Clay Circle Studio Handbook

updated 2/8/19

Mom always said...

A clean studio = a healthy studio.

Let's keep clay dust to a minimum & fir needles out of the sink.

Thank you!

MAKE IT NICE FOR THE NEXT PERSON

In the studio

- When possible toss clay and contaminated glaze materials into the garbage to keep them out of the plumbing. Please run the tap gently so as not to stir up the muck in the waste pan. Please, no clay in the bathroom sink. Rinse your hands in the studio sink, then wash with soap in the bathroom sink.
- Transfer glaze to the lid or another container only when glazing over a stained/oxided surface so as not to contaminate the glaze with stain/oxide. You can work out of the lid, then rinse it out if needed.
- When transfering glaze to another container or lid, pour a very small amount at a time so we don't end up throwing away unused glaze. Please conserve materials; they're expensive.
- When opening a jar of glaze, please do so over the sink or your table to keep the dried bits from falling to the floor. Dried bits of clay and glaze get stepped on and tracked across the floor resulting in micro-dust, which contains silica and is not good to breathe.
- Clean off glaze jars before closing them. Wipe down the jar, sponge around the threads of jar and lid so it's easy for the next person to open. Make sure the lid is on straight and not too loose or too tight.
- If you want to work with red, brown or black clay, bring your own canvas and take it with you. A dedicated hand towel is also a good idea. Clean all boards, bats, tools, etc. thoroughly, squeezing out the sponge with clear water frequently.
- Before glazing functional bisqueware, if you are NOT going to apply a stain, rinse it off to remove dust, etc. It makes glazing easier and prevents pitting. If you are going to apply a stain, don't rinse the pot off or the stain won't work.

At the End of Class

- Gently scrape or sponge the table of clay bits into your hand and throw them away. Pick up chunks of clay from the floor and throw in the garbage. It's OK to carefully remove the canvas, take it out behind the studio and shake it out. Please put it back on the table same side up as it was before.
- Vacuum any clay bits from the floor around your area with the Nilfisk, or use a mop or large

sponge and deposit any waste into the garbage can. Please keep fir needles out of the sink.

- Clean up any clay dust on the floor with a large wet sponge. (You will have to squeeze out and rinse the sponge repeatedly to clear the clay dust, which is not visible when wet.)
- Whenever possible, please dispose of clay, fir needles, gloppy stuff like glaze and other stuff in the garbage can, not the sink.
- Use a sponge and clean water to clean off tools, wareboards, bats, etc. Just rinsing doesn't do it. Rinse and squeeze out the sponge repeatedly as you wipe, otherwise you'll just smear the clay around.
- Don't put used newspapers back in the newspaper pile. Throw them in the recycling or if they're gloppy, in the garbage. When clay and glaze materials dry, they make dust we don't want to breathe.
- Extra points for sponging off the wedging table and cement board at the end of class.

Cleaning Brushes

1. Rinse the brush in cool or lukewarm water. Never use hot water as it can expand the ferrule, causing the hairs to fall out.
2. Wash gently using a little bit of mild soap. Dab the brush gently onto the piece of soap, then work up a lather in the palm of your hand.
3. Rinse and repeat until there's no trace of any color coming out. Over time a brush may become stained, but don't stop rinsing until you're sure there's no material left.
4. Rinse once more in clean, lukewarm water to remove any traces of soap. Shake off the water.
5. Use your fingers to gently shape the brush head into its original shape.
6. Leave brush to dry at room temperature. Ensure it's not resting on its head as it will then dry misshapen.

- If you're worried about the toxicity of the material you're working with, or want to avoid staining your hands, wear gloves while glazing and cleaning your brushes. Keep the gloves to reuse them
- To clean off wax: wipe off excess wax, soak brush in mineral spirits in glass jar for about one minute until wax dissolves. Gently wash brush with dish detergent or soap.

Coming to Terms

greenware = unfired clay

bisqueware = clay that has been fired to bisque temperature

Leather-hard = a specific stage during the drying of a clay object. At this stage, the clay is still visibly damp (usually a darkish gray) but has dried enough to be able to be handled without deformation. The clay can be carved or incised without breaking, but will not receive impressions. The leather-hard stage can be further refined as soft leather-hard, leather-hard, and stiff leather-hard.

Maquette = a sculptor's small preliminary model or sketch.

Functional pottery = pots used for food

What's the difference between underglaze, slip, engobe, glaze?

Underglaze: Traditionally, underglaze decoration is applied to the surface of a piece before it is covered with a transparent ceramic glaze and fired in a kiln. Hence, the name, "under" "glaze". Underglaze decoration uses pigments derived from oxides and stains which fuse with the glaze when the piece is fired. Some underglazes are shiny, which means a frit, or melting agent, has been added.

Slip (the kind you use to slip and score): Slip (noun) is a liquefied suspension of clay particles in water. This kind is the liquid version of the clay you're using, used to slip and score attachments.

Slip (the kind you use to coat or decorate a piece): Slip (noun) is a liquefied suspension of clay particles in water. This kind is made from a recipe, is clay-based, and is used for coating and/or decoration of greenware. Slip has more clay content than its other close relative, engobe. Slip is usually the consistency of heavy cream. ... (Slip may also be used for casting clay in plaster molds, i.e., casting slip.)

Engobe: The properties of an engobe sit in between a slip and a glaze. Engobes usually have a lower clay content and can be used on greenware or bisqueware.

All slips and engobes can be colored with oxides, carbonates and stains. (Sometimes very crusty surfaces can be made by applying slips and engobes over the fired glaze surface and then refiring.)

Glaze = a mixture of powdered materials that often includes a pre-melted glass (frit or flux) made into a slip and applied to a ceramic body by spraying or dipping and is capable of fusing to a glassy coating when dried and fired.

frit = the mixture of silica and fluxes which is fused at high temperature to make glass.

flux = substances, usually oxides, used in glasses, glazes and ceramic bodies to lower the high melting point of the main glass-forming constituents, usually silica and alumina. A ceramic flux functions by promoting partial or complete liquefaction.

Oxide = a compound of oxygen with nonorganic material; acts as a high-temperature superconductor

Stain = Ceramic stains can refer to ceramic colorant oxides suspended in water or to prepared coloring oxides (commercial stains, i.e., Mason stains). Colorants generally are sold in powder form and commercial stains may be either sold in powder or liquid form (eg., Georgies Interactive Pigments). Stains can be used by themselves as an underglaze color, in slips, in clay bodies, in glazes, painted on glazes, and in overglazes. One of the biggest draws for using stains is to achieve a very consistent color, as sometimes using a coloring oxide can have a less predictable outcome.

Wash = In this studio a wash refers to a ceramic material mixed with water, such as an oxide or stain, but also and underglaze or even glaze, that's applied over a piece usually after bisque firing, and wiped back with a damp sponge.

Stages of Clay

Moist Clay
- forming, coiling, soft slab, pinching
- impressing, stamping, rolling texture
- pressing into open-face mold
- rolling in colored clays (nerikomi)

Soft Leatherhard Clay
- slab work

Leatherhard Clay
- firm slab assembly
- brushing slips, engobes and underglazes
- slip trailing
- sgraffito
- carving
- incising
- inlay slips or underglazes (mishima)
- wax, latex and paper resists
- screenprinting with underglazes
- good time to clean up surfaces
- not good for forming or bending clay

Bone Dry Clay
- embellishing with underglazes
- erosion: shellac or wax resist
- not a good time to work the clay...it's too late, baby! Clay is at its most fragile.

Bisqueware
- staining, underglazing, glazing
- glaze inlay

Glazed ware
- overglazes and lustres
- decals and transfers

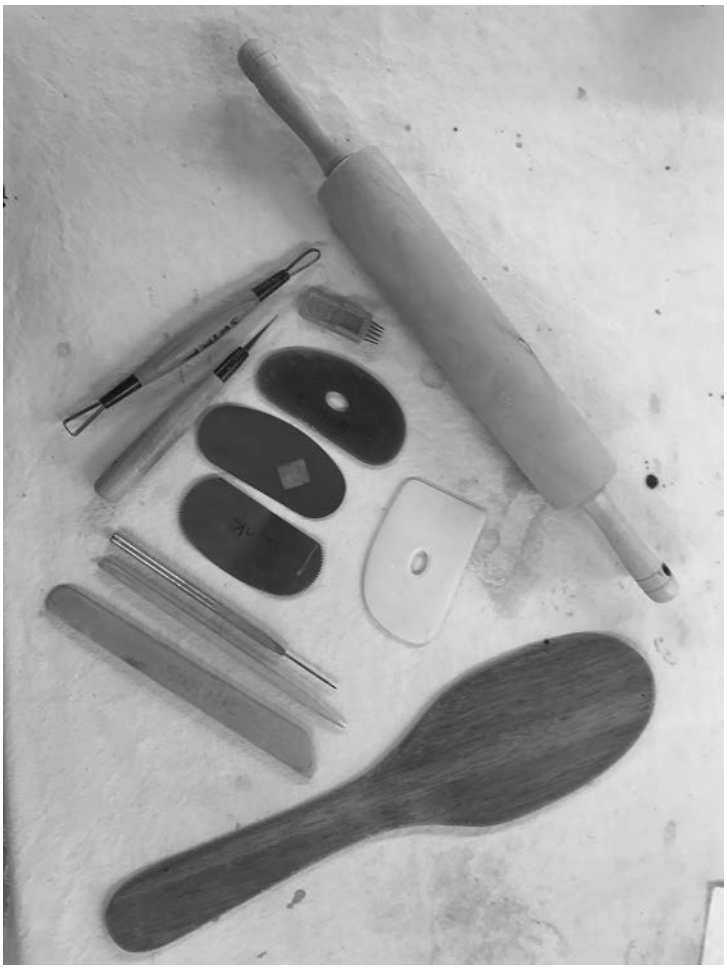
Handbuilding Techniques

working solid & hollowing

coil and slab coil

pinch (and wafer)

slab



Some Tools I Like

- metal ribs: serrated—can be used for forming, scoring. Essential.
- metal rib: flexible smooth
- Mudtools ribs, especially soft rib (red)
- needle tool
- sharp tool with a triangular cutting blade
- pencil tool, one end pointed, one flat
- paddle
- loop tool (basic one shown above)
- hand towel

Feel free to use the studio tools. Over time you'll find out what you like and you can collect your own. There are so many to love!

Firing Temperatures

- This studio uses only mid-range (cone 5–6) clay and glazes.
- **IMPORTANT:** Cone 5–6 (2167°F–2232°F) is NOT the same as Cone 05–06 (1888°F–1828°F).
- **IMPORTANT:** Please let me know if you're bringing any clay or glaze from outside into the studio. I'll need to know what kind of clay/glaze it is and its firing range. Again, cone 5-6 is NOT the same as Cone 05-06. Cone 05-06 is LOW FIRE and clays and glazes meant for that temperature range can MELT like the Wicked Witch of the West into a puddle, destroy your work or other people's work, and potentially ruin the kiln.
- In this studio, we usually bisque fire to cone 05 (1888°F). This hardens the clay to make it strong enough to glaze, while leaving it porous enough to receive glaze nicely.
- I glaze fire to cone 5 (2167°F) in oxidation. I use a slow cool-down program so that matte glazes stay matte, rather than going glossy.
- We use cone 5–6 clays that vitrify when fired to maturity. Vitrification (from Latin vitreum, "glass" via French vitrifier) is the transformation of a substance into a glass, that is to say a non-crystalline amorphous solid. In the production of ceramics, vitrification is responsible for its impermeability to water.
- See firing chart on next page. *Notice that cone 05 is a higher temperature than cone 06, while cone 6 is a higher temperature than cone 5.

Some Notes on Glazing

When glazing functional pottery or any piece that will not have a stain or oxide wash, give the piece a quick rinse under the faucet. This removes dust, which can sometimes cause glaze problems. Handle functional ware minimally with clean hands, as skin oils can cause glaze not to adhere.

Stir glaze thoroughly with a stir stick. If there's a bunch of stuck stuff at the bottom, let me know and I'll tend to it. Don't add water until you've stirred; sometimes glazes look fairly solid, but can be reawakened with a stir. Consistency should be like cream or half & half. Never add too much water or the whole jar of glaze will be too thin. Sometimes I like to put a little in the lid and add water with a spray bottle to get the desired consistency.

Most glazes require 2 to 3 flowing coats. Some glazes run in the firing, so don't apply more than one coat of glaze on the bottom 1/4" of the piece, and never glaze the very bottom unless we talk about it first. There's a lot more to say about glazing…best to have a conversation when you're ready to glaze your piece.

When reglazing a piece, take into account the glaze that's already on it and never apply more than 3 coats of glaze total to a piece. In the firing, the original glaze will remelt, and having too many total coats may cause the glaze to run. This doesn't apply to underglazes; they don't run.

Resources

ceramicartsnetwork.org, chineseclayart.com, georgies.com

Kiln Firing Chart

Firing converts ceramic work from weak greenware into a strong, durable permanent form. As the temperature in a kiln rises, many changes take place at different temperatures and understanding what happens during the firng can help you avoid problems with a variety of clay and glaze faults related to firing.

Temperature °C	Temperature °F	Cone (approx.)	Incandescence	Event
1400	2552	14 13 12 11 10	Brilliant white	End of porcelain range.
1300	2372	9 8 7 6	White Yellow-white	End of stoneware range.
1200	2192	5 4 3 2 01 02	Yellow	End of earthenware (red clay) range.
1100	2012	03 04 05	Yellow-orange Orange	1100–1200°C: Mullite and cristobalite (two types of silica) form as clay begins to convert to glass. Particles start melting together to form crystals, and materials shrink as they become more dense. Soaking (holding the end temperature) increases the amount of fused material and the amount of chemical action between the fluxes and the more refractory materials.
1000	1832	06 07 08 09 010	Red-orange	
900	1652	011 012 013 014 015	Cherry red	800–900°C: the beginning of sintering, the stage where clay particles begin to cement themselves together to create a hard material called bisque.
800	1472	016 017 018	Dull red	300–800°C: Carbonaceous materials (impurities in the clay along with paper, wax, etc.) burn out. The kiln requires ample air during this stage since after 800°C sintering begins and the clay surface begins to seal off, trapping unburned materials and sulfides, which can cause bloating and black coring.
700	1292	019 020 021	Dark red	
600	1112	022		
500	932		Dull red glow Black	573°C: Quartz inversion occurs where the quartz crystals change from an alpha (α) structure to a beta (β) structure. The inversion is reversed on cooling. This conversion creates stressses in the clay so temperature changes must be slow to avoid cracking the work.
400	752			Between 480–700°C chemical water ("water smoke") is driven off.
300	572			
200	392			Upon cooling, cristobalite, a crystalline form of silica found in all clay bodies, shrinks suddenly at 220°C. Fast cooling at this temperature causes ware to crack.
100	212			Water boils and converts to steam at 100°C. Trapped water causes clay to explode so keep the kiln below 100°C until all water has evaporated.

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