Penny and Nickel Battery

by Brenn10 on March 17, 2007

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http://www.instructables.com/id/Penny-and-Nickel-Battery/
**intro:**  Penny and Nickel Battery

This instructable is a battery made of pennies, salt water, and nickels. It produces voltage much like a battery, but you use pennies and nickels instead. It is a fun project for those pennies and nickels you don't wish to use anymore. Most of us don't usually go to the coinstars, and our change just piles up, so make a battery out of them!

Go to the next step for Items you need.

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**step 1: What do I need?**

Here are the items you will need:

For about 1 volt, you will need:

(6) Pennies
(6) Nickels
(6) Pieces of paper towel cut to a size smaller than the nickel
(1) Glass of water with 2 Tablespoons of salt dissolved in it

Optional: Multimeter to measure the amount of voltage you have produced.
**step 2: Mix Solution/Add Paper**

**Step 1** Pour two tablespoons of salt into a glass of water and try to keep it mixed with the water.

**Step 2** Put in the pieces of paper towel that were cut to the size of the nickel. A little bit smaller will do the trick.

*We do not want the pieces of salt paper touching each other*

Moisten the pieces of paper with the salt, and put them onto each nickel.

Go to next step for more details.

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**Image Notes**

1. Single piece of paper is placed onto the nickel
2. crumb
3. Nickel
4. Salt, mix it all together now.

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**step 3: Time to Stack!**

**Step 3** Once you have each piece of salt moistened paper placed on the nickel, place a penny on top of each nickel.

**Step 4** Now stack all of the coins. The sequence should be:

(The Nickel, is the bottom)
Nickel
Paper
Penny
Nickel
Paper
Penny
Nickel
Paper
Penny
etc...
eetc...
eetc...
step 4: Test with a Multimeter

Now it is time to test your battery with a Multimeter. The multimeter measures how much voltage is coming from the coin battery.

Please note, you can continue to add more coin sequences to the top of the other coins to get more voltage. I just happened to run out, so I could not get enough to light an LED.

For the Multimeter: Turn it to the number "20" for voltage, to get an accurate reading.

Image Notes
1. 0.83 volts

Image Notes
1. Almost 1V!

step 5: Troubleshooting

If your battery does not make any voltage, check the following:

1) Make sure the coins are stacked in an orderly fashion. Make it as upright as possible.
2) If your multimeter does not show any number, do #1, and also try switching the multimeter leads around.
3) Taste the paper to make sure it is quite salty.
4) Make sure the pieces of paper are not touching each other.
5) Add more coins! If you don’t see much voltage, just add more and more coins to get it to a good amount of voltage.

http://www.instructables.com/id/Penny-and-Nickel-Battery/
step 6: How does this work?!?!?

Well, its quite simple you see this is a single cell of a battery, so the zinc nickel and copper penny are called electrodes. The salt is called the electrolyte. As we know, all batteries have a "+" and a "-" terminal. Electric current is a part of current using electrons. Certain materials called conductors allow the electrons to flow through them. The two metals are good conductors, and so the current will flow from the "-" terminal through a conductor(salt mixture) to the "+" positive terminal.

If you don't get it, ask.

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Comments

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moodog says:
If you use an acid like pool acid for instance you'll get almost twice the volts

Aug 25, 2008. 12:24 PM REPLY

thelonelysandwitch says:
soak the paper in alcohol or lemon juice you will get more voltage.

Jul 15, 2008. 11:59 PM REPLY

Radioactive_Legos says:
Ha ha! It's a coin cell battery!

Apr 20, 2008. 2:08 PM REPLY

nathanzhang says:
i came across this tute because i was looking for a nice cheap low-cost, low-mass high-voltage power source for my ionocraft. i found it!

Apr 1, 2008. 2:51 PM REPLY

footballgirl004 says:
i made one of these and then i just left the pennies and nickels in a cup of salt and water and then i looked at them after i left them over night and they were almost all black

Jun 1, 2008. 1:13 AM REPLY

westfw says:
Ever since pennies became zinc with a thin outer layer of copper, I've been intrigued by the idea of building a battery from ONLY pennies. But I can't think of an easy way to get rid of the copper on one side (and part of the edge)? Of the penny. Any ideas out there?

Mar 18, 2007. 1:21 AM REPLY

http://www.instructables.com/id/Penny-and-Nickel-Battery/
triggernum5 says:
They have these nifty tools now called files..:) Or you could try contact electrolyzing it..

threecheersfornick says:
We messed around with pennies in metalworks, and figured out that sanding them or filing them will get them nice and silvery shiney pretty quickly. (If you use a dremel with sandpaper it'll take under a minute.)

ironsmiter says:
Coat one side with a chemical resist(Asphaltum, tar, hotglue, etc).
Place in a warm citric acid bath
Check every hour or so.
The stronger the solution, and the warmer the bath, the faster it'll strip the copper.

Citric acid is usually available in grocery stores.
Make sure to use the correct year pennies...
Some will be all copper, some steel, some copperplated zinc.

lbrewer42 says:
anything after 1982 is copper-plated zinc. Some 82's are this style - some are the older (mostly) copper style

westfw says:
Does citric acid really etch copper? I guess the big problem is that it'll eat the zinc away too. I don't think I know of anything that will dissolve the copper and stop when it gets to the zinc.

ironsmiter says:
sorry for the long delays in responding....
Yes, citric acid works well. Not so much etching, as dissolving into solution.
In my college "small metals" classes, we used a stainless steel tub with a low LP flame burner under it, as a "pickle tank". Mainly to remove the scale from a piece, after soldering.
It's effectiveness is illustrated by the nice blue color the liquid developes after a few days use (copper oxide is blue-to-green in color) it takes a while, but I've had students leave their 20-22 gague wire projects in the bath over the weekend, and come back on monday to fid only the heavier gague plate remaining.

Shark500 says:
it's simple
i just filed off the copper from half of the penny and stuck it into a lemon

... ishould really make an instructible on that.
I GOT DIBBS ON IT!

westfw says:
Go for it! Attaching wires to both sides of the coin might be a challenge...

ironsmiter says:
nice :-)
To avoid soldering, try artic silver epoxy? and stick the other wire directly into the fruit :-(

Classic potatoe clock, except with a higher amperage?

lemonie says:
UK pennies are copper plated steel these days. Concentrated nitric acid will remove copper quite effectively (I've done it, and this is how I know they're steel inside). However, the cell is only going to last as long as the copper-plating

westfw says:
It's the steel/zinc side that gets eaten away. The copper stays relatively unaffected. (at the Zn electrode, the reaction is Zn -> Zn++(aq) + 2e- (and the electronic travel off down the connected wire.) At the Copper electrode, you just have 2e- + 2H+ -> H2 (gas) (electrons from the wire, H+ from the acid electrolyte.)
(huh. I spent a bit of time searching, but I didn't find a web page that I thought explained this very well.)
The fact that you don't need "substantial" copper is one of the things that makes the copper-plated pennies so interesting...
lominie says:
Iron and Zinc have different redox potentials, I've not found coins made of zinc. However, I may see what can be done...

BorisTheSpider says:
Since pennies are mostly zinc now, and only partially copper, would it be possible to replicate the results using just the pennies and no nickels? If I understood correctly, it uses the zinc from the nickel and the copper from the penny. Since the penny has both, is there some other purpose for the nickel? Maybe the actual nickel in the nickel?

trigernum5 says:
Regarding Canadian coins, post 1996 pennies are only ~1% copper, while pre-1996 are ~99% copper.. The sweetest part, is they changed to round edges the same year they bunked up the metal, so any that are multi-facetted are Copper..

kinetisonic says:
This is also called a Voltaic pile. http://en.wikipedia.org/wiki/Voltaic_pile
This is great. Thanks for making this instructable.

Sunbanks says:
About how many do you need to power an LED?

Brennn10 says:
Well, it depends on the amount of voltage it takes to power an LED, and the amount of voltage the battery puts out.
A multimeter is useful to test the amount of voltage, and then you can determine how many more sets you need to add on.

Sunbanks says:
Ok. How would I connect an LED to the battery?

Brennn10 says:
I would recommend taping some hookup wire to the top and bottom of the battery, and then touching it to the LED. If it doesn't work, just switch the hookup wiring as it is connected on the LED leads. Remember the (+) and (-) poles on the LED are important because if the hookup wire isnt touching the correct leads, it wont turn on.

Sunbanks says:
Ok cool.

wingman246 says:
hey i think I did this one time, i'm not sure when though...

wan says:
haha i asked som1 bout these... and if u get it goin long enough, either the nickle of the penny will have lumps on it, because of the electrons... not suere if itz tru tho

wan says:
how long do these last? i dont think i get it...

Brennn10 says:
To tell you the truth, I am not sure. I guess until the salt dries up.

Dael says:
This is awesome!

Does anyone have any numbers for this? As in, how many volts they get with x number of stacks, max current, life span at x current?
I would post some myself, but im poor and dont have a multimeter/ammeter.

={(http://www.instructables.com/id/Penny-and-Nickel-Battery/)
Brennn10 says:
Approx .6 volts per cell.

jaadmc says:
cool i finally had stuff around the house to do an instructable.lol
i did the 6 nickles 6 pennies and got .60 volts then i went away for a few minutes and checked agian and the volts were way down i dont what....so i
added 6 more pennies nickles and paper to the top and i got a reading of 1.5 volts then approximatly 10 minutes later i got a reading of .45 volts

chuckr44 says:
If the cells are wired in series, you just add the voltages. I tried it with cells made of a copper penny, zinc (galvanized) nail, and lemon juice for
electrolyte. I strung 3 together and the voltages added together (per multimeter reading). But how long they last? Not real long, several hours maybe.

science4u says:
1)If you do not get copper and nickel zinc,you can use aluminium foil and one rupee coin,or old 20 paise soin and old 50 paise coin.(this combination gives
approx. 0.6vts and 0.40-0.50 milliammps wen salt sln. is used as electrolyte)
2)If you cant ligt a led using 6 cells ,ten try connecting 3 cells in series and 3 in parallel and then connect bot of them,if ten to you dont get it ten try using 9-
10 cells in series ,you will ten definitely able to ligt a low powered led.
3) if you dont get the materials which i ave mentioned,use any two different metals.also you can use dil.hcl,as it gives more voltage.

jaadmc says:
Is there any way this battery could be charged leaving the stack together??????

Aeshir says:
This is really cool. I'm sure I've seen it somewhere else a buttload of times but I still think so.
Oh and this is a cell, not a battery. At least I think so, correct me if i'm wrong (maybe if each of the coins is a cell on its own).

gzusphish says:
One penny/paper/nickel unit would be a cell. A stack of cells makes a battery.

ich bin ein pyro says:
but if you stacked a bunch of battery cells on top of eachother wouldnt it still be a cell?

Brennn10 says:
Thanks, I changed the title around a bit.

CanisLupus says:
mmmmath,
you probably could put paper in between each of the coins and it would likely not make a difference or maybe it would. Consider this: The paper contains the
electrolyte solution/mix (which basically facilitates the transfer of electrons from the zinc to the copper) by forming ions and complexing with copper ans Zn.
Salt consists of sodium and chloride ions. The salt dissociates into these two ions when dissolved in H2O, hence why the paper must be wet.
If you put electrolyte between each coin, you increase the likelihood of electron transfer. This might contribute to less resistance of electron flow in the
battery.
Haven't tried it yet. Let me know if you measure a greater voltage.

chuckr44 says:
Pure zinc from a sci catalog is too expensive. Instead use galvanized nails, they are coated with zinc to prevent rust. That's what I used with my wet cell.
One part was a galv nail (zinc) the other was a piece of copper tubing, sanded to remove oxydation. Place in a glass with lemon juice or vinegar, and I got
1.2v out of it!
Plus using a galv nail is easier than removing the copper from a penny.
Ok, what are US nickels coated with these days?

xXm4st4z3nXx says:
I saw this in the book Sneaky Uses For Everyday Things
pretty cool I must say
ich bin ein pyro says:
whats the science in this? im curious its awsome

alexsolex says:
This is called "oxydo-reduction" in French... (http://fr.wikipedia.org/wiki/R%C3%A9action_d%27oxydo-reduction)
This may be the English version... (not sure) http://en.wikipedia.org/wiki/Redox

Brennn10 says:
This is a single cell of a battery, so the zinc nickel and copper penny are called electrodes. The salt is called the electrolyte. As we know, all batteries have a '+' and a '-' terminal. Electric current is a part of current using electrons. Certain materials called conductors allow the electrons to flow through them. The two metals are good conductors, and so the current will flow from the '-' terminal through a conductor(salt mixture) to the '+' positive terminal.

I hope that sums it up.
I will post this explanation in the instructable.

mrmath says:
Question: Why not

Nickel
Paper
Penny
Paper
Nickel
Paper
Penny
Paper
...

??? I don't understand why you don't put the paper between each coin.

Also, which is the plus and which is the minus?

How long would a battery like this last, I wonder.

Brennn10 says:
Ok, the paper that is moistened with the salt, goes between each nickel penny set. So one nickel penny set produces about 1/3 volt.

The battery can last close to 2 hours.

As far as the plus and minus, I have no clue. You have a 50-50 chance anyway:)

mrmath says:
That's what I don't get. You say in your instructable that it should go

Nickel
Paper
Penny
Nickel
Paper
Penny

But I'm wondering why you wouldn't have it be

Nickel
Paper
Penny
Nickel
Paper
Penny

In otherwords, you've got paper between the nickels and pennies in each set, but no paper between each set of nickel, paper, penny sandwiches.

Tool Using Animal says:
I think it's because nothing would happen. Assume there's an electron flow from nickel to penny caused by the electrolyte, if you then had paper with electrolyte next and then another nickel, the electron flow is reversed. sums to zero

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