

Etched Minty Valentines Candy Box

by [photozz](#) on January 28, 2007

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intro: Etched Minty Valentines Candy Box

Or.. a good demonstration of why throwing a radio into the bathtub will kill you. I'll explain later.

Speaking of killing you, as we are using water and electricity here, please be super-duper cautious. I can't be held responsible for burned fingers, house fires, dead cats or any combination thereof. Please use some common sense!

This is a decent project that should cost you little or no money, depending on what you have laying around the house. The idea is to use electricity and salt water to etch an image into the top of an altoids tin. The same process can be used to actually cut the image all the way through if allowed to go long enough. I'll explain the principles behind this as we go along.

First things first, Project materials and cost:

1 Altoids can, or similar metal canister - \$0 (I'm using garbage here...)

1 spare DC power supply brick. 5v or greater. Preferably a decent amperage. I use a 12v 1A supply. it really seems to make no difference beyond how long the etch will take - \$0

Old PC case fan, light bulb.. something that will run on the current from the power supply. This is used to limit the amount of current being transmitted, as you don't want to burn out the power supply. - 0\$

1 PLASTIC bowl or pan. Never NEVER use a metal pan of any kind. - 0\$

About half a cup of salt. - 0\$

A couple of bolts and some heavy copper wire - optional 0\$

Plastic packing tape (I use clear.. don't have to I suppose.). Not masking tape. It has to stand up to salt water - 0\$ I steal mine from my day job.

Sandpaper, or green scrubby. -0\$ I used the scrubby from my kitchen sink. Don't tell the girlfriend.

Razor blade or knife. I highly recommend an Exact-o or similar, although I did this with a straight "utility" style blade.



step 1: Prep the minty tin

For the tin to etch properly, the top of the tin will need to be cleaned to bare metal. This can be done with a fine grade of sandpaper, or a green scrubby. I tend to go with a little of both.

Run the tin under hot water and sand lightly until most of the paint is gone. then clean it up with the scrubby. any areas where there is paint remaining will not etch properly, so take your time.

When it looks clean, rinse and dry it off thoroughly. At this point, try not to touch the surface any more than you have to . The oils from your skin could affect or block the etching.



step 2: Masking the tin and draw your design

You need to mask off the top of the tin. Cover the bare metal with the packing tape. If you use more than one strip of tape, leave a little overlap to assure that you have a water tight seal between the pieces. Any bare metal still revealed at this point could wind up being etched. Try and work out all the air bubbles and make sure the edges are covered.

Taking a sharpie or other pen that will draw on the tape, sketch out your design. it's OK to be a little sloppy. I had drawn in some writing here, but abandoned it in the next step. I'll add my "message" later. You will be cutting around the design.



step 3: Cut out the design

This one can take some practice, depending on how steady your hands are. Using the razor, carefully cut out the design from the tape. In this case, I went around each side of the lines I had drawn, then using the tip of the blade, peeled the tape out of the line, leaving the bare metal exposed.

Where ever you remove the tape, the metal will be etched. Mistakes are fine. don't panic. If something gets cut by accident, just use another piece of tape to seal it up again. your just creating a mask here to keep the water off certain areas. Your cutting does not have to be a work of art. it just has to get the job done.

This step can take some time. Be patient and work slow. I abandoned the writing in my design as it was just too small and I was using the wrong blade for really delicate work.

I'll take this opportunity to point out an option. You could also draw your design on the bare cover using a sharpie or other non water based ink. The etch would then remove all material not covered by the sharpie. I prefer the mask and cut out method. It gives you much cleaner lines, and just looks nicer when done. I have examples of both methods later in the instructions.

step 4: Set up the etching station

WARNINGS:

There are several important points to make here.

First, you must use a DC power supply. An AC supply will have little or no effect, no matter how strong. AC current stands for Alternating current. It means that there really is no "positive" electrode. The current in AC circuits alternates directions. The electrons will never flow consistently enough in one direction to transfer metal particles. The Mythbusters (US Discovery channel show..) actually demonstrated this theory in episode 26 "Salsa escape)

http://dsc.discovery.com/fansites/mythbusters/episode/episode_06.html

Jamie and Adam attempted to cut their way through prison bars using this method and salsa as the liquid. Adam used direct AC current from the wall, Jamie used DC from a smashed radio power supply. Adam's had no effect.. Jamie's bars were cut clean off.

Second, DO NOT plug in the power supply until everything is set up. plugging it in is the last step before etching starts.

Third. When testing the PC fan, don't accidentally put your finger in there and cut it like I did that one time.

Fourth. If you have cats, keep the cords up and tight. It will make a spectacular and dangerous mess when your cat grabs a wire and runs for it.... little sh**s...

Fifth. I should not have to say this, but I will. In no case under any circumstances at all ever should you run house (mains - for those of you overseas) current directly into the solution. it just won't work for one thing, and could very easily kill you.

Last, you are using electricity here. Please be careful.

The basic idea of using electricity to plate or etch metal has been around for a long time. In fact, it has been the subject of several articles:

<http://www.instructables.com/id/EKVI03SL4PEV2Z566X/>

There was another one where a guy used the same process to cut a design into his PC case, but I can't find it right now...

It's essentially the same principle used to chrome or gold plate metal. You put the positive electrode on one metal, and the negative electrode on another. When you submerge them in a conductive liquid, like saturated salt water, the electrons will flow from one metal to the other, taking some of the metal with them. You will get the idea.

This is also (in principle) how throwing a radio in the tub will kill you. The electricity will flow from the radio, through YOU, to the metal drain in the tub. Mythbusters episode 19:

http://dsc.discovery.com/fansites/mythbusters/episode/00to49/episode_07.html

Take the plastic bowl and fill it with about 2-3 inches of lukewarm water. Slowly dissolve the salt into the water until it won't take any more. This is a saturated salt solution. You could use regular water without the salt, but it would require more electricity, and take far longer. The salt increases the conductivity of the water greatly.

For the process to work, the two metals should be close, but not touch in the water. I usually pinch the negative wire between the lid and base of the tin, then connect the positive electrode to the fan, and then to two lengths of copper wire wrapped around some bolts. Check the diagram and picture below. The bolts just help create more surface area. You could use the wire alone. I usually use two bolts. It spreads the effect out better. If you only used one electrode, try to get it centered under the piece. If it's off to one side, the etch could be uneven.

In this case, I have the bolts on the bottom of the pan, add the tin floating upside down in the water. It works just as well to flood the tin and have it submerged in the water.

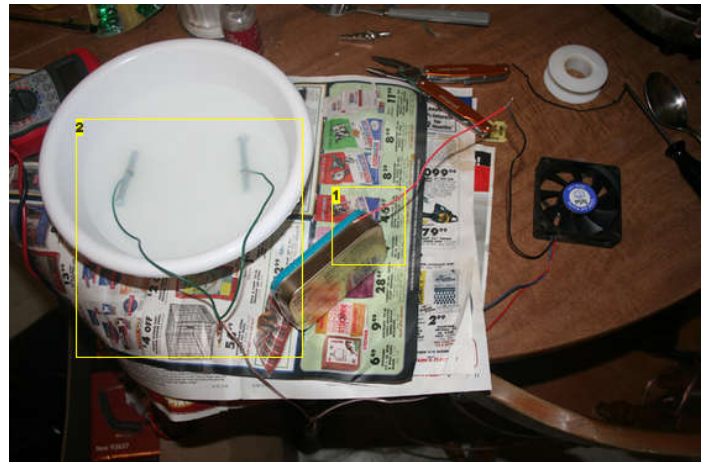
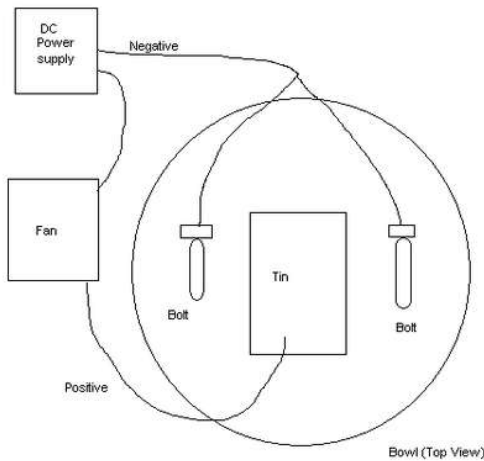


Image Notes

1. Positive connection wire pinched in the lid. I have a sacrificial length of copper wire attached to the lead. I didn't want to eat away at the wire
2. Two bolts connected to the negative lead. Again, used the sacrificial wire to save the actual power supply leads.

step 5: POWER ON!

OK. Once you have it all together, make sure the tin is not touching the wire/bolts in the liquid. Make sure nothing is shorted. Make sure your fingers are not in the fan. Put the cat in the closet.

Plug in the power supply. For safety - **DO NOT leave the room**. Sit there and watch. It should not take that long. And it's cool looking.

You should immediately notice the fan spinning, and bubbles rising from the bolts. If none of this is going on, unplug the power and check all your connections. It could be one of several things.

1. Wires crossed or wired incorrectly. The positive should be on the tin, the negative on the wire/bolts. Make sure nothing is shorting out. If the bubbles are only coming off the tin, you have it wired backwards.
2. Parts are too far apart. Try to make it less than an inch, if you can.
3. Not enough power. You might need a stronger supply.

Once you have bubbles, you will notice the water start to change colors. It can vary depending on the metals you are using. There will eventually be some scum as well. This is all normal. In the pictures, you can see mine going a bit orange.

Let it go for about 5 minutes. You can check every now and then to see how it's working. Times will vary depending on the strength of your power supply. Once it appears to be etched to your satisfaction, unplug the power, and remove the tin. Rinse it well in warm water, and remove the tape. If any adhesive is left behind, just clean it off with GOO GONE or some such solvent.

<http://www.instructables.com/id/Etched-Minty-Valentines-Candy-Box/>

I would not recommend using the bowl for food after this. The scum left behind should be explanation enough.

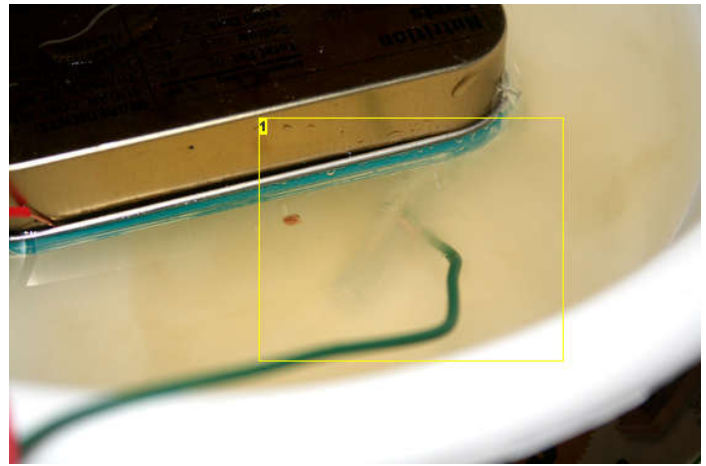
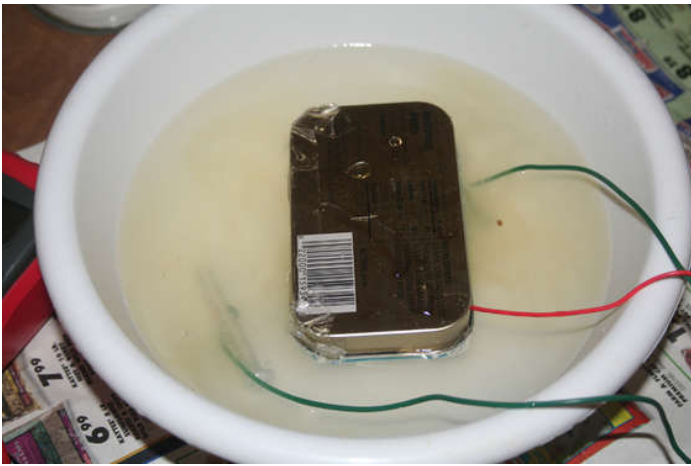


Image Notes

1. Bubbles coming off the negative lead.

step 6: Ta-DA!

Bingo! Etched Tin. Do a little dance and go show the neighbors.

If you were to allow the etch process to continue, it could cut all the way through the metal, creating a cut-out design.

You could stop here, or you could get fancy. I got fancy.

Using another idea, I opened the tin, and wrote my message on the inside of the lid using a sharpie. Any non-water soluble pen should work, but you will need to get it off again, so don't go crazy.

I covered the top of the lid in tape again to protect it. I then etched the lid portion using the same process. The areas where the sharpie was resisted the etching (pretty well anyhow) leaving the writing behind. After it etched a bit, the cat knocked the whole damn thing over. It had worked pretty well by that point though. I rinsed it, removed the tape from the top and lightly used a green scrubby to remove the sharpie revealing the un-etched area underneath.

I took some spare fabric we had laying around and glued it to the inside. I would have preferred felt, but you work with what you have. I'm filling it with chocolates for my beautiful and fabulous girlfriend. Sorry about the bowl and scrubby dear.

Good luck, be safe and have fun!



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Comments

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Hadokendude says:

Dec 15, 2008. 2:19 PM [REPLY](#)

I had three questions: A) What do you use for a DC power supply? Like a computer power supply, or something different? B) In place of a power supply would a 9-volt battery work? and finally B) Is it imperative that I use a cooking bowl of some sort, or could a plastic disposable bowl work as well?



photozz says:

Dec 16, 2008. 8:17 AM [REPLY](#)

A: Anything that puts out DC voltage. I have used PC power supplies and "Wall Wart" adapters. both work fine.

B: Yes. A battery should work ok as long as the piece is not too large. The bigger the etch, the more power or time required. A few people have used batteries with good result.

C: any plastic, non-metallic container would be good.

Cheerio!



gnargnar says:

Nov 18, 2008. 3:53 PM [REPLY](#)

stupid question: where do i get an AC power supply? i have one of those "pick-your-voltage" things and it say AC/DC converter but that doesn't help me much... what's the verdict on 9v battery with a lightbulb in the circuit? also, any examples of the muriatic acid edition? thanks!



zus says:

Jan 29, 2007. 4:08 PM [REPLY](#)

What metals can you do this on ?
I'm guessing pretty much everything except steel ? any kind of soft metal ?



AznPanda says:

Nov 2, 2008. 5:26 PM [REPLY](#)

Altoids cans work im guessin



photozz says:

Jan 29, 2007. 4:18 PM [REPLY](#)

as far as I know, any metal that will conduct electricity. It's not an acidic reaction, it's electrons taking molecules of the metal away as the electricity flows out. it should work on anything including stainless.



Gonazar says:

Apr 22, 2008. 4:45 PM [REPLY](#)

I think copper is ideal isn't it? it makes a better oxidizing agent in the electrolytic cell. I just finished my chemistry 12 course, so i'm kinda testing the water in applying it in real world.



AznPanda says:

Nov 2, 2008. 5:17 PM [REPLY](#)

Yeah CAN WE USE CHEAP PLASTIC DISPOSABLE Bowls? Can we use light bulbs instead of fans?? Are you sure this works? or is there a different way to do this? Willa 9 v battery work with copper wiring a completely sand papered altoids can and a light bulb instead of a fan?
Please respond....



siege engines ahoy says:

Sep 26, 2008. 1:09 PM [REPLY](#)

In addition, can i use one of those cheap disposable plastic bowls/
trying 2 keep my bills to a minimum lol



siege engines ahoy says:

Could you just use a 9v battery for this? assuming you add a shi*load more fans, i assume. . . could i just use a buncha little lights? i want to do this at school with my science teacher . . . great project btw

Sep 25, 2008. 2:21 PM [REPLY](#)



mistermarchman says:

so, this could also work for etching circuit boards, no need for that ferric chloride.

hmm. i might just have to try that.

Aug 15, 2008. 6:05 PM [REPLY](#)



aridese says:

Electrolysis (etching) with table salt is an EXTREMELY DANGEROUS thing to do.

Table salt (sodium chloride) ionizes in water:
 $\text{NaCl} \rightarrow (\text{Na}^+) + (\text{Cl}^-)$

The positive and negative electrodes gather Cl^- and Na^+ respectively. The positive electrode will make chlorine gas! I am confident you smelled a "pool" like odor when you performed this.

If you don't want to take my word for it, here is a site describing the process in greater detail:

<http://chemed.chem.purdue.edu/genchem/topicreview/bp/ch20/faraday.php>

In the quantities you are using, the amount of gas produced can be dangerous -- this is the same poison gas used in WWII. An alternative electrolyte you can try for electrolysis is sodium carbonate (washing soda) or sodium bicarbonate (baking soda) heated to 200C to produce sodium carbonate.

For the safety of others, please amend / remove this instructable...

Jun 20, 2007. 12:29 PM [REPLY](#)



pharoah says:

First, let me point out that Chlorine gas was only used at the beginning of World War ONE, it was replaced with more effective gases such as mustard gas.

Second, if you perform this experiment in a well ventilated area you should be fine. I don't think anyone here would be stupid enough to stick their face above the etch bowl and inhale for a few minutes. Just exercise a bit of caution people.

Jul 30, 2008. 10:18 AM [REPLY](#)



threecheersfornick says:

If table salt ionizes in water... why doesn't the ocean create chlorine gas? Should I stop going to the beach? And, couldn't you just do this outside?

Oct 19, 2007. 7:53 PM [REPLY](#)



finfan7 says:

has to have electricity.

Sep 2, 2008. 9:47 PM [REPLY](#)



offlogic says:

Aridese- Etching with saltwater is safe, ask someone who knows, like a teacher or art or chemistry. Better still, experience the hazard first hand: etch something. Then you can compare and contrast the sheer hazard vs. running with scissors (the pointy ones, especially) and using household ammonia cleaners (DEADLY GAS!!!!).

Chlorine was used in WWI (notably at Ypres, Belgium in April 1915), but was considered more trouble than it was worth. That made it easy to get signatories to the 1925 Geneva protocols that banned the use of "poison gas".

Sep 11, 2007. 9:22 PM [REPLY](#)



photozz says:

**sigh... let's calm down here. this process may produce minute amounts of chlorine gas, but as has been discussed in the past the amount produced with a tabletop setup is so small to be noticed, much less approach dangerous levels. The level of chlorine gas coming off a swimming pool is many times more dense than what I can produce with 5volts in a mixing bowl of salt water.

This has already been extensively covered farther down in the thread. No, the kitchen did not smell like a pool, and I had one etch running for over 6 hours.

That being said, if you notice noxious green smoke or such, a certain amount of common sense should be applied as with any project on instructables.

Jun 23, 2007. 10:21 AM [REPLY](#)



theburn7 says:

dude, if i ever have a mythbusters question, i will ask u

Jun 13, 2008. 3:45 PM [REPLY](#)



Boss_Sauce says:

Thanks for this tutorial! I want to etch everything now...

I did a little experimenting last night-- <http://etchtest.blogspot.com>

Curious if anybody has figured out a good inky marker that can be used to mask but will clean off with goof off or something...?

Feb 1, 2007. 9:01 PM [REPLY](#)



Linksep says:

You could try an oil based "Paint Pen" which should clean up nicely with a petrol based solvent (lacquer thinner).

At work I use pure alcohol (they call it E-200, not sure why... 200 proof ethanol?) to remove sharpie marks from aluminum, usually works pretty good but results can vary.

May 15, 2008. 4:31 PM [REPLY](#)



Jalakahops says:

I will now reveal to you the greatest sharpie secret.

The best way to remove sharpie ink....is with more sharpie ink. Wait wait let me explain. Write something on metal with a sharpie then write over it again and quickly wipe away. Tada, it all wipes off. Inside the pen is the chemical that dissolves sharpie ink and it dries quickly. When the solvent dries up all thats left behind is your "permanent" writing.

May 4, 2008. 5:07 AM [REPLY](#)



theburn7 says:

kool ty

Jun 13, 2008. 3:41 PM [REPLY](#)



spinnergrrrl says:

I think you could use liquid frisket (goes on with a brush or a nib.) I use it for masking glass etching, I don't see why it wouldn't work for this.

Feb 3, 2007. 10:43 AM [REPLY](#)



photozz says:

Cool. Nice job.. I have the fan in the system cause it limits the current somewhat. On my original try, I burned out the first 1a supply I had. It just got too hot. Adding the fan just puts some limit in the circuit. Besides, it's really cool to see the fan turn on and off when you tale the metal out of the water.

Sharpie seems to work pretty well. others have said nail polish ..

Feb 2, 2007. 10:32 AM [REPLY](#)



HOMEPIE64 says:

do another instructable on how to correctly felt the inside

May 4, 2008. 4:31 AM [REPLY](#)



Bran says:

This is so awesome! This makes me really want to (gasp) etch my Sandisk Sansa View (8gb) when I get it, though I will of course go through many, many test runs. Is there any way that you could etch it without dunking it in the water, as precious electronics don't mix too well with water. Thanks!

Oct 18, 2007. 5:27 PM [REPLY](#)



recon506 says:

just pop the drive open and pull the circuit board out. then etch, and when you're done dry the board less drive out with a hair-dryer and put the circuit board back.

Mar 29, 2008. 11:27 AM [REPLY](#)



photozz says:

The only way I could see doing it would be to create a water tight seal around the area to be etched and exposing only that metal to the water. It would be tricky, but not impossible. Also, don't get the current anywhere near the circuit board on the drive. Have to say it... **I am not responsible**

Oct 23, 2007. 7:54 AM [REPLY](#)



threecheersfornick says:

Yes, but it's more complicated... you'd have to use a laser or a stronger acid...

Oct 19, 2007. 7:51 PM [REPLY](#)



zetlin says:

anybody got an Instructable on how to etch or make cool images on plastic
I have a pp plastic case that i have to use for school
any ideas???

Feb 13, 2008. 3:20 AM [REPLY](#)



dizzytired says:

Is this technically electroplating? I dunno if I made a mistake somewhere along the line, but I used a couple chrome vanadium sockets in place of bolts and I seemed to get just a really shiny surface instead of that etched look.

Feb 12, 2008. 11:22 PM [REPLY](#)



Einsteins Circuitry says:

Feb 12, 2008. 9:10 PM [REPLY](#)

After only 15 minutes of etching, I'm feeling dizzy... Is that normal? ;-) Just kidding. But when I was cleaning the bowl out my hand started to burn a little... Not sure why. There's not nearly enough chlorine being released, but I believe that Na_2O (2 sodium molecules per oxygen molecule) is being created which I think is an acid. (please correct me if I'm wrong) I only have two suggestions: where gloves, and do it in a well ventilated area.

PS: Nice Instructable! +1



NickH says:

Jan 30, 2007. 5:32 PM [REPLY](#)

There's a faster method of etching a design on metal using an acid solution. You need fewer parts and no electricity. Melt some old candles in a double boiler. Dip your metal piece and make sure that it's entirely covered in wax. Let it cool. Using any kind of stylus -- a toothpick will do -- draw your design by just scratching the wax away. Dunk your piece in a low acid solution. The acid will etch the metal only where the wax has been removed. Use a chicken feather or something similar to stir away air bubbles that will form on your design as the etching proceeds. Obviously, the acid solution should be placed in a glass bowl or soup plate. When finished, melt the wax away by heating your piece either by boiling it in water or with a hair dryer. CAUTION: When diluting acid, add acid to water. Never add water to acid. To avoid serious burns, use rubber gloves and goggles when dealing with acids.



bgugi says:

Feb 11, 2008. 7:10 PM [REPLY](#)

always do things as you ought to (outta), add the acid to the water (watta) if you think your life's too placid, add the water to the acid...



i make shooting things says:

Feb 6, 2008. 4:32 PM [REPLY](#)

lemon juice?? buy one of those little green bottles of pure lemon juice (no water.)



Daax says:

Dec 23, 2007. 10:15 PM [REPLY](#)

I'm totally gonna do that! One question: If I use some thing like contact sheet (like a sheet of tape) instead of wax, will it work just as good? Or will the acid eat through the tape?



Zephyrllis says:

Feb 29, 2008. 7:39 AM [REPLY](#)

Contact paper does work, at least I've used it for etching copper plates for printmaking. One thing to be careful of though, is that since the contact paper is thicker and goeey-er, be sure to not leave any plastic burrs (tiny edge pieces that may be sticking up from being scratched/cut away) because they will effect the etch.

Also, depending on the brand, it's HARD to get all the goo off.



NickH says:

Jan 5, 2008. 6:09 AM [REPLY](#)

I have no idea. Try it on a scrap piece and see what happens.



tydeus says:

Jun 11, 2007. 10:08 PM [REPLY](#)

If you're using muriatic acid (containing HCL) you can neutralize it by carefully adding some limestone rocks. You probably have some white rocks in your neighborhood that are just a little grainy and shiny and white, those are probably the same I use from my landscaping. Don't expect to get the rock back after, it will be completely gone.



HOMEPIE64 says:

May 1, 2007. 7:18 PM [REPLY](#)

what do you mean by a low acid? i know that your comment is old but that never stops the press right.



NickH says:

May 3, 2007. 3:19 PM [REPLY](#)

A low acid solution would be a few drops of muriatic acid in a cup of water. If that works too slowly, you can add more muriatic acid. Muriatic acid is used for etching concrete to remove mold. Home Depot should carry it.



carbon says:

Jun 17, 2007. 5:54 PM [REPLY](#)

Actually, I've always seen the product you describe as being a mix, with *phosphoric* acid as the main ingredient. I've scoped it out at several stores, and it appears that they only carry muriatic acid in the garden section. Two one-gallon bottles (~30% concentration) for \$9.98.



HOMEPIE64 says:

May 5, 2007. 5:56 AM [REPLY](#)

got it thanks for helping the newbie



brianf25 says:

[Quote: Use a chicken feather or something similar to stir away air bubbles]

lol.. a chicken feather

Jan 31, 2007. 2:32 PM [REPLY](#)



photozz says:

Cool idea with the wax. that would work here as well. I was trying to get away without buying anything. :) I do have cats as well. Judging by the spray pattern of salt water on my kitchen when they tried to "help", I'm reeeeealy glad I was not using acid.

Jan 30, 2007. 8:43 PM [REPLY](#)



i make shooting things says:

is the fan needed or is it just to clear the hydrogen/oxygen/chlorine (fumes) from electrolysis?

Feb 6, 2008. 4:37 PM [REPLY](#)



moshimishi says:

how much would reducing the amps affect the speed? if I used something with say 100 amps, how much longer would it take to etch?

Dec 11, 2007. 4:04 PM [REPLY](#)



photozz says:

Well, the more amps, the faster it would etch. Keep in mind that the amount of surface area also affects how long it takes. the more surface area being etched, the longer it will take. I have no idea what the formula would be to calculate surface area to amps to salt concentration to whatever. All I can say is give it a shot and see how it goes.

Dec 11, 2007. 9:00 PM [REPLY](#)



Nerw says:

I throw cans in the woodstove to get the paint off

Dec 1, 2007. 10:14 AM [REPLY](#)



shop dweller says:

Way too cool! I want to try this with a photo mask

Nov 24, 2007. 3:28 PM [REPLY](#)

[view all 181 comments](#)