

Underglazes



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Unit 3

In this unit, you have the choice of glazing a bisqueware object you have purchased or glazing a hand-constructed item, sculpted or wheel thrown item you made using any of the techniques learned in Unit 1, Unit 2, Unit 7, or Unit 8. If you make your own item to fire with an underglaze, review the “Basic Information” section from Unit 1 of this manual.

Project Requirements

Produce one functional or decorative art piece that is at least 4" in width or height and no larger than 12" in width or height using underglaze techniques (i.e., brush stroke work, tinting specialty glazes, airbrushing, layering colors, etc.). The art piece may be either purchased greenware or bisqueware, OR a hand-constructed piece created by the member. Judging will primarily be on the quality of underglaze techniques.

- Enter the Underglazes Hand Constructed class if the exhibit item was made by the member.
- Enter the Underglazes Purchased Greenware/Bisqueware class if the exhibit item was purchased by the member.

Basic Information

1. Underglaze can be applied to greenware and fired in a low fire greenware firing before any clear coat or mixed glaze is applied to the bisqueware stage.
2. Underglazes may also be applied to bisqueware with a clear coat over top of it fired to the cone specifications of the underglaze. The results of this type of application can vary greatly and be a bit difficult in application as the bisqueware is porous and hard to gauge how many coats are needed to obtain adequate results and may require quite a bit of testing before achieving satisfactory results.

2. This is not recommended unless the underglaze label suggests this type of application. In some cases, applying to bisqueware is easier for detailed work.
3. If working with bisqueware, wash it with cold water to remove dust and let it dry completely before applying underglaze. If working with greenware, be careful not to smudge the underglaze.
4. The underglaze may be thinned, with underglaze medium or water, for desired consistency.
5. Underglaze may be intermixed to create color variations. Refer to types of underglazes.
6. For a solid, opaque color, you can typically apply two to three thin coats of underglaze, allowing each coat to dry before applying the next coat.
7. The underglaze may be applied with a brush, sponge, airbrush or a variety of other available tools.
8. Underglaze may be used in a sgraffito technique.
9. You can apply underglaze and fire it as it is, or you can apply a clear glaze over the dried underglaze for a glossy finish.
10. Underglazes must be applied smoothly and precisely because they do not move in firing.
11. Underglazes require specific cone firing as indicated on the underglaze labels.

Types of Most Common Glazes

- 1** Opaque underglaze is usually made from a clay base and should not be mixed with different kinds of underglaze or any of the glaze types. It is mostly used for solid coverage and can be thinned with underglaze medium or water. This type of underglaze works well for:
 - a. Figurines
 - b. Blocking in design work
- 2** Transparent underglaze is made with concentrated colorants and less clay base. It is usually thinned with an underglaze medium or water. This type of underglaze works well for:
 - a. Brush stroke work
 - b. Tinting specialty glazes
 - c. Airbrushing
- 3** Specialty underglaze is usually made with a frit base. It can be mixed with its own kind. Very rarely can it be mixed with other ceramic media. The most popular colors in this type are red and orange. It is recommended to follow the manufacturer's instructions for proper application.

There are new and improved ceramic media introduced daily. It is very important to read all labels for recommended application and firing instructions.

Have your project leader, parent and/or ceramic studio help you choose your greenware and underglazes. They will be able to assist you in your choices and guide you.



Why Do Problems Happen and How to Fix Them?

Sometimes underglaze colors look streaky after firing because not enough coats were applied or the brush was dipped in water, which thins the color. To fix this, apply more coats and avoid adding water to the brush.

If colors look faded after firing, it might be because the glaze used doesn't match the underglaze. Always use glaze and color from the same brand. Overfiring can also change colors—refire to the correct temperature to bring back the true color. Stir colors well and apply enough coats.

When glaze chips or peels off, the piece might have dust, fingerprints, or polished spots that resist glaze. Sometimes the bisque wasn't fired enough. Test by scraping with a coin: if it cuts in, it's underfired. Clean the piece and make sure the underglaze isn't too thick.

Pinholes in glaze usually mean there was dust. Make sure the piece is dust-free before glazing. If pinholes appear, rub the dry glaze with the heel of your hand to fill them.

Cracks or pinholes in underglaze can happen if coats are too heavy, applied before the previous coat dries, or if the color is old. Fix by lightly sponging the area to seal cracks.

If greenware resists underglaze, it's often because of dust or body oils. Wipe with vinegar water before applying underglaze.

Sponged pieces look streaky when color is dragged instead of using a dabbing method. For wash-away pieces, glaze may peel if wax wasn't cleaned off—scrub away residue and refire.

Airbrush problems? If it won't spray, the color may be too thick or the vent clogged. If it spatters, the color may be too thin or the airbrush is too close. If it spits, there may be foreign matter or low air.



Underglazes Technique List

In the ceramic technique chart below, put the date when you learned the skills. Place a check mark in the column of skills you would like to learn. Discuss skills you would like to learn with your leader. She/he will be able to give you hints on how to achieve your goals.

Ceramic Knowledge and Goals Checklist	New skills I have learned	Skills I want to learn or improve
<p>Detailing (Embossing): opaque, translucent, specialized, velvet. Application of color to a design already in the greenware.</p>		
<p>Antiquing: A method of applying color, then wiping it down.</p>		
<p>Burnishing: A technique where a piece is polished before firing to make it smooth and shiny. Burnishing was practiced in prehistoric Egypt, Europe, the Middle East, and by Native Americans. The Pueblo Indians of New Mexico and Arizona are noted for their highly burnished ceramics. It continues to be practiced in the U.S. as well as parts of Africa.</p>		
<p>Polish with Opaque Underglazes: Southwest Indian technique that has been passed down for generations.</p>		
<p>Texturing: Thickened underglaze to form a textured pattern or background.</p>		
<p>Veiling: Designing work using translucent underglaze and a sponge.</p>		
<p>Sgraffito: The act of scratching a design through a colored slip that is painted over a piece to reveal the clay underneath.</p>		

Ceramic Knowledge and Goals Checklist	New skills I have learned	Skills I want to learn or improve
Altering the greenware pattern for a special effect.		
Mishima: A technique where fine lines, pattern, or a design is carved into leather-hard greenware then filled with contrasting slip or underglaze and then the excess is wiped away to reveal intricate, inlaid designs. This is like the opposite of sgraffito.		
Stenciling: Cut-out patterns used to apply a design by brushing, sponging, or spraying onto the clay.		
Free Brush Design: A brush design where the strokes of the brush are apparent.		
Simulated China Painting (using transparent underglazes, double and triple loading the brush with several colors to give a feeling of China painting).		
Majolica Underglaze: applied over satin or matte glaze.		
Airbrush: A device operated with compressed air that allows the operator to control a fine spray of color or decoration for a more realistic effect.		
Miscellaneous: A combination of techniques or any other underglaze not listed. Include a technique sheet.		

Unit 3 – Underglazes Rainbow Color Theory Study Project 1

Basic Information

Project 1 is a color study using transparent underglazes. Learning color mixing with underglazes is very similar to color mixing with paint. This process can be achieved two different ways: one through the process of mixing two underglazes together before applying, like paint to achieve new color combinations, or through the process of layering underglazes on top of one another directly on the piece. This technique is similar to working with watercolor paints and layering colors on top of one another to achieve new colors. Through experimentation, there are a countless number of colors that can be achieved through using color theory with underglazes on pieces.

There are many color combinations to choose from when mixing underglazes. However, it is best to start with the use of the primary colors: red, yellow, and blue. These three colors can not be created (just as in painting), but can be used to make other colors.

- Red + Yellow = Orange



- Yellow + Blue = Green



- Blue + Red = Purple



Depending on the number of layers applied, other combinations of colors could be achieved as well (Ex: mixing or layering more red than yellow underglaze will create a red-orange, which is a tertiary color). For this project, we will just stick with equal parts of each primary color.

This project will be considered as one of your required pieces. Learning projects are usually not entered in competition. Be sure to include pictures of this learning activity in your record book.

Steps

1. Select suitable greenware or bisqueware (small vase or plate) or make a piece using the techniques from units 1, 2, 7, 8, or 9.
2. Prepare work area.
3. Follow the safety rules.
4. Clean greenware with proper tools. Initial and date the bottom of the piece for identification.
5. After you have checked for seam lines and imperfections, remove excess dust from your piece using a damp sponge.
6. Create "guide lines" on your piece. This can be done by drawing vertical lines about .5 inch to 1 inch apart until the whole piece is complete (These will be our areas of new colors). You can use a pencil or marker as they will burn off in the firing process.

Unit 3 – Underglazes Rainbow Color Theory Study Project 1

Steps Continued

7. Place a red, yellow, and blue underglaze on your work.
8. Dilute the underglaze with underglaze medium or water (distilled is recommended) to a canned milk consistency.
9. Using your brush, begin by brushing red onto the first vertical line.
10. Next, clean the brush thoroughly and be sure to not leave excess water in the brush either. Then apply the yellow underglaze to fill in the vertical line next to the previous.
11. Once dry, rinse the brush again and use the red underglaze to layer on top of the previous yellow “stripe” created (this will be our orange stripe).
12. Next, clean your brush and apply the yellow underglaze onto the next stripe in the pattern.
13. Cleaning your brush, use the blue underglaze to paint on the blue underglaze onto the next vertical stripe.
14. Once dry, clean your brush and apply yellow underglaze on top of the blue “stripe” that was previously created (this will create our green).
15. Upon rinsing your brush, use the blue underglaze to paint the stripe next to our “green” stripe blue.
16. Next, rinse your brush to apply red underglaze next to the previous one.
17. Next, after cleaning your brush, apply the blue underglaze on top of the red “stripe” previously done once it is dry (this will create our purple “stripe”).
18. Repeat Steps 9–17 until the entire piece is completed.
19. Clean the worktile and brush and reshape your brush.
20. Fire to the proper cone.

Continued Steps After First Firing

1. Prepare a working area.
2. After cleaning the bisqueware piece with a damp sponge and letting it dry completely, apply a wax resist or do a hot wax dip to the bottom of your piece. Make sure the wax completely covers the bottom and comes up the sides about $\frac{1}{8}$ ” to ensure the clear coat glaze does not get applied too low on the sides of the piece or any gets on the bottom of your piece because this can cause your piece to stick to the kiln shelf in the second firing.
3. Apply two coats of clear coat glaze. Be sure the piece is dry before applying the second coat.
4. Clean your brush and reshape.
5. Fire to the proper cone.
6. Complete your ceramics e-record project and expense supplement sheet.
7. Evaluate your project using the Unit 3 guideline or scoresheet for judging.

Unit 3 – Underglazes Brush Stroke Study Project 2

Basic Information

Project 2 is a brush stroke study using translucent underglazes. Learning brush strokes is similar to learning to play a musical instrument. You may want to practice the basic brush strokes on paper or on a clear polypropylene sheet protector until you feel comfortable to apply your learned skill on your piece. Try designing several daisy patterns on paper with watercolors or acrylic paints to practice the brush strokes. Different types of brush strokes can help you create botanical designs for things like flowers, leaves, trees, grasses, and other elements inspired by nature.

- This project will be considered as one of your required pieces. Learning projects are usually not entered in competition. Be sure to include picture of the activity in your record book.
- You may need to purchase a round brush (#4 or #6).

Place a polypropylene sheet protector over the brush stroke illustrations and practice the brush strokes. After you fill the page, just wash the protector off and repeat the process. Remember that you do not need to stay within the boundaries of the detail. This is known as "free brush." Perseverance is very important and the reward comes with your sense of accomplishment.



Brush stroke illustration



Unit 3 – Underglazes Brush Stroke Study Project 2

Steps

1. Select suitable greenware or bisqueware (small vase or plate) or make a piece using the techniques from units 1, 2, 7, 8, or 9.
2. Prepare a work area.
3. Follow the safety rules.
4. Clean greenware with proper tools. Make sure your piece is initialed and dated on the bottom of the piece for identification.
5. After you have checked for seam lines and imperfections, remove excess dust from your piece using a damp sponge.
6. Trace or sketch a daisy pattern onto the piece. Members repeating this unit may want to design their own pattern.
7. Wash the new brush with soap and water. Rinse the brush and reshape.
8. Prepare a translucent yellow underglaze for your first flower.
9. Dilute the underglaze with underglaze medium or water to a canned milk consistency.
10. Thoroughly clean and rinse the brush again and reshape by pulling the brush across a paper towel trying not to leave any excess water in the brush.
11. With a well loaded flat or rounded tip brush, start at the top of the petal and use the tip of your brush to apply pressure and pull your brush inward to a point towards the center of the flower. In doing this, you are creating a "fat rounded" top, with pressure. You are then easing up on the pressure as you stroke inwards to the center to form the more narrow part of the petal, and ending by pulling the brush away from the object to make the final point. A delicate steady hand is better than a heavy hand. With practice you will learn how much pressure to put on your brush. Keep turning your piece so you are pulling your brush strokes towards yourself. You may need to rinse your brush and thin your underglaze often.
12. Mix a diluted yellow-orange translucent underglaze to a canned milk consistency.
13. Using the handle end of the detail brush, fill the center of the flower with dots of the yellow-orange colored underglaze.
14. Mix a diluted yellow-green translucent underglaze to a canned milk consistency.
15. Using the tip of a pointed tip brush paint a stem for your flower. Fill in leaves along the stem by using the same brush and brush strokes as you used on the petals starting at the stem and pulling away gently letting up pressure as you pull to create a leaf.
16. Dilute a small amount of black green translucent underglaze. Thin to a light cream consistency.
17. Using a #1 liner brush, outline the petals and leaves. Place dots inside the center of the flower for a shadow effect and to create depth. Refer to illustration for placement.

Unit 3 – Underglazes Brush Stroke Study Project 2

18. Clean the brush and reshape.
19. If you would like, try mixing some other colors using your knowledge from the color wheel exercise in the beginning of this ceramics manual to create more flowers around your piece.
20. Fire to the proper cone.

Continued Steps After Bisqueware Firing

1. Prepare a working area.
2. After cleaning the bisqueware piece with a damp sponge and letting it dry completely, apply a wax resist or do a hot wax dip to the bottom of your piece. Make sure the wax completely covers the bottom and comes up the sides about $\frac{1}{8}$ " to ensure the clear coat glaze does not get applied too low on the sides of the piece or any gets on the bottom of your piece because this can cause your piece to stick to the kiln shelf in the second firing.
3. Apply two coats of clear coat glaze. Be sure the piece is dry before applying the second coat.
4. Clean your brush and reshape.
5. Fire to the proper cone.
6. Complete your ceramics e-record project and expense supplement sheet.
7. Evaluate your project using the Unit 3 guideline or scoresheet for judging.

Colors and patterns for Project 2 are suggestions only. You may want to design your own pattern and/or choose different colors. Be creative! The secret to brush work is learning to relax and to control the brush. The more you practice the more you will relax, and your brush strokes will improve. Working in watercolor or acrylic paints on paper will allow you to practice the brush stroke techniques at a more cost effective pace.



Unit 3 – Underglazes Exhibit Piece

Basic Information

Magnificent! You have completed projects 1 and 2. Here are some skills you have learned:

- Color theory for layering underglazes
- Basic brush strokes for creating botanical designs
- Application of opaque and translucent underglazes

You are ready to complete Project 3 which may be your exhibit piece. This will be your "design and create" piece. You may use the skills you have learned or apply a new skill. Remember to apply what you have learned from the Principles and Elements of Design in Ceramics when designing your piece. If time permits you can complete several projects. Evaluate your piece using the Unit 3 guideline for judging.

Suggestions

1. Before choosing what your exhibit piece will be, and if you have the opportunity, go to several ceramic studios to see other ideas and possibilities.
2. Look through ceramic publications for technique ideas.
3. Be sure to stay within your unit medium (underglaze).
4. You may want to change your piece by alternating the design of the Greenware.

5. Practice your design on paper first so you can execute proper proportions and balance of your design before you put it on your piece.

Steps

- 1 Select suitable greenware or bisqueware (small figurine, vase or plate) or make a piece using the techniques from units 1, 2, 7, 8, or 9.
- 2 Follow cleaning steps.
- 3 Decide on the technique you wish to achieve. Your leader will guide you. If you do not have a ceramic project leader, contact your Extension Specialist so she/he may be able to connect you with a local project leader or a knowledgeable person. If neither is available, you can research what you want to know on the Internet, at a library, or ask staff at a ceramics supply store, or visit a ceramics studio and consult with an instructor or artist there.

Firing Your Piece

By now you will have applied an underglaze to either greenware (wet clay) or bisqueware (already fired once). Next, you will have let your piece(s) dry. Then fire to the temperature recommended for your specific underglaze and clay body. You can stack greenware when bisque firing, but glazed pieces should not touch in any firing.

After cleaning a bisqueware piece with a damp sponge and letting it dry completely, apply a wax resist or do a hot wax dip to the bottom of your piece. Make sure the wax completely covers the bottom and comes up the sides about $\frac{1}{8}$ " to ensure the clear coat glaze does not get applied too low on the sides of the piece or any gets on the bottom of your piece because this can cause your piece to stick to the kiln shelf in the second firing.

Guidelines for Judging Your Project

- Underglaze should be used to enhance overall design and texture.
- Underglaze should result in even coloring except when antiquing or using a wash.
- Underglaze may be used to emphasize detail.
- Innovative methods (sgraffito, mishima, underglaze transfers, layering, etc.)?
- Decoration should complement the vessel's curves, angles, and proportions.
- No pinholes, dust, fingerprints, or smears in underglaze areas.
- Line quality: Clean, confident lines without unintended wobbling or blotches.
- Brushwork: Even, deliberate strokes. No accidental streaking unless stylistically intended.

