LEEDS PRINT WORKSHOP

Etching with Copper Sulphate

Background/Context

Etching is thought to have originated in the 1500s when metal-workers used it to decorate guns, armour, cups and plates. It was adopted by artists as a method of reproducing an image and became widely used in printmaking practices. Traditionally copper plates were etched using nitric acid or ferric chloride. In recent years the movement in printmaking to introduce safer alternatives and improve the environmental impact of the processes has led to a rival of etching as an artform. Using copper sulphate solution to etch zinc and aluminium plates is a safer and easier alternative to traditional etching using harmful chemicals.

Equipment needed

Hot Plate	**Trays for water & copper sulphate**	**Zinc or Aluminium Plate**
Roller for wax ground	**Grey Rags**	**Lincoln Wash**
Metal File	**Washing Up Liquid**	**Greyboard Squares**
Copper Sulphate crystals (or pre-mixed solution)	**Apron**	**Newsprint Paper & Tissue**
Salt	**Gloves**	**Parcel Tape**
Cutting Mat	**Craft Knife**	**Papers for Printing**
Etching Inks (or we use a mix of stay open inks with linseed reducing jelly)	**Dust Mask (when mixing fresh solution)**	**Etching tools such as scribes, burnishers and roulette wheels**

Health & Safety

Whilst copper sulphate is a safer alternative to acid etching there are still some things to consider.

- Ensure good ventilation as small amounts of hydrogen gas are produced from the solution. This is unlikely to cause an issue in a general studio but keeping windows and doors open is advised.
- The copper sulphate can irritate bare skin so use gloves and an apron.
- It is not advisable for pregnant women to work with copper sulphate solution as when inhaled it can be harmful to an unborn foetus.
- Wear a dust mask when mixing up the powder into a solution to avoid breathing any in.

Preparing a Plate

Filing and degreasing a plate :
A metal plate needs to be polished to create a smooth surface before etching. We buy plates which are already polished and come with a protective plastic coating on them. Remove the plastic on both sides being careful not to create any scratches in the surface. Check if the edges are sharp, if so, then hold the plate just off the edge of a table and file the edges down at around a 45 degree angle.
Once filed you will need to degrease the plate thoroughly using a soft clean cloth and liquid soap/washing up liquid. Rinse under the tap then blot the plate dry being careful not to put any finger marks on it. This should always be done before applying a ground to a plate.

Applying a ground :
Switch on the hot plate and turn it up fully if using hard ground or half way if using soft ground. Place your metal plate onto the hot plate and wait a few moments for it to heat up. Rub the wax ground ball across the plate and it should start to melt instantly. Apply a small amount and roll this across the plate evenly with the roller so it is a thin translucent layer. Remove the plate (palette knives or metal rulers work well to carry it off the hot plate) and leave the ground to cool and harden on the plate.
The soft ground will remain quite soft so be careful not to touch it!

Stopping Out :
You will need to cover the back of the plate to make sure this side doesn't etch in the copper sulphate solution. To do this lay a cutting mat underneath some newsprint paper and lay the plate facedown on the newsprint. Then cover the back of the plate with brown tape, taping it straight onto the paper. Now use a craft knife to cut through the tape around the edges of the plate.

Making the Image

When creating an image onto the plate you need to gently remove areas of the ground to allow the copper sulphate to come into contact with the metal. You don't need to press too firmly as you don't want to actually scratch the plate, just remove the ground.
You can use a traditional etching needle (known as a scribe) or anything with a point to create fine lines. You can also use roulette wheels, wire wool or sandpaper to create texture.
Remember that you must create your image back to front so that it prints the correct way round.
If you wish to trace an image onto the ground before creating the image you can do this using tracing paper and pressing the pencil lines off the paper onto the plate before drawing into the ground.

Using Copper Sulphate

When mixing the copper sulphate wear a mask, apron and gloves and ensure adequate ventilation.

For zinc plates :

Deep etch;
200g copper sulphate mixed with 1 litre of water
Normal line etching;
100g copper sulphate mixed with 1 litre of water
Fine line or soft ground;
50g copper sulphate mixed with 1 litre of water

For aluminium plates :
Same as above but add 200g/100g/50g salt, equal to the amount of copper sulphate used.

Mix the solution in a plastic jug thoroughly for approximately 5 minutes. Now carefully add the solution to a flat tray. If the solution doesn't fully cover the bottom of the tray then you can prop up one side of the tray so the solution gathers at one end.

Place your plate into the copper sulphate solution in the tray to begin the etch. 10 minutes is recommended with a fresh solution. The longer it is left in the deeper the etch will be. As the solution is used it becomes weaker so bear this in mind if it has been used a few times already, the time it is left in may need to be increased.

You can remove the plate occasionally to check it, you should be able to feel fine grooves subtly etched into the plate. Some brown deposits should also come away from the plate when it's ready.
Remove the plate from the solution and rinse with water, then blot it dry. Then use a little Lincoln Wash or white spirit on a rag to clean the ground off the plate.

Storing & Disposing Copper Sulphate

Store mixed copper sulphate in a plastic bottle and make sure to remove the lid periodically to avoid any build up of gases.
Do not pour copper sulphate down the sink as it is hazardous to marine life. The solution can be used until it turns brown and is exhausted. At this point soda ash should be added to neutralise the solution which will absorb the solution and turn into crystals. This should be left to dry and then disposed of with chemical waste.

Printing

Once your plate is etched you can print your first proof.

Take some ink from the tube or pot and loosen it on the perspex surface with a palette knife. If you are using stay open Hawthorn inks, mix this with a little linseed reducing jelly and don't forget to add a couple of drops of cobalt driers.
Use a cardboard square to apply the ink across the plate, working across it in all directions. Now gradually wipe the ink of using scrim in circular motions. Be careful not to press too hard as this can remove the ink from the etch lines, you just need to take it off the surface. Tissue paper squares can then be used to wipe any further ink residue off the surface and off the edges of the plate.

Paper needs to be soaked in water in a tray for a few minutes and then blotted before it is printed. Suitable papers for this process are 300gsm canaletto, fabriano or somerset satin papers.

Place a sheet of tissue paper down on the bed of the etching press, then your plate faceup and then your dampened paper on top, then another sheet of tissue and a piece of newsprint. Then roll it through the press and reveal your first proof.

Finishing
Oil based inks take approximately 2 days to dry, as long as cobalt driers have been added and the ink hasn't been applied too thickly.
Damp paper can sometimes wrinkle when left on a drying rack so it can be sandwiched between two pieces of blotting paper and a heavy board can be placed on top to help it dry flat.

Further Reading
You can see innovative examples of etching in the works of master artists like Rembrandt van Rijn, Albrecht Dürer, and Francisco Goya.

More recently artists such as Jamie Barnes and Kathryn Desforges use etching and aquatint processes in their work.
https://www.jamiebarnesprint.co.uk/
https://kathryndesforges.co.uk/

Useful Resources
Suppliers;
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