



Copper Etching

Developed with Angie Szabo
Grades 6-12



Time Required

1-2 weeks

Objectives

Students will...

- Be able to state the correct order and progression of the steps of etching
- Be able to explain what a “resist” is and what an “etch” is and how they are used in the etching process
- Create a design that works successfully with the resist and process of etching
- Be able to use proper technique and follow the correct progression of the process in order to complete a properly etched, detailed design

Introduction

Want to give etching a try? Start with copper. Copper and copper etching solution are economical, easy to work with, and relatively safe. To etch metal, you apply resist to its surface — resist is a substance that will prevent the metal from etching wherever it is applied. Once the resist is applied, the copper piece is submerged in the etching solution to etch.



CAUTION Safety Issues

Ferric chloride etching solution is relatively safe to use. Since it is not an acid, but a salt, it will only etch copper and brass. However, since it is a skin irritant, disposable gloves should always be worn. Ferric chloride is also very staining and will not come out of clothes, tabletops, flooring, etc. and it takes days to come off skin ... so be careful. You will also need to research how to dispose

of the ferric chloride in your area, as there are copper salts dissolved in the used solution. Always wear safety goggles when using ferric chloride. Additionally, it is recommended that a teacher is the only person to handle the steps of etching that involve ferric chloride.



Directions

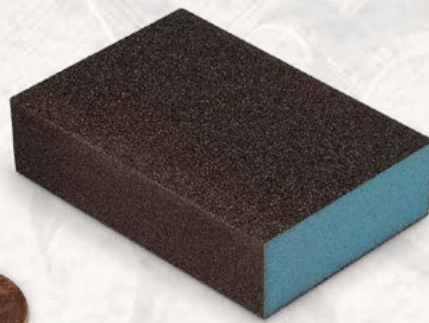
Step 1 Prepare the copper piece by rubbing it with a flexible sand bar or steel wool to roughen it up. Stop Out varnish sticks better on clean metal with a slightly rough surface.

Step 2 Protect the back of the copper piece by using an old brush to paint a thin layer of Stop Out varnish over it. Clean the brush with rubbing alcohol when done. When the back of the piece is completely dry, cover it with masking tape to prevent any etching.

Step 3 To apply the design, use a crow quill pen to draw the Stop Out varnish onto the copper. Fill a small cup with the Stop Out varnish, dip pen into it, and draw on the copper piece. When you are drawing the design, the Stop Out varnish will start to dry and clog up the pen. Have a small cup of rubbing alcohol handy and, when the Stop Out varnish starts to clog the pen, dip it in the alcohol and then wipe it clean with a rag.

ALTERNATIVE 2. Instead of using a crow quill pen, the design can be applied using a rubber stamp and Stop Out varnish to stamp the image on the copper piece.

ALTERNATIVE 3. Use Sharpie® marker to draw your design onto the cleaned copper blank instead of using the Stop Out varnish. Experiment with these two techniques and compare the difference in the textures and line qualities when students have completed their design.





Step 4 Stop Out varnish dries very quickly, so after about 15 minutes it is ready to go into the etching bath. Pour the etching solution into a plastic container big enough to hold the piece. Be sure to use a plastic container with a snap-on lid so the etching solution can be stored for future use.

The copper piece will need to be suspended design-side-down in the ferric chloride etching bath. To do this, put a long strip of tape across the back of the piece, with the ends of the tape attached to either side of the plastic container, and place it in the etching bath just below the surface.



Etching time can vary depending on how deep an etch you want and how fresh the solution is. Etching can take anywhere from 30 minutes to 3-4 hours. Check the etching progress occasionally by picking up one end of the tape and lifting the piece out of the bath. Rinsing the surface of the copper with a little water once in awhile also helps with the etching progress.



Step 5 When you are satisfied with the depth of the etching, remove it from the etching bath and rinse well with water. Saturate a cotton ball with isopropyl alcohol and use it to rub off the Stop Out varnish. Once the Stop Out varnish is removed, scrub the copper with some soap and a flexible sand bar or steel wool. Your etched piece of copper can now be cut, formed, and finished as desired.

Materials



- Flat Copper Blanks, 8 oz. (Approx. 17) Copper Circles, 1¾" dia., 18-gauge — 9724105 or Individual 3" square, 18-gauge — 0400924(K)
- Stop Out Varnish, pint — 9736298
- Sharpie® Markers, black, ultra thin and thin — 9730243 and 9726841(A)
- Copper Etching Solution, pint — 9736297
- 1" Masking Tape, 60-yd. roll — 9723757
- Storage Cups w/Snap-On Lids, pkg. of 8, 2" H — 9726390
- Cambro® CamSquare® Poly Storage Containers, 2 qt. — WA33732 and lid — WA34474
- 70% Isopropyl Alcohol, quart — K01036(J)
- Hunt Crow Quill Pen, pkg. of 12 — 9722366
- Flexible Sand Bar — 8700102 or Steel Wool
- Latex-Free Disposable Gloves, box of 100, size large — C20032

ADDITIONAL MATERIALS

- Rags
- Cotton balls
- Stamps

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