

squishycircuits®

Squishy Battery



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Comments, Questions, Concerns? Please reach out at: ContactUs@SquishyCircuits.com

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Introduction

What is a Squishy Battery?

Every Squishy Circuit needs a battery holder and batteries to work, right? Not this project! In this project, we will create a simply battery. If you combine enough of them you can even light a LEDs!

Note: This project is more advanced. We include some background information but if you would like more information about something or are confused, we encourage you to research more about that particular topic or to contact us.

Materials

Supplies needed for each student or group of students:

- Galvanized Nails (or other zinc)
- Copper Wire (or other copper)
- Conductive Dough
- Insulating Dough
- LED
- Multimeter



Background Knowledge

What is a Battery?

A battery is a device that produces electricity through an electrochemical reaction between two metal electrodes and an electrolyte.

In this project, we have two different electrodes, one made out of zinc (the galvanized nail) and one made out of copper (the wire). At a chemical level, the zinc 'wants' electrons more than the copper does, so when they are both placed in the electrolyte (conductive dough) electrons start moving from the copper to the zinc. These moving electrons are electricity!

In all batteries, the two electrodes are called the cathode and anode. The cathode 'wants' the electrons and the anode 'gives' the electrons. So, in the Squishy battery the copper wire is the cathode and the galvanized nail is the anode.

This project is very similar to the lemon battery or potato battery experiments. There are many great explanations and tutorials online that you check out for more information. [The SciShow has a good explanation of the chemistry on Youtube: https://youtu.be/GhbuHT1GDpl](https://youtu.be/GhbuHT1GDpl)



Credit: SciShow

Part 1: Creating a Cell

Procedure

A battery is usually made up of several cells to increase the power output. Let's start by making one to ensure everything is working properly.

- 1) Place your electrodes (galvanized nail and copper wire) into your electrolyte (conductive dough)
- 2) Measure the voltage across the nail and the copper wire. It should be around .8 volts. The copper is the positive terminal.



A single-cell Squishy Battery generating .8 volts

If you are not seeing a voltage, double check that you're using conductive dough and that you have two different electrodes. Other electrodes will work, but we have the best luck with the galvanized nail and copper.

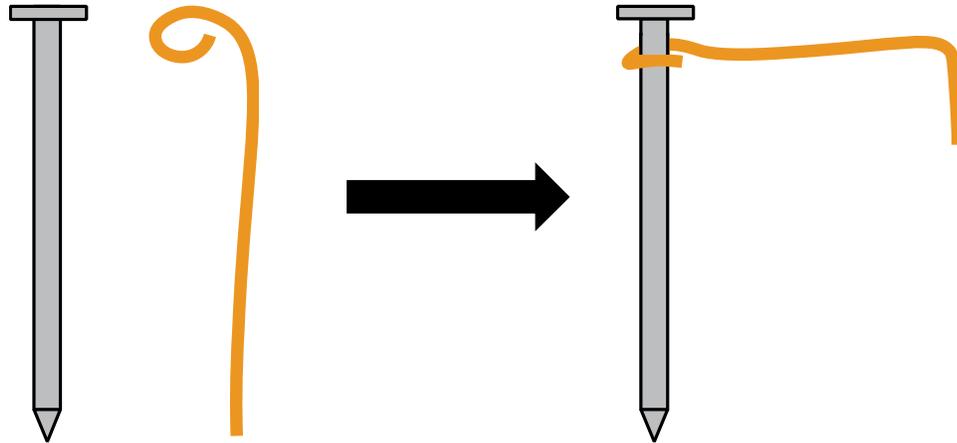
Part 2: Building the Battery

Procedure

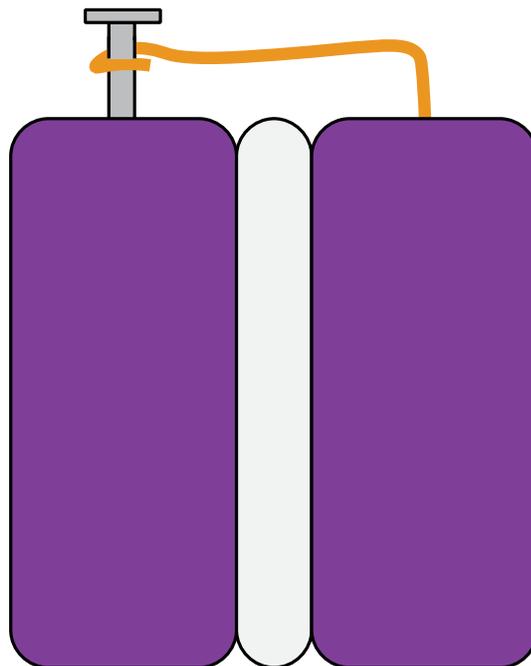
Adding cells in series will add more voltage to your battery.

Connecting cells (or a series of cells) in parallel will increase the available current to power components.

- 1) Create electrode pairs by twisting a piece of wire around a nail



- 2) These electrodes will be used to connect cells together. Join the individual cells by placing a layer of white insulating dough in-between them. The electrodes connect the two cells.



3) Alternate the electrodes so that each cell has a galvanized nail and copper wire.



A six-cell Squishy Battery generating 4.7 volts

- 4) Try to light a LED with your Squishy Circuit! Red LEDs take the lowest power to run so may work the best. Do piezoelectric buzzers work? If you added enough cells in series and parallel, do you think you could get the motor to run?



A dimly-lit red LED powered from the Squishy Battery