

Copper & Brass Etching

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Tools & Supplies Needed

- Copper or brass with resist applied.
- Tupperware container of Edinburgh etch
- Containers of neutralizer and rinse water
- Several chunks of foam tray
- Packing tape
- A magnetic stirring unit is very helpful.
- Sacrificial plastic tongs, nalgene gloves, plastic drop cloth, and safety glasses.

Background

There are a variety of mordants that can be used to etch copper and brass. Most of them are pretty nasty to use. Fortunately, ferric chloride (FeCl_3) and its mutant stepson *Edinburgh Etch* (EE) are reasonably cheap, easy to handle, and effective. What they aren't is *acid*. Ferric chloride is actually a salt. In practical terms this doesn't mean much, except that it's easier to neutralize both of them in a mixture of salt and vinegar than it is with baking soda, although baking soda will work.

It's important to remember that neither of these will etch silver or gold. For them, you need more serious acids.

Ferric chloride has been the traditional 'safety' mordant for copper based alloys for many years, and is used industrially to etch copper circuit boards. For jewelry use, it has one major drawback: gunk. In use, a sludge of god-only-knows-what compounds builds up in the etched areas, and stops the action of the bath. There have been a number of inventive solutions to this problem over the years, ranging from spray-etching tanks to my own trick of using foam floats and magnetic stirring units. In recent years, the printmaking world has developed a 'souped up' ferric chloride etch, known as *Edinburgh Etch*. EE is ferric chloride fortified with a bit of citric acid. The citric acid keeps the sludge in solution, so that it doesn't build up in the pattern. It also makes the acid more aggressive by lowering the pH. It extends the working life of the acid baths by keeping the sludge in solution. A win-win all the way around. EE is easy to make, and effective. The only drawback is that it's necessary to keep separate baths for copper and brass.



The etching area on the back porch. On the right are the two stirrers with the etching baths, one for copper, one for brass. Next to them is the neutralizer bath, followed by rinse water. Note the tarp to keep the etch from staining the tabletop.

Procedure

STEP ONE:

Tape. Lots of tape. You should already have a piece of metal with a resist design applied to it.

The next step is to use packing tape to seal the back and edges so the mordant doesn't attack those areas. Anything the mordant can touch, it'll go after, so make sure your back and edges are sealed. I typically do this by laying a large piece of packing tape across the back of the piece, and then folding it back onto itself to seal the edges. Run a little bit of the long sides onto the front edge of your metal, so that the metal makes an envelope. It's OK if those make a sort of tape flap. The extra area will make it easier to tape it to a float. Take the short edges and wrap them up around the sides of your metal, and slightly onto the front. Rub them down with a piece of wood to make sure they're well adhered. If you need a precise edge on the front, trim the edges of the packing tape with a razor.

STEP TWO:

Safety Break. The etching area is set up out back. Before you get near it, stop and think. You should be wearing safety glasses at all times, and acid resistant gloves before you touch anything else. There are plastic aprons hanging on the peg by the lapidary grinders, near the back gate.

The good news about the EE baths we're using is that they're not very aggressive to skin and clothes. The bad news is that they stain. A nasty rust brown. Don't let it get on you. If it does, neutralize it with plenty of the neutralizing solution, then plenty of baking soda and water. Then flush that with plenty of water.

Be aware of where you are, and what you're doing, and what the other people in the area are up to. The goal is that nobody gets splashed, and nothing gets spilled.

STEP THREE:

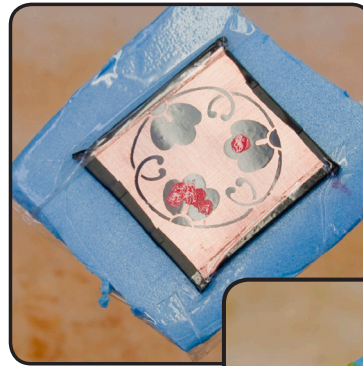
Go Floating. Somewhere near the etching tanks, there should be rolls of packing tape. Find one, and tear off a couple of smallish strips. Use these to tape your metal face up onto a piece of foam. The foam should be slightly bigger than the metal. It is possible to gang up several smaller pieces onto one foam float. This is important, because space in the baths is limited. It's better to have several people floating together. More will fit into the baths. The reason for the magnetic stirring units is to provide agitation to make sure there is always fresh mordant attacking each area of the surface. Since ferric chloride likes to make a heavy sludge, floating the patterns upside down on the surface helps it drop away. EE doesn't sludge up to the same degree, but floating the metal makes it easy to retrieve, and can't hurt.

Next step is simply to put your float into one of the two acid tanks. Make sure you put it into the right one. Make sure the magnetic stirring units are actually stirring. They use little white bars that spin in the tanks. Those are moved magnetically, and it's easy to knock them off center, especially the older silver unit. It shouldn't be just sitting there rattling, you should see a whirlpool. If they're off center, use the plastic tongs to find the bar and put it back in the middle.

STEP FOUR:

Wait & Spin. Once the metal is floating in the etching bath, your part is done, let the mordant do its thing.

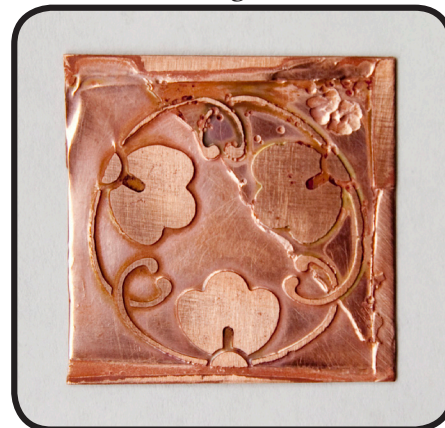
Edinburgh Etch (EE) is fairly aggressive. To test a fresh batch, I etched a piece of 20 gage copper. After 15 minutes, the pattern had been etched down .0057". After 45 minutes, it had etched to a depth of between .0110" and .0150", nearly half way through in spots. Use those figures as a rough guide. Check your depth periodically, especially if you're trying something where the depth is critical.



The sample piece taped to a foam float.



Sample piece after 15 minutes. Notice the sludge, even with EE, and the etchant trapped under the tape.



Sample piece after 45 minutes. The top right corner was masked off after 15 minutes,

STEP FIVE:

Rinse. Once you've decided that the etch is deep enough, pull your piece out, and dunk it in the neutralizer bath, and then into the rinse water. Rinse it further under running water. Pull the tape off the floater under running water. Mordant frequently gets stuck under the tape, so don't take your gloves off yet.

Pull the packing tape off the metal under running water as well, just in case some of the mordant got caught in it. Then take it back and run it back through the neutralizer and rinse water, just to make sure. One last pass through running water, and you're ready to go make something with your etched metal.

STEP SIX:

Clean up. Once your metal is done, clean up any spills, damp spots, or anything else that seems like it should be clean.