

## LEMON BATTERY

Valentina Erastova, Alessia Lepore  
24 Apr 2020

**Aim:** to understand how batteries store energy

**Age:** 8-11yo

**Complexity:** moderately complex

**Cost:** less than £10

**Location:** indoor, kitchen

**Materials & Equipment:** pennies (better if pre1992), aluminium foil (or galvanised nails), 4-6 lemons (other fruits/vegetables can also be used) , low power LED light

### Preparation:

1. Wash your pennies in soapy water, then rinse and dry them off with a paper towel. This will remove any dirt sticking to them.
2. Carefully cut three aluminum foil rectangles, each three centimeters by 20 centimeters.
3. Fold each strip in thirds lengthwise to get three sturdy one-centimeter-by-20-centimeter aluminum strips.

**Note:** In this activity you will make a very low-voltage battery. The amount of electricity generated by this homemade battery is safe, and you will even be able to test it by touching your finger to it and feeling the weak current. Higher voltages of electricity, however, can be very dangerous and even deadly; you should not experiment with commercial batteries or wall outlets.

### Assembly:

1. Place the lemon on its side on a plate and have an adult carefully use the knife to make a small cut near the middle of the lemon (away from either end). Make the cut about two centimeters long and one centimeter deep.
2. Make a second, similar cut about one centimeter away and parallel to the first cut.
3. Push a penny in the first cut until only half of it is showing above the lemon skin. Part of the penny should be in contact with the lemon juice because that is what serves as the electrolyte. This copper penny in contact with the lemon juice serves as your first electrode. Note: If your lemon has a very thick skin, you might need an adult to carefully cut away some lemon peel. *Why do you think is it important for part of the penny to be in contact with the lemon juice?*
4. Slide one of the aluminum strips in the second cut until you are sure part of the aluminum is in contact with the lemon juice. *Can you guess which part of a battery the aluminum strip that sits inside the lemon is? Do you think it is important for the aluminum to be in contact with the lemon juice?*
5. You have just made a battery! It has two electrodes made of different metals and an electrolyte separating them. *Do you think this battery is generating electricity or is there still something missing?*

**Adult supervision is required for any experiment!**

**Disclaimer:** *Scientist Next Door* is a service to the public for educational and entertainment purposes. There is no legal contract between *Scientist Next Door* and any person or entity.

*Scientist Next Door* or any of the participants are not responsible for, and expressly disclaims all liability for, damages of any kind arising out of use, a reference to or reliance on any information provided. The information shared is an opinion of the poster. While we thrive to provide the most correct, complete and up-to-date information, we cannot guarantee it.

While *Scientist Next Door* suggests experiments, provides direct links to experiments and can guide through these experiments, we hold no responsibility for any damages, safety hazards, it is important to enforce [general safety rules](#) through the experiment at home.

**Adult supervision is required for any experiment.**

**Adult supervision is required for any experiment!**

### RISK ASSESSMENT

HAZARD	Likelihood and Seriousness of inJury	Control Measures	Remaining Risk
Sharp nails, plates, wears - Could cause cuts	Likelihood 3; Severity 3	Monitor kids when they are using metals, and make sure metals are not too sharp.	Low
Lemon juice - Irritation if it gets in eyes	Likelihood 3; Severity 3	Encourage metal rods to be put carefully into fruit to prevent squirting of fruit juice. Call a first aider if fruit juice gets in eyes, who may perform an eyewash if trained and confident to do so.	Low
Lemon juice - Juice is acidic and can cause damage if in contact with cuts.	Likelihood 3; Severity 1	Clean rods between use so not covered in juice when children handling them. Check that children don't have uncovered cuts before starting demonstration. Demonstrators should wear plasters over any cuts they have. In case of accident, wash the affected area with clean water.	Very low

**First Aid: wash eyes with plenty of water; treat cuts/abrasions with topical antiseptic and a plaster**

**Remember - never do experiments alone!**

**Disclaimer:** *Scientist Next Door* is a service to the public for educational and entertainment purposes. There is no legal contract between *Scientist Next Door* and any person or entity. *Scientist Next Door* or any of the participants are not responsible for, and expressly disclaims all liability for, damages of any kind arising out of use, a reference to or reliance on any information provided. The information shared is an opinion of the poster. While we thrive to provide the most correct, complete and up-to-date information, we cannot guarantee it. While *Scientist Next Door* suggests experiments, provides direct links to experiments and can guide through these experiments, we hold no responsibility for any damages, safety hazards, it is important to enforce [general safety rules](#) through the experiment at home.

**Adult supervision is required for any experiment.**