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Etching Copper or Brass

Submitted by: Linda Woods, [St. Johns Lower School](#), Houston, Texas

Unit: Jewelry Making

Lesson: Etching Copper or Brass Bracelets, Pins and Earrings

Grade Level: Middle School through High School (and adults) -Examples are by sixth graders

[See more examples on St. John's Lower School Web Site](#) - Middle School Gallery

Etched brass washer with copper tubes - Etched washers w/[Beads](#) - Etched brass cuff bracelet

Background:

SPECIAL NOTES ABOUT FERRIC CHLORIDE ETCHANT: It is toxic. It can be used safely with adequate ventilation, rubber gloves, GOGGLES, and an apron. If you have a small class and can trust your older students to handle the etchant responsibly, fine. If you have a large class with ANY irresponsible kids, I would tell them to hand over the piece for you to etch after they finish preparing it for the etching bath (below). Ferric chloride is permanently staining to counter-tops, floors, sinks, clothes. If you get it on your skin, it prickles. You can easily wash it off your skin with water and the prickling will stop. If your sink is in a bad place to rinse the etchant off, or if it will stain, rinse in a water bucket. Remember to soak in ammonia for 15 minutes right after the etching process to stop the action of the etchant. In my jewelry class, I keep a model magic large plastic tub and lid right in my sink (LOVE MY BIG ROUND FLAT BOTTOMED SINK!!!) with ammonia and water diluted 50/50. We just slide the lid off, drop the piece in, and recover the ammonia to keep fumes to a minimum.



Materials You Need:

- [Ferric Chloride](#) for copper (See notes below about safe use and tips.)
- A [deep Rubbermaid container](#) with lid.
- [Rubber gloves](#), [Goggles](#), [Smocks](#)
- [Styrofoam](#) – to float your metal on
- [Clear tape](#) for protecting the back of your metal 2" wide – hardware store
- [Double sided white foam tape](#) - hardware store
- [Red enamel paint pens](#) for resist
- [Darkener for copper or brass](#)
- Metal: [20 gauge](#) (earrings, pendants), [18 Gauge](#) (pendants), or [16](#) or [18 Gauge](#) (for cuff bracelets)
- [Steel wool](#) (to remove resist after etching)
- Sandpaper – [280](#), [400](#), and [600](#) grits to remove scratches from metal prior to etching, and to clean off resist and shine up your metal after etching.
- [Files](#) to smooth ends and edges of [metal sheet](#).
- [Silicone nail files](#) from a beauty supply to put on final gloss shine (Maybe you didn't know that silicone nail files do a beautiful job of polishing metal!)
- [Crystal Clear Acrylic Spray Paint](#) to seal copper if desired.
- [Sunshine polishing cloth](#) to keep it nice. (Do not use ammonia based liquid cleaners on darkened etchings, as they will remove the darkener.)



Make sure to use rubber gloves to remove the metal, as it really dries out your skin. I would never think of letting my classes of 15 sixth graders handle the etchant. However, this summer, I had a group of 8 very responsible kids in a metalsmithing camp, ages 12 to 18. I explained the dangers of Ferric Chloride, and told them the safe ways to use it. I gave them a choice of handling their own etching or handing it to me. I watched them like hawks and they were perfectly reliable. I kept the apron, gloves and goggles right next to the etchant. The etchant is on a cart right next to the sink, sitting in the Rubbermaid container, on a plastic tray, over a plastic bag.



My sink is a big round brown ceramic chip sink that 10 kids can fit around at a time. The etchant has stained my sink, but it can't hurt it any more than that. There was no crowding in the serious etching area. There is one apron and one set of goggles and gloves that stay there, along with a big sign to remind them of safety precautions. It's great when they can be responsible for keeping up with their own timing for their own etch. At the

end of the day, anyone who's etch was not finished left a little piece of paper on top of their Styrofoam float still in the etch that said what time to check it next and I finished checking for them. As per disposing of your etchant, check with your county agent as to how they want you to handle that. In most places, it can go down the drain with lots of water with no problem to pipes. It is not an actual acid, rather, it is iron chloride, which is a salt. It is MUCH safer to use than Nitric Acid, except both would be really bad if you got them in your eyes.

Wear a [rubber apron](#) if possible with the ferric chloride, but with ferric nitrate, if you are etching silver wear a rubber apron. In extremely rare circumstances ferric nitrate can self-combust! Though my teacher and all jewelers I have talked to on [Ganoksin](#) say they know about that with ferric nitrate, they have never had a problem. You don't want the ferric nitrate (or ferric chloride) anywhere near your torch, and the rubber apron is worn with ferric nitrate because it is not combustible like cotton would be. I have even heard a precaution about washing your clothes ASAP after using ferric nitrate, without just throwing it in a laundry hamper. Follow precautions for both and you will be a happy little etcher who makes beautiful jewelry safely!

Etchants can be strained through a coffee filter basket with a coffee filter in it to trap the eventual sludge that settles on the bottom. You can speed up the action of your etching if you use a chemical stirrer, or tape an aquarium pump motor to the side or lid of your etch container. The vibration speeds up the action. If you do neither of those, you can also speed up the action a bit by tilting the pan filled with etchant (this is why I use a deep but long container) gently every five to ten minutes.

ETCHING: A process that combines a protective resist and a liquid that will dissolve metal to create relief or texture on metal. While there are MANY resists that will work, some are toxic, and others are very messy. Our resist in this case is a fine tipped red enamel paint pen. The etchant bath (ferric chloride for copper, ferric nitrate for silver) dissolves the metal and the resist protects it from the etchant, thereby creating relief. Further directions follow below.

SOURCES OF DESIGN:

Nature, personal icons, favorite things, food, plants, flowers, birds, animals, reptiles, insects, architecture, places, vehicles, food, seasons, landscape, religious icons, hearts, people, geometric or organic shapes, Petroglyphs, African art, primitive art, Egyptian, Mayan, Incan, Art Deco, Art Nouveau, Japanese graphics, stained glass pattern books, etc. Many of these suggestions could be found in [Dover copy free illustration books](#).

Another idea is to etch patterns onto a sheet of metal to cut up later to use in fabricated (constructed) jewelry designs (earring parts, pendant parts, etc.)

When you have an idea for your design:

With a fine (not extra fine) [Sharpie](#), trace around your metal sheet on a piece of white paper. Lay tracing paper over the traced metal shape outline. Design on tracing paper until you come up with a design that is graphically pleasing.

Things to consider in your design: balance, readability (nothing too small), unity overall, and positive negative relationships.

When you have finalized on your design, put your plans aside while you prepare your metal.

If you are cutting out a piece with a jeweler's saw, you will need to draw the shape on [Tracing Paper](#) and [Rubber Cement](#) it to the metal so that you can saw on the contour line of the drawing to obtain your shape. Sand the surface first to 600 grit finish, then rubber cement the tracing paper design sheet to the metal, cut out with your saw, drill holes if desired (for piercing) file and sand, etch, and polish.

IF YOU WANT TO DRILL HOLES IN YOUR DESIGN, DRILL THEM BEFORE YOU SAND or you will be sanding twice to smooth off the rims of the drilled holes.

STEP BY STEP ETCHING PROCEDURE:

1. Sand away scratches on your metal with 320, 400 and 600 grit sandpaper. Sand until the ONLY scratches you see when you turn your piece in the light are from the sandpaper. Use 320 first, then 400, then 600.

Sand in one direction, back and forth...try to sand in a direction that is parallel to the edge of your metal.

2. File the edges of your metal and follow with 400 and 600 grit sandpaper wrapped on a fat Popsicle stick.

3. Transfer your design to your metal by using a resist (red enamel paint pen.)

4. Use a scribe to scratch through the red paint pen to add delicate areas to your design. Remember that only the red paint pen areas are going to be high relief. If you scribe delicate pattern or line through the red, those lines will etch. For example, add veins to a leaf, lines to a turtle's shell, etc.

5. Add small pattern to fill in any large areas that are not red pen. This small pattern helps to add a little sparkly interest, but more important, it keeps sandpaper from scuffing broad areas of your design later when you sand off the darkener.

6. Add a patterned or line of border with paint pen. It serves as a nice sort of frame for your design, and it helps to keep the sandpaper from removing darkener at the edges later when you sand off the darkener.

7. Add PAINT PEN around the outside edge to protect the edges from etchant.

8. Place wide transparent tape protection on the back to protect the back of your piece from etching, making sure to press out any air bubbles on the edge of the piece.

9. Add Double stick white foam tape over the transparent and Styrofoam boats. At this point, instruct your students to give the piece to you if you are handling the etchant. Remind them about safety procedures frequently if you trust them to do it.

10. Check your etch after the first 30 minutes. Carefully remove it, rinse it, and feel the surface with your fingers. It should be about as deep as a file card is, at least. Too shallow of an etch will be disappointing when you sand off the darkener or try to set up shiny/matt areas of your design, as the low relief will receive scratches.

11. Soak in ammonia for 15 minutes to stop action of etch, then rinse and dry.

12. Remove red paint pen with steel wool (put tape on back first to protect from scratches and lay it in the sink with water running over it as you steel wool the paint pen away.

13. BRACELETS OR ANYTHING LIKE A FOLD OVER BALE PENDANT THAT WILL BE SHAPED WITH A HAMMER LATER MUST BE ANNEALED NOW!!!! You can't bend metal that has not been annealed with the torch to red hot. Pieces that will stay flat and not be hammered can proceed to next step.

14. BRACELETS AND ANY OTHER ANNEALED PIECES: following annealing, piece goes in pickle (a hot solution to dissolve fire scale...keep it in a crock pot near your torch, available from Rio Grande) for 10 minutes to stop the action of the etch. You will need copper tongs to remove the piece from the pickle) Then proceed as normal:

NEXT STEP: Darkening

Use a fine brass brush and a little dish soap to thoroughly clean grease and fingerprints from your metal. You must rinse really well, and keep fingerprints off of it at this point. Dry the piece. You can buy a fine brass brush at any hardware store. Brass brushes highly polish metal as well as clean it.

Use a plastic paintbrush (metal brushes destroy the darkener!!!) to apply the brass and copper darkener to your metal. Try not to get it on the back of the metal. Wear gloves and goggles, as you don't want this in your eyes,

either. You do not want this in your eyes. It seems so safe to just dip a brush in the darkener, but take no chances! I keep goggles at the darkening station, and only one brush there, so kids might have to stand in line. I put a little darkener in a low flat container so it can't tip over like straight out of the bottle could. When finished darkening, the goggles and the brush go back on the tray by the darkener dish.

Wait until your piece is as dark as you wish, then rinse and dry.

Sand the darkener off with 400 sandpaper, followed by 600 to give it a good shine. Make sure that you are sanding with a sanding block or a piece of sandpaper wrapped around a stick. DO not use just some sandpaper over your fingers to remove the darkener, as you will also be pressing sandpaper into the low relief. Keep sanding until you obtain a mirror image. There should be no darkener remaining on the surface of your metal.

Hammer your bracelet around a bracelet mandrel using a rubber mallet at this point. Hammer pendant bales around a round mandrel at this point. Put pin backs on pins.

TAKE PICTURES!!! Share your work and revel in the BEAUTIFUL CREATIONS!!!

Various surface effects can be achieved after etching. A really beautiful thing to do is to high polish or tumble polish the whole piece and then go over the high relief with fine sandpaper, thereby creating contrast in the metal between satin and high shine. Brass and Copper Darkener or Silver Darkener (which I prefer to Liver of Sulfur) can be added to the etched design and sanded from the top of the metal to create shiny high areas and contrasting dark low relief. I prefer Jax brand darkeners. Various patina recipes are available on www.ganoksin.com, which is an EXCELLENT resource for jewelry tips, discussion, and galleries. You can create various patinas on your pieces and then polish the high relief, which looks awesome! There are many places to order supplies from. My two favorites are Rio Grande Jewelers (1-800-545-6566, www.riogrande.com) and Thunderbird Supply (1-800-545-7968, www.thunderbirdsupply.com). Both of these locations are in Albuquerque, NM.

Alternative bracelet etch idea: You could drill holes on one or both sides of an etched narrow strip of metal to make a bracelet (18 gage). You could etch pattern onto the bracelet, drill holes, and cut out items from sheet metal to dangle from the bracelet, combined with beading and wire techniques. (Check out Jatayu wire designs and gallery at <http://www.conniefox.com> for amazing wire tutorials). If your piece is going to be a pendant, consider how you will suspend it or string through it. Some possibilities include making the bale (loop) part of your pendant's design. Once etched, you could anneal the piece (torch it till red hot to make it possible to bend) and hammer the bale around a small round mandrel (screw driver or nail?) mandrel to shape it. Hand held propane torches are sufficient heat for annealing. If you are going to do very much annealing, fill a metal pan with pumice to lay your piece on while you anneal. You can buy sheets of fire retardant in 12x12 (30.5 x 30.5 cm) squares to lay on your counter-top or desk, or to protect a wall from your torch, if need be. Check the Rio Grande Jewelry Supply catalogue (www.RioGrande.com) for pumice pans, fire brick, and fire retardant tiles in 12x12 (30.5 x 30.5 cm) size.

On the next to the last day, we have a group critique. Kids talk about what has worked, their final impressions of the project, excellent examples of design and craftsmanship, things they would like to try next time.

I always take my class out for beignets (across the street from school) on the last day of jewelry. They get to wear their jewelry all together and we are a spectacle to behold!

Enjoy your jewelry experience!

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NOTE About Materials:

Red Enamel Paint pens are just paint pens that are not water based. Most paint pens are enamel. Ask in an art supply store. I buy the darkener at Rio Grande Jewelry Supply: www.riogrande.com It would probably be best if you call Rio Grande's Customer Service to place your order if you are not familiar with the products. You want the darkener for copper and brass. Acrylic spray can be bought at any paint store or art supply. It is simply a [Crystal Clear Acrylic Spray Paint](#) with glossy finish that you can spray over the darkened and finished piece to protect the finish from tarnishing.

I don't like using that anymore, as I have found that ketchup is a great copper polish and it does not damage the darkener. Ammonia based cream or liquid copper cleaners will remove the darkener when they are shining your copper... you don't want that! If you use the ketchup to polish it (non toxic and it works!!!) you won't need the sunshine polishing cloth. Just be sure when you remove the darkener that you sand with the 600 grit sandpaper to a very bright finish. It takes about 5 more minutes of sanding to remove all of the darkener from the top relief of your etching. Just FYI, a sunshine polishing cloth can also be bought through Rio Grande. Ask them to send you a catalogue for metals as well as tools. Their phone number is 1-800-545-6566.