



Tips for Successful Glazing

Learning to Glaze – The Glazing Process

The craft of clay also includes surface treatment, most commonly in the form of a glazed surface. Surfaces for utilitarian wares, mugs, bowls, plates must be treated to make them food safe whereas a ceramic sculptural piece can be completed in a variety of ways without the complication of being food safe. Take the time to explore glazing and surface treatments. The field of glaze technology has many experts that have dedicated their careers to the science of glazing, so utilize our small library of glaze books, internet groups dedicated to various manufacturer's glazes and the numerous articles in pottery and ceramic magazines and their accompanying websites to explore how to complete your pieces.

About Glazes

Ceramic glazes consist of three main components: glass formers, fluxes, and refractories. Glaze theory and testing studies how to melt these mixed elements onto a pot and control the mixture in coordination with the applied temperature/heat in a commercial kiln. Glass (silica) has a very high melt temp (around 3200 degrees), to lower that melt temperature we add a flux (like a soda ash that melts at 1600 degrees). If only these two elements are mixed together the glaze would actually run/flow off the pot. In order to control the flux/flow, a refractory (like kaolin or alumina) is added to the glaze to stop/control the flow of the glaze melting in the kiln. The Seeger method was developed in order to look/analyze the atomic elements of the glaze mixture. Unity Molecular Formulas (UMF) can be calculated in order to determine how a potential glaze mixture will react in the kiln.

Starting Out

- Give yourself time to glaze. Invest time in the surface.
- **Take Notes. Take Notes! Take NOTES!!!** Start a glaze notebook.
- Always take copious notes so that you can either repeat or avoid previous results.
- Bisque-ware is fragile. Do not hold it by the handles, thin rims, or knobs while you are glazing.
- Glaze particles are not good for us to breathe or ingest. Please take extra care to wipe tables/ mop floor areas as you glaze and when you are finished.
- Plan out your glazes for each piece and group pieces you want to glaze with similar glazes.
- Remember that glazing takes time, so only work on pieces that can be finished within your allocated timeframe.
- Do not eat/drink while glazing in the glazing area.

Prepping for Glazing-Rinsing

The glazing process generally starts after the bisque stage, with a quick wash or rinse of the bisque, wax bottoms or resist areas, glazing, then clean-up of the pieces before they go on the glaze rack to dry out for the final glaze firing.

Bisque pieces are still fragile, so do not hold pieces by the handles, thin rims, or knobs while you are rinsing and waxing. Pieces will also continue to shrink during the final glaze firing, so finalizing shape, surface and fit, should happen at this stage.

Why should the bisque pieces be rinsed? The bisque pieces have gone through the kiln one time at a lower temperature, anywhere from Cone ^06 to ^04, or lower, based on the studio's guidelines. This process burns off organics and produces "pores" in the work. The bisque firing also produces kiln dust with fine particles that remain on the piece. In most cases, if not wiped or rinsed off, this dust will prevent some glazes from properly adhering to the surface, producing

bare spots or crawling areas. If sanding is needed at this stage, sand first, then quickly rinse the piece.

Rinsing-A quick rinse in the sink should clean the piece, it should look dry within seconds after a fast rinse. It will be a bit cool to the touch. If the piece is too saturated with water, the glaze will not dry or adhere to the surface.

Decoration – Some surface treatments can be applied at the bisque stage, underglazes for example, transfer papers. See Surface Decoration sections below for more details.

Lids - Make sure that lids or removable parts come off easily before applying wax. For example, if a lid fits too tightly, pick an appropriate sanding/grinding device and remove some surface area. Please use a mask when sanding, do not sand and/or grind a piece while around other people glazing. Always remember to rewash a piece after sanding or grinding.

A lot of pottery studios use a commercial wax applied to the surface for the bottoms or resist areas. The wax will burn off in the glaze firing leaving these waxed areas relatively free of glaze, depending on the viscosity of the glaze(s) used and where on the piece the wax is applied.

Wax on Bisque Ware

Waxing provides an area of clean, bisque surface area so the piece can sit directly on a kiln shelf. The piece, theoretically, won't fuse to the shelf when the glazes melt in the glaze firing. Waxing can also be used as a resist area on pieces for decorative effects. All wax areas should be wiped clean between glaze color application or at the end of the glazing process before moving pieces onto the glaze firing rack.

Wax does not come off once it is applied on bisque-ware until it is fired away. Be aware that touching a newly waxed surface with your fingers may transmit the wax to unwanted areas. **Be careful not to drip wax in unwanted places!**

Sculpture simply needs to have the base of the piece washed clean of glazes or other surface treatments that would potentially fuse to a kiln shelf. Take care to clean enough of the sculpture's bottom surface area regardless.

Waxing Basics:

- **Use wax designated brushes ONLY when applying wax to your pieces.**
- Apply a single coat of wax.
- Apply wax to the bottom (if using dipping glazes) and to the lower ¼” of the foot of your artwork in order to create a clean line for the glaze to stop at and to help avoid a glaze running onto the kiln shelf.
- Apply wax resist to bisque ware anywhere you do not want glaze.
- Let it dry for 15 minutes or longer before applying the first glaze. This is a good time to organize and think about which glazes you are going to use.
- **Lids/Removable Parts** - Apply wax resist with alumina (*please ask instructor or studio assistant to mix for you*) to lids and galleries of covered jars/ teapots in order to fire lids on pieces. Throw away any unused wax mixed with alumina. Clean dripped glaze in these areas, as the glaze might potentially fuse the parts together.
- Clean your **wax brushes** well with dish soap after waxing. If they harden, they will be unusable.

Glazes – Mix It Up

Piece(s) should follow guidelines above (rinsing, wax preparation) before readying for the glazing process.

Ceramic glazes are mixtures of various mined and refined particles suspended in water. When firing a bisque piece to its glaze firing range, the piece goes through “sintering” around 1650° F, changing from clay into a true ceramic material. Within the top 100° to 150° range of the top glaze firing range (depending on the clay type), the glazes finally start to melt and fuse into the piece, thereby turning it into a true “vitrified” glass-formed object.

The wet glaze colors often do not reflect the final surface color after the glaze firing; the final colors are determined by multiple glaze tests. AOC handmade dipping studio glazes have test tiles and often commercial glazes will have a picture on the front of the glaze bottle or test tiles glued to the top of the bottle.

Chemistry, time and temperature finalize this stage of the process to get the final glaze color(s). In general, glazes are applied in layers, and different results can be achieved by changing how the layers are applied. AOC has a small library of glazing technique books, and there are numerous books, articles and websites dedicated to glaze chemistry or join an internet group to see how others achieve their colors.

Dipping glazes and most commercial glazes cannot be mixed together. They all have different elemental compositions and results will not match test tiles if they contaminate each other. In general, glazes are always layered on a surface.

Additionally, how the piece is made affects how the glaze responds in the kiln. Horizontal pieces versus vertical pieces will have somewhat different results, depending on the glazes and layering techniques used. Using the rule of thirds on a vertical surface, for example, will be helpful when using a running glaze or a potentially runny set of glazes on pots or sculpture.

Low fire clays do not truly vitrify, think of the earthenware pots used for gardening. In order to make utilitarian pots food safe, low fire glazes with different chemical mixtures that melt at lower temperatures are used. Typically, utilitarian low fire pots need glaze on the bottoms to make them food safe, so low fire stilts are used under the pot to keep them from fusing to the kiln shelf. Stilt marks can be sanded down after firing.

AOC students are encouraged to use test tiles to try glaze combinations and we have a small stock of the assorted in-stock clay tiles available. When using test tiles, it's helpful to document the rear of the test tile with a bit of underglaze or underglaze pencil.

Again, using a notebook to help to organize and record how glazes are applied to the surface of the pottery will help to achieve consistent results or how to avoid some failures. Here's where a glaze notebook is most helpful to record the areas glazed, which glazes are used and how many coats of glazes are applied to achieve the desired result.

Dipping Glazes and Commercial Glazes

The difference between dipping and commercial glazes requires different application to the surface due to the makeup of the glaze. Dipping glazes use water in combination with the glaze elements, but commercial glazes use water and a substance like CMC gum that enhances the flow of the glaze, but thin and flocculate the glaze.

*Dipping glazes and most commercial glazes cannot be mixed together**. They all have different elemental compositions and results will not match test tiles if they contaminate each other. In general, glazes are always layered on a surface.

Avoid cross contamination of glazes. Remember to keep a clean water bucket handy to rinse brushes and continue to refresh the water bucket as it gets filled with glaze remnants from the brushes or other application tools. The brushes can also contaminate glazes, so make sure to clean brushes thoroughly between changes and when done clean glazing brushes with soap and water.

*Some commercial (bottled) glazes and underglazes, like Mayco Stroke and Coat and the Amaco Celadon glazes can be mixed - please contact studio instructor or assistant to make sure.

AOC Dipping Glazes

The handmade AOC dipping glazes use water and must be mixed before using, and in general, only require one dip for application.

The dipping glazes don't have a flocculant (meaning these glazes don't stay suspended in the water), when using these glazes, so the water usually separates and the mixture sinks to the bottom of the buckets. The mixtures settle out and must be stirred for consistent glaze dipping. For results most similar to the test tiles, thoroughly mix all glazes before each use.

There should not be sludge at the bottom of the bucket or a layer of water on the top of the bucket when done mixing. Use a brush, immersion blender, hand, or a drill with a mixing paddle to thoroughly mix a dipping glaze. Be careful to not over agitate a glaze, i.e., try to not induce bubbles on the top when mixing, these will adhere to your pot. Continue to mix your glaze throughout the glazing process, as they settle out quickly.

AOC handmade dipping glazes will have various viscosity, depending on the glaze, anywhere from the thickness of 2% milk to heavy cream. Consult with studio instructor or assistant how to apply for single coat coverage.

Please do not adjust the dipping glaze thickness. Please contact the studio instructor or studio assistant to check and/or adjust the glaze viscosity. **No exceptions.**

The AOC dipping glazes cannot be mixed together because they have different compositions and will not match test tiles if mixed.

Keep lids on the buckets you are not using to prevent splashing and accidentally mixing glazes. Use separate tools and brushes for different glazes if layering and/or dipping in different glazes and keep these areas wide apart on the various glaze mixing tables. Some of the more popular AOC are in rolling buckets under the long glaze table.

There is also a tall bucket of water next to the long table to quickly clean off the drill mixing paddle.

Glazes Variation in Results-Glaze thickness affects the resulting glaze color and character greatly; a glaze will look different when applied thickly or thinly; additionally glazes react differently dependent on the layering of glazes. Temperature also changes the appearance of the glaze dramatically. Glazes can be applied by dipping, brushing,

sponging, or with an applicator bottle. Experiment with these. When brushing or sponging, the application will be thin and may require more than one layer.

AOC Test Tiles-Notice if there are signs or notes if the glaze moves/ runs, these test tiles are fired hole side down. Look for thickness built up at the base or drips forming. IF it does pool or run on the test tile, allow for that running behavior on your piece. Compare your test tiles using thick vs. thin applications and notice the differences-color, texture, and underglaze coverage in your glaze notebook.

Rule of Thirds- For vertical pieces, using the rule of thirds, divide the surface into three parts, visually or draw on with a pencil or marker (these burn out in the kiln firing). This method will make “safety” zones of where you can or can’t apply additional coats of glaze. In general, on the outside of pieces, the bottom third of the piece should have normal glaze application, meaning a single coat of a glaze. Keep all secondary and tertiary glaze coats on the outside of pieces up in the first third zone of the piece, in order to prevent potentially running glaze that will melt and stick the piece to the kiln shelf.

For horizontal pieces, keep glaze(s) to a minimum on the side where the piece will sit on the kiln shelf, consult with the studio instructor or studio assistant. Try to keep all foot rings, inside and out, clear of glaze, using ¼” at the bottom of the piece as the safety zone. If there is no foot ring, flat bottomed pieces cannot be glazed on the bottom.

Resist/Waxed Areas- Additionally, if the item has waxed areas, these areas must be wiped off before applying a different glaze in order to avoid contamination of glazes. Basically, clean as you go, in regard to waxed areas.

Combining Dipped and Commercial Glazes-The two glaze types can be combined, but it’s recommended to test the combination out first with test tiles.

Glazing Basics-Dipped Glazes:

- A shiny, gloss glaze will make the best liner (interior glaze) for utilitarian pieces. They are easier to clean and are more pleasant to eat off of.
- For vertical pieces, visually divide or mark the piece into thirds, this will give you “safety” zones of where you can or can’t apply additional coats of glaze. This is dependent on the glaze(s) being used.
- Glaze the interior of vertical pieces first, use a pour in, pour out method.
- **All coats of glaze MUST be dry before applying additional coats inside or outside of the piece.**
- Some of the glazes at AOC are kept on the thinner side to allow for quick dipping or for a couple thin coats, consult with instructor or studio assistant.
- Count off seconds as you dip your pieces, include this information in your glaze notebook.
- If the glaze is cracking on the surface as it dries, the glaze may be too thick and will “spit” off the piece in the firing or crawl in the thick area. Wash the piece off and redo the glazing later after the piece has completely dried. Check with the instructor before proceeding.
- NSF=Not Food Safe, marked on test tile on bucket
- Crackle/Bead Glaze does crack on the surface, so handle it quickly and put a firing cookie under it on the glaze kiln shelf. Not food safe.
- Running glaze(s) or runny glaze combinations-put a firing cookie(s) under the item on the glaze firing shelf
- The dipping glazes can be dipped, splattered, or various application styles can be used to adhere to the surface, but in general, these aren’t glazes meant for brushing on the surface.
- Most drips will show on more transparent glazes, and can be sanded off after the piece is completely dry with your finger.
- Let the final piece dry completely to the touch, clean up (see clean up section). Move the piece(s) to the glaze kiln shelf with an AOC firing form.

The “Three Second” Dip for a single coat of an AOC Dipping glazes

In order to utilize the AOC single glaze color, prep pieces as notated in the rinsing and waxing guidelines.

Make sure there is space on a table to set the wet piece down after dipping. Use tongs or hand to hold a piece, practice how to get the piece under the glaze and out of the glaze while holding it over the bucket.

For dipping glazes-the three-second rule applies to the first coat. Count this off while submerging a piece in the glaze, submerge entire piece, count: “One Mississippi, two Mississippi, three Mississippi,” then pull piece out of glaze and hold

upside down over the glaze bucket to allow drips to fall into the bucket. Slide piece onto a table surface and gently release the tongs, spreading the tool forks wide in order to not scrape the side of the glaze. Dab small amounts of glaze with your finger into the tong spots as needed. Let this coat dry entirely before touching the piece.

The longer you hold your work under the surface of the glaze the thicker the application will be. Count off seconds as you dip your artwork, the timing is also great info to include in your glaze notes.

Please no longer than a "Three Second" Dip for the first dip, some glazes need only a quick dip in and out, so check with studio instructor or studio assistant.

For additional dips, for example, doing a rim dip, make the second dip two seconds, the third dip a one second. Again, always let the first glaze layer **totally** dry before adding additional layers. Apply the additional coats lighter and lighter with the dipping style glazes. Each successive dip should be shorter than the original glaze dip, keeping these dips up in the top third area, always shorter in length than the original coat. See the rule of thirds above.

The AOC Two Color Combination Dipping Guidelines

In order to utilize the AOC two color combinations, prep pieces as notated in the rinsing and waxing guidelines above. Choose colors from combination tiles, noting where there are combos that are runny on the test tiles. If runny glazes are selected, utilize the rule of thirds for the second coat in the combination. Count off the seconds as you dip your artwork, the timing is also great info to include in your glaze notes.

Mix the two chosen colors selected and set up two glazing stations with separate brushes, tongs, etc. Make sure there is space on a table to set the wet piece down after dipping. Remember to mix the dipping glazes as they settle quickly.

The first dip of color should be short, submerge the piece completely and pull out of the glaze and hold over the bucket for drips. Put wet piece down on the table and dab in glaze by hand where tongs or hands touched the piece. Let dry completely, then clean all waxed areas of first glaze.

The second dip of color will also be short. Submerge the **DRIED** glazed piece in the secondary color, and pull out of the glaze and hold over the bucket for drips. Put wet piece down on the table and dab in glaze by hand where tongs or hands touched the piece.

Let dry completely, then clean all waxed areas of the piece. Move to the glaze kiln shelf with an AOC firing form.

Commercial Glazes Stocked at AOC

The commercial, bottled AOC glazes that are stocked are a variety of Amaco, Coyote, Spectrum and Mayco glazes. These glazes are manufactured with a variety of chemicals, oxides and/or pigments based on the glaze type.

The commercial glazes do have a flocculant added to the mixture, so these glaze types look as though they are always mixed. Because of the flocculant these glazes typically require 3 or more brushed on coats in order to achieve the surface color as noted on their label photos or website test tiles.

Read the recommended instructions on commercial glazes for number of coats needed and the recommended firing temperature. Some of the commercial glazes will fire to different temperatures and generally have written instructions on the label to that effect and some have general results if firing out of the recommended firing range.

Shake the closed bottle a few times before opening. Use a brush to knock down the glaze from the top and shoulder areas of the bottle and mix that down into the glaze in the bottle. Commercial glazes should be somewhere around the thickness of heavy cream to milk consistency.

Please do not adjust the commercial glaze thickness. Please contact the studio instructor or studio assistant to check and/or adjust the glaze viscosity. **No exceptions.**

AOC has attached test tiles (lighter and darker clays) to the tops of our stocked glazes with the recommended coats as specified by the manufacturer.

The various commercial glaze manufacturers will often have their glaze combinations published on their websites and/or have active FB groups that describe glaze color combinations. Sign up for these groups and/or their newsletters. The commercial glazes lend themselves easily to fun glaze combinations, changing up layers and coats.

Glazing Basics-Commercial Glazes:

- A shiny, gloss glaze will make the best liner (interior glaze) for utilitarian pieces. They are easier to clean and are more pleasant to eat off of.
- For vertical pieces, visually divide or mark the piece into thirds, this will give you “safety” zones of where you can or can’t apply additional coats of glaze. This is dependent on the glaze(s) being used.
- Glaze the interior of vertical pieces first, use a pour in, pour out method.
- **All coats of glaze MUST be dry before applying additional coats inside or outside of the piece.**
- Apply three or more (as recommended on label instructions) for coats of bottle glaze for the single color
- Include coats, glazes and sections decorated of the piece in your glaze notebook
- If the glaze is cracking on the surface as it dries, the glaze is too thick, wash off and redo later. Check with instructor before proceeding.
- NSF=Not Food Safe commercial glazes have varying marks on the label about food safety and may occasionally need to be looked up on their website.
- Running glaze(s) or runny glaze combinations-put a firing cookie(s) under the item on the glaze firing shelf
- The commercial glazes can be poured, splattered, slip-trailed, or applied in various methods.
- Commercial glazes can be tested with less or more recommended coats of glaze for variations in the finished glaze, document in your glaze notebook.
- Let the final piece dry completely to the touch, clean up (see clean up section). Move the piece(s) to the glaze kiln shelf with an AOC firing form.

Cleanup for Glazing

All pieces that go into the kiln room are required to wipe clean the bottoms from 1/8” to 1/4” of all Cone 5/6 glazed bisque depending on glazes and techniques used. Items not properly cleaned **WILL NOT** be fired.

Wipe ALL of the glaze off the bottom/foot of your pot (even little tiny drips). Anything the glaze touches will fuse to it-your pottery and the kiln shelf.

Wax Resist Areas- If using wax resist during glazing, make sure to wipe the waxed areas clear of glaze before applying subsequent glazes. This prevents contamination of glazes. Remember to clean these areas before placing the item on the glaze firing shelf, otherwise those spots of glaze will adhere to the piece during the glaze firing. If wax resist was applied on contact areas, like lids or removable part, clean those areas up before moving piece into the kiln room (see notes above about waxing).

Firing Form-Move pieces to the allocated kiln shelf with appropriate AOC firing form underneath the work(s). Firing forms are in the black hanging file folder inside the kiln room.

Wash Up-Please thoroughly clean all table surfaces, brushes, tongs, sponges, palettes etc. at the end of each glazing session. Wipe and/or mop up glaze room floor for spills. Please use liquid soap where needed and thoroughly clean all items that have been used. Put all tools away at the end of each session.

Mending Chipped Glaze-Do not add more glaze to chipped or bumped areas of the glazed surface until it is totally dry. Use thicker glaze, from the side of the bucket, if possible, or from the top of the lid of the commercial glaze, to patch by hand or with a small brush.

Surface Decoration-Slips, Underglazes, Oxides and Washes

About Slip

Slip is watery clay with colorant added. These can only be applied on green-ware that is still leather hard and hydrated. If it is applied to dry clay or bisque-ware it will flake off. Use these slips to increase your color palette, carve through them to reveal the clay color, or apply them to create texture.

About Washes

Colorant washes are water with one colorant material and/or a mixture. They can be applied under or over the glaze. At AOC we have multiple Copper Carbonate (Green to Red), Iron Oxide (Brown to Tan), Rutile Oxide (Straw to Rust) and Cobalt Carbonate (Blue) Washes. These should be applied thinly. They are best used in brushwork techniques, to incised lines or to accent texture. Check the test tiles for the basic colors after they have been fired. The oxides will also do some color changes over/under glazes. Try this technique out on a test tile first in order to determine what the end result will potentially look like.

Washes can also be made from underglaze and water; the underglaze washes will not generally change color.

About Underglaze

Underglaze can be applied on both greenware and bisqueware. You may use the underglaze provided at the studio in moderation. If you want to use large amounts, please purchase them from your local supplier.

Underglazes may be mixed together like paint on a palette. The color in the bottle is similar to the end result when covered by a clear glaze. Underglaze will show most clearly through transparent glazes like the commercial or studio clear gloss glazes or on bare clay. Underglaze may be used on the foot of your artwork, but the kiln wash may leave a white mark where it touches the kiln shelf.

Using Wax Resist Over Glaze

Use wax over glaze to create patterns when layering glazes. Let your wax dry for **1-2** hours (when applied over glaze) before layering a second glaze. Often it is best to apply it the day before you will dip the second glaze. Cover the wax jar so it doesn't dry out. Clean your wax brushes right after use. [Clean glaze drips off of waxed areas as well, so remember to clean these areas in between coats of glaze \(especially if changing glaze colors\).](#)

Using Wax Resist on on Greenware

Wax may be applied to greenware and "cut" through to create precise lines, a variation on mishima technique. These lines may then be filled with oxides or underglaze. Any drips of underglaze or oxide not absorbed into the cut lines should be wiped off to create a clear pattern.

FAQ

Penalties

Though rare, any damages to our kiln or kiln furniture directly attributed to your work will result in replacement or repair charges at your expense. This includes but is not limited to: glazes running onto the shelf, unknown or misidentified clay melting to furniture, and armatures burning off or fusing to the shelf (if wire).

FAQ

- We fire all low-fire (04-06) work (bisque and glaze) to cone 06. Doing so allows us to get your work through the kilns and back to you much faster.
- All bisque firings are done at 06, no matter what clay body.
- Mid-fire glaze firings are done at cone 5.
- We can also fire Gold Luster and Mother-of-Pearl Luster at cone 018.
- Know the clay type and glaze firing range for your clay. We will not fire unknown clay or glazes. Commercial bisque is always accepted.
- Remove all paper and armatures from sculptural pieces.
- Work must be dry or nearly dry for bisque firing

- We do schedule occasional Raku glaze firings, please sign up via the website when available, pieces must be bisque fired first

Can I glaze the bottoms?

That depends on the firing temperature:

For **low-fire** work (cone 06), the answer is yes, so long as the piece isn't too small! For cups, bowls, trays, figurines, etc., feel free to glaze the bottoms! We can put your pieces up on stilts (little spikey stands) for firing.

For **mid-fire** (cone 5) work, no, the bottoms of your pieces must be completely free of glaze. Leave a minimum 1/8" to 1/4" glaze-free clearance at the bottom of your pieces.

What about underglaze?

Though underglaze will *usually* not stick to the shelf at **mid-fire temps**, there is some risk of certain colors fluxing out just enough to become 'tacky' and stick to the kiln washed shelf. This may result in small bits of kiln wash stuck to the bottom of your pieces. We are willing to fire mid-fire work with underglaze on the bottoms, but it is at your own risk. The kiln wash can usually be sanded off.

Low-fire work with underglaze on the bottoms is perfectly fine and should not stick.

Do you fire beads?

Yes, we will fire ceramic beads, but you must put your work on the beading racks and /or provide your own bead rack(s) for the glaze firing.

I need this tomorrow! Can I pay extra for a rush firing?

Firings are done on a first-come, first-served basis. **We do not offer any rush services.**

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