



Throw those batteries away and switch to water powered devices! The this DIY flashlight never runs out of batteries, water is all around us and will never run out. One of today's causes of pollution is the improper disposal of batteries containing heavy metals such as lead and mercury, the answer, using water as electrolyte!

Imagine wall clocks operating & lasting 6-12 months with water, you'll never need to leave your house just to buy batteries and there's no need to recharge them with wall-chargers. What could be more convenient than replenishing your batteries with water from the faucet? :D

The flashlight runs 30mins continuously with tap water and 2 hours with saltwater. Not bad for a single celled prototype :D This thing also works well with calculators, clocks & radios **Remember, adding a second cell triples the glow and lighting time!**

How Does It Work?

This is a type of battery called the "**Galvanic Cell**", having 2 different types of metals and is connected by a salt bridge. It works like your typical battery but uses water as its electrolyte. If you want to read more about how batteries work "**click here**" The output voltage is pretty faint and isn't enough to run a single LED. By the help our trusty "**Joule Thief Circuit**", the LEDs would glow even at low voltages.

MakerSpaces Mackay www.makerspacesmackay.com

Is It Really Powered By Water?

Well not really, the water serves as an electrolyte, a replacement for toxic chemicals used in regular batteries, which usually ends up in dumpsites. So why call it water powered? Of course no one would be interested in the title "Galvanic Flashlight" plus that's what easily pops up in people's minds.

Why Is There No Switch?

This is a project designed for amusement. I did it on purpose, not to add a switch. I tell everyone that this flashlight doesn't need switches, it runs on free energy! (free electrolyte that is)

I'm starting a Weekend Project channel:

Please support my new FB page :D There are more interesting stuff to come!

For the plan to succeed I need to have a number of viewers from YouTube, Facebook & Instructables.
Thank you for your cooperation!

[WATER POWERED FLASHLIGHT VIDEO!](#)

Step 1: Gathering Tools & Materials



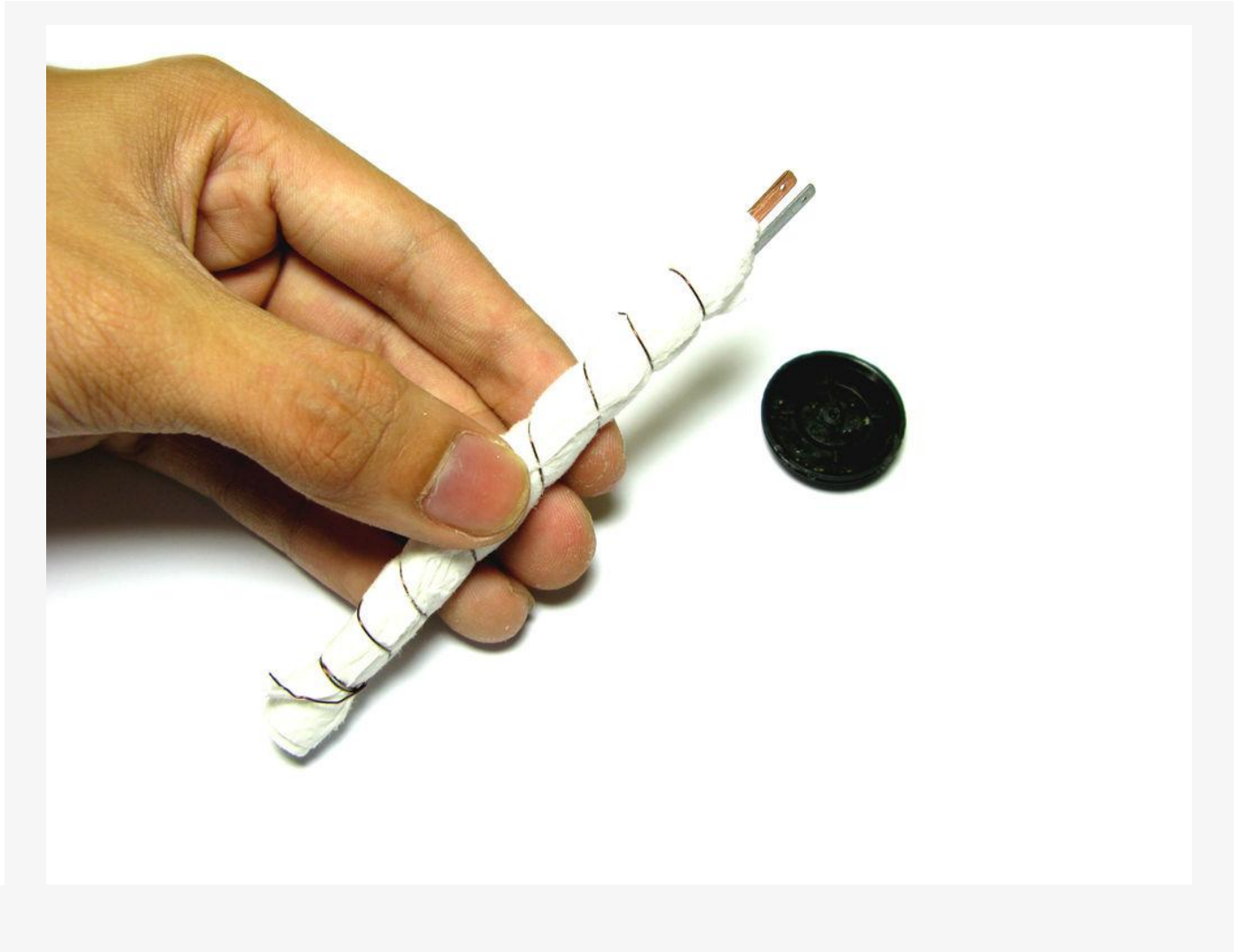
Parts & Materials:

- PVC Pipe 4" Long (3/4"Ø) [**Local Hardware**]
- PVC Coupling 3/4" to 1" [**Local Hardware**]
- Recycled 3xLED Torch [**Inventory = Free**]
- Toroidal Core/ Bead [**Recycled From CFL Bulb**]
- 2N3904 Gen. Purpose NPN Transistor [**Radioshack**]
- 1K Ohm Resistor (1/4w) [**Radioshack**]
- Cooper & Zinc Strip [**Local Hobby Shop**]
- Magnet Wire/ Copper Wire [**Inventory/ Local Hardware**]
- 4 Sheets Of Tissue Paper [**Toilet/ Bathroom**]
- 2x2" Sheet of Acetate [**Bookstore/ Office Supplies**]

Tools & Equipment:

- Leatherman MultiTool
- Soldering Iron
- Hot GlueGun
- Teflon Tape
- Super Glue

Step 2: Preparing The Power Cells

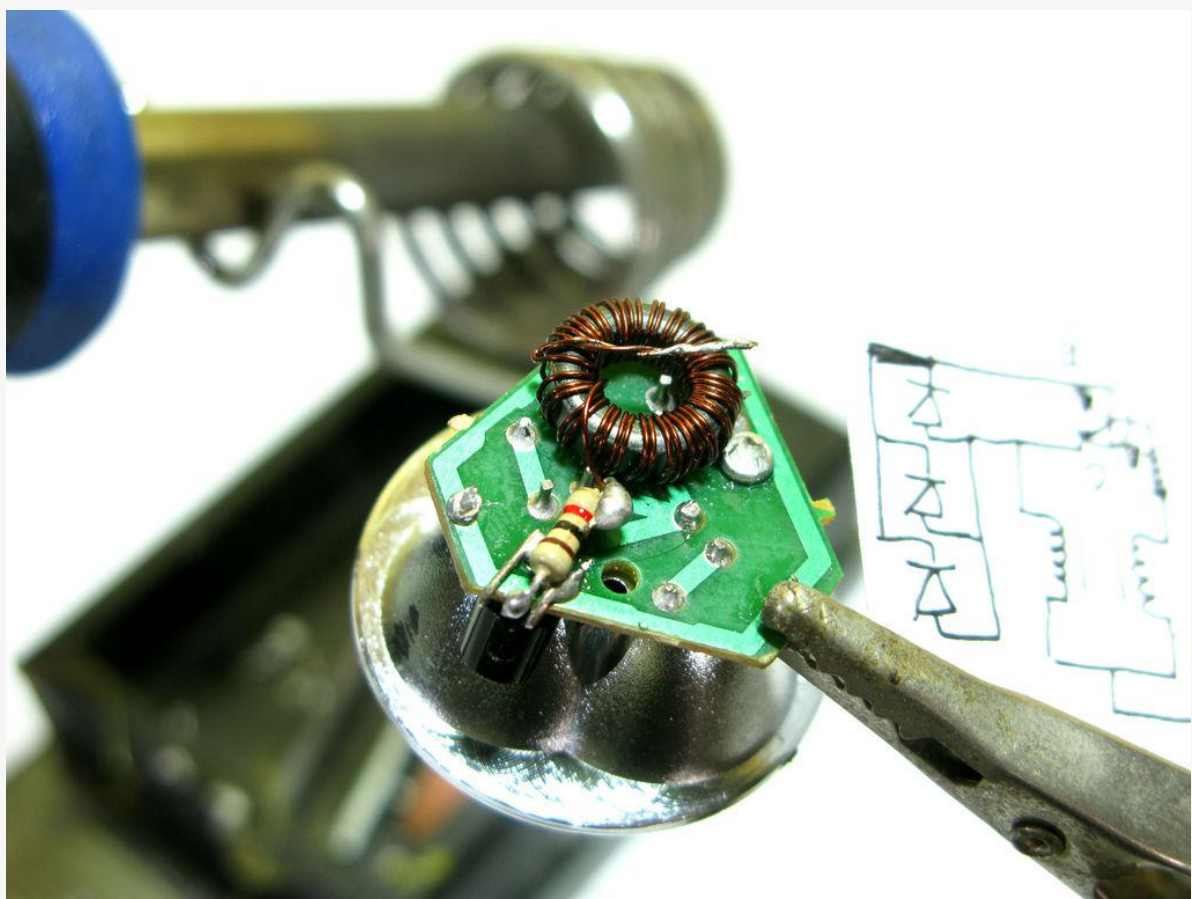


The power cell is your flashlight's main source of energy. Basically there are two strips of metal, one for the anode and one for the cathode. The "Copper Strip" will provide the positive energy while the "Zinc Strip" for the negative.

Procedures: Assembling The Power Cell:

- 1st.) Roll tissue paper around your "Copper Strip" until you reach the 3rd sheet.
- 2nd.) After reaching the third sheet, roll the "Zinc Strip" until you reach your final sheet, which is the 5th sheet.
- 3rd.) Now tie some copper wire around the PowerCell, this prevents your tissue from tearing once it gets wet.
- 4th.) I recycled a pulley since it fits snugly on the PVC Coupling, puncture 2 slits for the metal strips to fit in.
- 5th.) Insert both metal strips through the pulley's hole and seal/ waterproof it using epoxy/ superglue/ hotglue.

Step 3: Assembling The Joule Thief



What's A Joule Thief?

A "joule thief" is a circuit that helps drive an LED light even though your power supply is running low. What can we do with it? We can use it to squeeze the life out of our drained batteries. Bottom-line, this circuit makes LEDs glow even at low voltages.

Let's get started! Hummm, you probably encountered a joule thief before. Lucky for you I have a more detailed guide about making a simple joule thief found here: [Making A Simple Joule Thief \(made easy\)](#)

If you already know how to build one, you can just follow the simple diagram from above. I needed to make my circuit more compact so I soldered my transistor below the LED's board while the toroidal core was glued above the LED's board.

[Click Me! Visit my full tutorial on building a joule thief.](#)

Step 4: Combining The PowerCell + Joule Thief



You probably came to a realization that the flashlight, uses to two separate projects the: PowerCell + Joule Thief, in order to work.

For this step, solder the wires on your "PowerCell" going to the "Joule Thief" then apply superglue around the coupling. Finally jam the LED's reflector to your coupling and wait for 5 mins for the glue to dry.

Step 5: Preparing The Water Storage Cylinder



Get a 4" long PVC pipe, but wait! Make sure there's a thread on the other side. I'll give you two choices, you can stuff in a cork on the non-threaded side and use a syringe to fill her up with water, or glue a small piece of acetate and use it as a water level indicator.

Step 6: Fill Her Up!



Just fill tap water in, and you are ready to go! Attention! Tap water won't last for more than 30 mins due to lack of electrolytes. Saltwater will give a boost to the flashlight's glowing time but still it would only last for 2 hours. Vinegar & Gatorade works best, since both of them contains a lot of electrolytes, glowing time would last for 5-10 hours!

Adding a second cell triples the glow and lighting time!

Tested Liquids As Fuel:

- Tap Water = 0.5v - 0.9v (@400 mAh)
- Saltwater = 0.7v - 1v (@600 mAh)
- Vinegar = 0.9v - 1.2v (@850 mAh)
- Gatorade = 0.9v - 1.3v (@700 mAh)

Step 7: You're Done!



Let's light up the world, with free energy! Also, don't be shy to share your own Water Powered Battery below the comments.