato battery.

Potato is not the best electrolyte among fruits and vegetables. For example, **lemons** work even better than potatoes! But since potatoes are more common, cheap, and resistant, they are the best choice for organic production of electricity.

Materials

For Joeys:

- 3 half potatoes / 3 slices of lemon per group (or other fruit/veg)
- 3 pieces Copper Tape
- 3 Galvanised Nails or Screws per group
- 4 Alligator Clip leads per group
- 1 LED per group

For leaders/adult helpers:

- Knife
- Scissors
- Multimeter

Method

- **Cut the potatoes in halves or fruit into slices**. If you decide to work with halves, use the kitchen knife to cut each potato into halves. **Wash the potato** first so the dirt doesn't interfere with our electrolyte reaction. Remember, each half produces around 0.5V so you can plan how many halves you need to power the lamp. For a **3.5V lamp**, we will need **7 halves** of potato. You can connect 4 slices and then gradually add more until the lamp lightens up.

- **Cut the copper tape** using the scissors. To start, cut **3 pieces** of copper wire per group with a **length that is slightly wider than each piece of fruit/veg**.
- **Place each of your fruit/veg pieces on top of a piece of copper tape** so that the copper is touching the fruit/veg. Stick a nail/screw in each piece of fruit/veg.
- Using an alligator clip connect a nail/screw on your first potato to copper tape on the second potato. Do this again to connect the second potato to the third.
- Now, use your third alligator clip to connect the copper tape from your first potato to the LED.
- Use your fourth alligator clip to connect the nail/screw on your third potato to the second wire on the LED.
- The LED must be connected in the proper way for it to light up. If you can't tell which LED wire is positive and which is negative, just swamp connected wires. And if it still doesn't light up, add more slices of potato until the LED lights up.
- And there you have it. Your homemade, natural, and renewable source of electric energy!