

An Important Lesson from a Potato Battery

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Many of you may have seen “batteries” made from potatoes or lemons. These are frequently the topic of science fair exhibits. They also tend to lighten the mood in more serious science classes when studying electro-chemistry.

Essentially, all you need to put together a potato battery is a large potato (obviously), a copper electrode, a zinc electrode, a few pieces of wire for connectors, and a volt meter. Most of these materials are readily obtainable. A copper pipe strap can be easily straightened to serve as the copper electrode, and a galvanized metal spike with its zinc coating can be used as the zinc electrode.

Once you have assembled the required components, you simply insert the galvanized spike into one side of the potato and the straightened copper strap into the other side of it (they must not touch each other). You can then fasten a wire to each of the electrodes and connect them to a voltmeter. A digital display meter will be easier to read than one with a needle indicator. The copper strap should be hooked up to the positive side of the meter, and the zinc-coated nail to the negative terminal.

With the potato battery I made, the voltage generated was 0.57 volts DC (direct current). This is not enough to power anything; but as a scientific curiosity, it’s definitely “neat”. By putting two potato batteries in series, the voltage can be doubled. Actual voltages may vary from one potato battery to another due to a number of uncontrollable factors. However, in all cases, a voltage should be observed.

In 2009, a group of individuals, who probably had far too much time on their hands, entered the Guinness Book of Records for having generated 538.1 volts DC using 1,000 potato batteries connected in series.

Using a lemon instead of a potato will generate a slightly higher voltage, but the overall effect is the same.

What actually happens is that the weakly acidic juice of the potato functions as an electrolyte, just like the acid in a car battery. With two dissimilar metals such as copper and zinc, a potential difference is developed which causes electrons to travel through the electrolyte from one piece of metal to the other. When the circuit is completed by connecting a wire from each electrode to the volt meter, an electric current begins to flow.

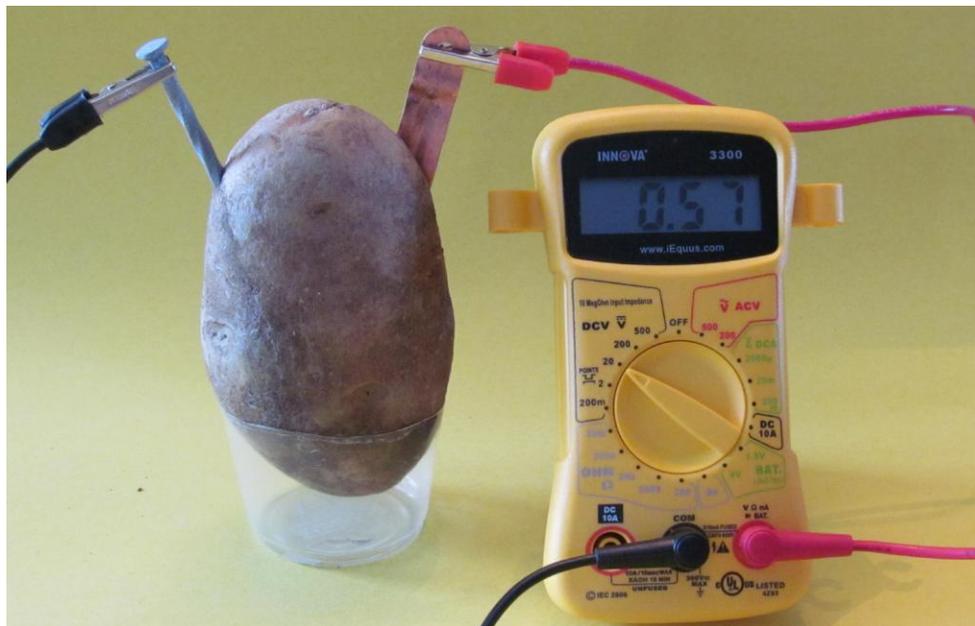
Now for the important lesson: In our simple experiment here, we deliberately brought two dissimilar metals into contact through the juice of the potato. As we saw, an electric

current was generated. Such things can occur unintentionally in our homes if we do not use the correct materials for a do-it-yourself project. This is quite obvious when working with copper plumbing.

Copper piping should only be secured with copper straps paired with copper nails to fasten them to wooden framework. If non-copper metal straps are used, there can be a potential difference between the two dissimilar metals which may cause corrosion of the copper piping or tubing. Over time, the results can be costly. The same thing can take place if non-copper nails are used with copper pipe straps.

This type of corrosion can also happen if you connect copper piping to any other metal piping. A plastic connector, or other appropriate measure, is necessary to prevent them from physically contacting each other.

So, before you go fastening copper piping or any other metal materials in place, remember to use compatible straps, nails, or screws to do the job. In this way, you will avoid setting up a potentially corrosive “battery” in an undesirable location.



Potato battery showing voltage generated