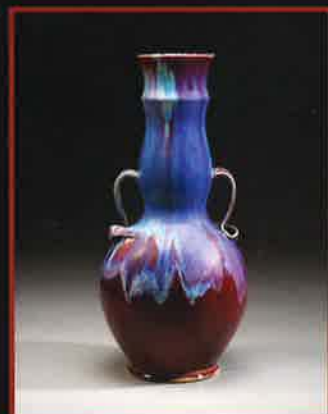


UNLOCK THE SECRETS TO MID-RANGE GLAZES



John Britt has created the ultimate guide to mid-range glazes for working potters with hundreds of glaze recipes. It will help ceramic artists understand that glazes require not only a recipe, but also a suitable clay body, mixing directions, proper application, and specific firing and cooling cycles.

With intense stains, washes, and underglazes, Britt coaches potters through ways to boost their colors and achieve mid-range results that are every bit as stunning as high-fire. John also covers the frontier of mid-range, with instructions and tips for wood, salt, and soda firing.



BRITT

THE COMPLETE GUIDE TO
MID-RANGE GLAZES



LARK

THE COMPLETE GUIDE TO MID-RANGE GLAZES



GLAZING & FIRING AT CONES 4-7



MORE THAN
400
GLAZE
RECIPES!

JOHN BRITT

Salt, Soda, and Wood-Fired Glazes

Salt, soda, and especially wood firing are traditionally cone 10 processes. But recently, cone 6 soda firing has become more popular, perhaps because soda firing is a relatively recent innovation and potters feel a bit freer to experiment with it.

I'll discuss these two types of firing separately, first salt/soda, then wood, but they're in no way mutually exclusive. Many potters fire with wood and also add salt or soda at the end of the firing. And some potters, out of necessity, merely use wood as a fuel source, thereby including many other glaze types.

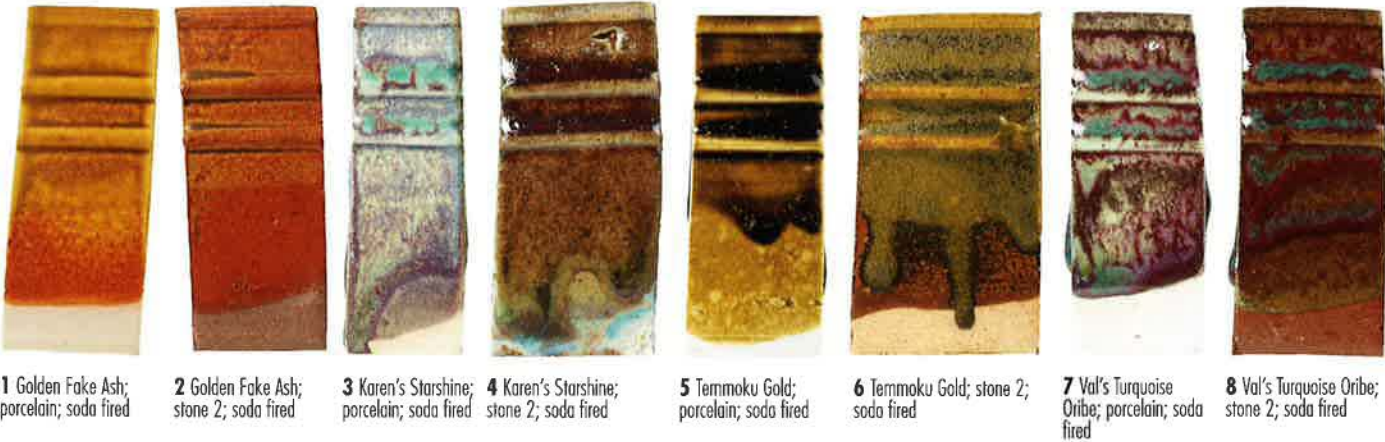
Salt and Soda Glazes

Before delving into the subject of salt and soda firing, I want to emphasize that there are really no "official" salt or soda glazes, in the way that there are crystalline or matte glazes. Soda and salt glazes are merely glazes that look good in soda or salt firings. These are generally arrived at by the aesthetic sensibilities of the artist, obtained through old-fashioned trial and error. Almost any glaze in this book can be used in a salt or soda firing. (See tiles 1-8.)

One of the tricks to choosing glazes for salt and soda is to pick matte glazes that are on the verge of being glossy. That way, when the soda or salt vapors hit the glaze it easily changes to a glossy glaze in that area. This helps accentuate the directional nature of the firing (one side of the pot is glossy green, for example, and the other is a black matte). For this reason, potters often just try their cone 10 recipes at cone 6 soda or salt. These glazes may be a bit stiff or unmelted in a regular electric cone 6 firing, but in the soda or salt they're wonderful for decorative ware.



Silverman Blue, Hamada Turquoise, Chartreuse, Karos Black, and Somebright Green
Julia Galloway, *Vase with Blue Flowers*, 2011. 10 x 4 x 8 in. (25.4 x 10.1 x 20.3 cm). Porcelain; cone 6; neutral to oxidation soda. Photo by Sandy Simon. (Glaze recipes on page 161.)



1 Golden Fake Ash; porcelain; soda fired
2 Golden Fake Ash; stone 2; soda fired
3 Karen's Starshine; porcelain; soda fired
4 Karen's Starshine; stone 2; soda fired
5 Temmoku Gold; porcelain; soda fired
6 Temmoku Gold; stone 2; soda fired
7 Val's Turquoise Oribe; porcelain; soda fired
8 Val's Turquoise Oribe; stone 2; soda fired

SALT/SODAS

	Karen Starshine	Green Matte	Hamada Turquoise	Silverman Blue	Water Blue (cone 04)	Woo Yellow	Chartreuse 2	Karos Black	Somebright Green	Klinesville Gold
Custer Feldspar			54.6	45					45	
Cornwall Stone		22.5								
F-4 Feldspar	46	45.4	8.2					9.7		
Nepheline Syenite						42.5	22	18.7		55.1
Silica	20			7	10	9.1		36.1		
Whiting	10	18.6	9.3	7			2	3.6	7	20.2
Kaolin		5.2		6	7	9.1	30	8.8		
Ball Clay			2.1				3		13	
Wollastonite								7.1		6.1
Dolomite						15.4				
Magnesium Carbonate										4.9
*Barium Carbonate			16.5	35			22			
Strontium Carbonate	5					23.9			25	
Frit 3110					77					
Frit 3124							8	5.3		
Gerstley Borate	12				6			10.7		
*Lithium Carbonate	2						13			
*Zinc Oxide		8.3	9.3						10	
Soda Ash	5									
Redart										13.7
Red Iron Oxide			1			3			2	7.1
*Copper Carbonate	5	4	2-3	3-6	4				3	
*Chrome Oxide							2.5			
Mason 6600								10		
*Barnard Slip								2		
Zircopax						16.6				12.6
Titanium Dioxide	4	4								
Rutile									2	
Bentonite	2	2	2	2	2	2	2	2	2	2

* Indicates toxic ingredient



Green Matte and Silverman Blue
Mark Knott, *Oval Flower Boat*, 2009. 5 x 19 x 4 in. (12.7 x 48.2 x 10.1 cm). Porcelain; cone 6; oxidation soda. Photo by Walker Montgomery. (Glaze recipe above.)

BLACK SLIPS

	Suze's Black Slip	Black Decorating Pigment	Rosulek Black Slip	Galloway Blue Black
Alberta Slip	72	90		
Ball Clay	18			
Nepheline Syenite		10		
Frit 3124			1 part	
Mason 6300				1 lbs
*Chrome Oxide	7			
*Cobalt Oxide	1.5			
*Cobalt Carbonate		5		
*Copper Oxide			1 part	
Red Iron Oxide	1.5		1 part	
			1 part porcelain slurry	Quart of Flashing Slip

* Indicates toxic ingredient

Glazes containing copper oxide are often a favorite in both salt and soda firing because copper oxide produces bright, attractive blues and greens in the presence of sodium oxide (see tiles 9 and 10). Copper glazes can also be matte black if saturated with copper oxide. As the sodium vapors flux areas, dynamic surfaces of alternating matte and glossy can be created either where the pots are directly sprayed or on those adjacent to them. This is particularly evident in directional (cross-draft) kilns due to uneven distribution of sodium oxide on the pot.

Flashing slips are often applied to pottery to create colors from the action of volatilized sodium oxide. The slip turns yellow to orange in light reduction. First a thin layer of slip

is applied over the entire pot, then black or colored slips are trailed over it. The flashing colors complement black and colored slips handsomely. Another option is using a flashing slip in one area of the pot and a glaze in another.

At cone 6, a variety of flashing slips can be used on bisque ware or green ware. Often the only difference is thinning the slip to a sp gr of 125. Due to the lower temperature, standard cone 10 slips don't always flash as nicely because they're high alumina, so often the kaolin is reduced and more flux is added to assist melting. A standard flashing slip at cone 10 would have 10–30 percent nepheline syenite, but at cone 6 it could be from 30–50 percent nepheline syenite. Other potters add borax, Zircopax, and titanium to get different flavors at cone 6. (See tiles 11 and 12.) Still other potters just use cone 10 slips and apply them thinly; then everything depends on the amount of soda or salt that is added as well as how much the kiln is reduced.

Another variation is to apply terra sigillatas at the bone-dry stage. Another method is to ball mill various clays like Newman Red, Redart, or Laterite and then make those into terra sigillatas. (See tiles 13–18.)

Salt Firing

Salt and soda firing are two forms of atmospheric glazing. This process occurs inside the kiln when common salt (sodium chloride, NaCl) or soda ash (Na₂CO₃) is introduced into the kiln at high temperatures (2150–2300°F/1177–1260°C). This is typically a high-fire technique, but salt/soda does volatilize above 2012°F/1100°C, so this allows a wide temperature range. (There's even low-temperature [cone 04] salt fuming, possible because the fire box, where the salt and soda are introduced, is much hotter than the chamber, allowing material to volatilize.)

Upon its introduction, the salt or soda immediately vaporizes and flows vigorously throughout the kiln, coating everything with a thin layer of volatilized sodium oxide, which appears as a thin sheen of soda glass on the clay



9 Selsor Oribe; porcelain; soda fired
10 Selsor Oribe; stone 2; soda fired
11 June's Yellow 2; porcelain; soda fired
12 June's Yellow 2; stone 2; soda fired
13 Laterite Slip; porcelain; soda fired
14 Laterite Slip; stone 1; soda fired
15 Laterite Slip; stone 2; soda fired

FLASHING SLIPS

	Helmer	June's Helmer	Helmer Slip	June's Yellow 2	June's Yellow 3	Blair's Red	Galloway	Tile 6	Porcelain Slip	Hopper White Slip
Nepheline Syenite	50	23	36	29	25	15	16	10		
F-4 Feldspar			8							5
Spodumene			12							
Kaolin		20	8					15	34	10
Helmar Kaolin	50	50	32			65				
Grolleg Kaolin						20	19			
Tile 6 Kaolin							65	70		
Ball Clay				57	63				24	75
Silica		7		4	2			5	18.7	10
Frit 3124									18.7	
Talc									4.6	
Borax				10	10					
Soda Ash			4							
Zircopax				5	5				10	5
Titanium Dioxide				7	7					

surfaces. A variety of effects is produced, depending on the amount of salt or soda introduced, the temperature and duration of the salting period, the type of clay body and its particle size, the glazes used, and whether the kiln is fired in an oxidation or a reduction atmosphere.

A typical firing in a large kiln requires 10–20 pounds (4.5–9 kg) of salt. Some potters use as little as 5 pounds (2.3 kg), while others prefer as much as 50 pounds (22.7 kg) per firing. You may use many forms of salt: table salt, pickling salt, kosher salt, sea salt, rock salt, or similar forms, but check their additives. Some salts may contain chemi-

cals like calcium silicate to prevent caking, which may have an adverse effect on the final outcome of the firing.

There are many ways to salt a kiln, but most often at cone 6 it's introduced into the kiln on an angle iron, sometime when the temperature is above cone 5. Another method is to wrap 1–2 pounds (0.5–0.9 kg) of salt into a newspaper package called a burrito, dip it in water, and throw it into the kiln. Or dissolve the salt in hot water and spray it in.



16 Laterite and Helmer; porcelain; soda fired
17 Laterite and Helmer; stone 1; soda fired
18 Laterite and Helmer; stone 2; soda fired



Temmoku Gold over Suze's Black Slip
Teresa Pietsch, *Stump Sugar and Creamer*, 2013. Sugar bowl, 5 1/4 x 5 x 5 in. (13.3 x 12.7 x 12.7 cm); creamer, 5 x 5 1/2 x 4 1/2 in. (12.7 x 14 x 11.4 cm). Light stoneware; cone 6; wood/soda reduction. Photo by Steve Mann. (Glaze recipes on pages 87 and 162.)

WASH

Yellow Ochre Wash

Yellow Ochre	33.3
Kaolin	33.3
Frit 3124	33.3



1 Albany Black 1, leaf impressed in wet glaze, rebisque, apply leaf wash; fire to cone 6; stone 1; E4. (Glaze recipes on pages 136 and 97.)



Galloway Blue Black stain inlay, Galloway Flashing Slip, Karos base with 6% copper carbonate, and Somebright Green
Julia Galloway, *Scissor-Tailed Flycatcher Pitchers*, 2010. 16 x 8 x 8 in. (40.6 x 20.3 x 20.3 cm). Porcelain; cone 6; neutral to oxidation atmosphere in soda. Photo by artist. (Glaze recipes on pages 162, 163, and 161.)

Washes

Washes are coloring oxides combined with a flux and mixed with water, usually in a 50/50 blend. Rather than weighing the materials, most potters just measure them with a spoon. Here's a basic recipe, with variations.

Copper Wash 1

1 teaspoon copper carbonate (or Mason stains)
1 teaspoon frit 3110 (or Gerstley borate)

Then add water to make it very thin, like watercolor paint. This is because a glaze may typically have 0.25–10 percent colorants in it, but a wash is 50 percent colorant, which is very strong; diluting it is essential, or the marks will be black and crusty instead of brown—in the case of iron oxide—or green, for copper carbonate.

This settles fairly quickly in the container, so you must continually stir it. To correct this, some potters add a teaspoon of EPK (kaolin). The kaolin suspends the other ingredients and doesn't really interfere with the wash because it's so high in colorant (pigments).

Apply decals, china paints, and gold lusters: This is typically done on top of a glaze before a lower temperature re-fire, but you can mix it up and put the decals under the glaze. Some glazes will "eat" a decal in an interesting fashion, while other will obscure it to some degree.

Use wax and latex to apply resists in combination with glazes: It can be as complex or as simple as you want, but it's an easy way to add visual interest. Simply glaze a piece with one coat, wax a design, and then add another coat. Wherever the wax was painted on, it will resist the second coat, creating a two-color design. (See *Scissor-Tailed Flycatcher Pitcher*.)

Glaze and soft bisque to harden the glaze: You can glaze a pot with texture and then soft bisque it. This just means heating to red heat. Some potters just re-bisque. This hardens but doesn't vitrify the glaze, and you can rub in oxides or paint designs without washing off the initial coat. Then just fire to cone 6. (See tile 1.)

BISQUE SLIPS

	Slip 1	V.C. Slip	V.C. Slip 2	Katz Engobe
Custer Feldspar		25		
Soda Feldspar			10	
Nepheline Syenite	25	15	30	
Spodumene				
Silica	30	25	22	30
Kaolin	20	20	12	
Calcined Kaolin		10	15	15
Ball Clay	20	10	3	
Velvacast Kaolin		10		
Frit 3124		10	10	
Borax	5	5		
Zircopax		15		
Soda Ash		8		

Copper Wash 2

1 teaspoon copper carbonate
1 teaspoon frit 3110
1 teaspoon EPK

It would be almost impossible to list all the possible combinations of oxides, but it's easy enough to see the pattern. Just mix frit or Gerstley borate with oxides. You can also mix more than one oxide in a cup—copper, cobalt, and rutile, for example, and they don't have to be all equal parts—and combine them with frit. Be adventurous and keep good records!

Slips

The term slip can be somewhat confusing. Slip is a mixture of clay and water. The simplest slip can be just your clay body watered down. But you can also have slip recipes. These high clay slips are usually put on leather-hard pieces because wet clay has a high shrinkage, so they work well together.

A terra sigillata is an extreme version of this type of slip. It's usually 100 percent clay. (Even the clay body that you make a slip from has flux and filler in addition to the clay.) But it's deflocculated and then applied to bone-dry ware and sometimes burnished. If used very thin, it can be applied to bisque ware, too.

CONE 04 GLAZES

	V.C. Turquoise	V.C. Transparent Satin	V.C. Satin Stone
F-4 Feldspar	15		
Nepheline Syenite		15	
Silica	11	15	
Whiting	3	5	
Kaolin	9	2	5
Talc		5	
Frit 3124	91	52	45
Gerstley Borate	17	10	
*Copper Oxide	2		
Bentonite	2	2	2

* Indicates toxic ingredient

REACTIVE SLIPS

	Reactive Slip	SC Slip
Custer Feldspar	60	
Nepheline Syenite		30
Silica		10
Kaolin		25
Ball Clay	40	25
Frit 3134		10
Silicon Carbide (fine)	5	0.5–5.0
*Manganese Dioxide	2	

* Indicates toxic ingredient

A simple recipe is 1500 gr of clay to 1 gallon (3.8 L) of water and 1 tablespoon (14.3 gr) of sodium silicate. Allow this to sit for several days, then siphon off the top layers, throwing away the coarse particles left at the bottom. (I avoid this process by using very fine clay like XX saggar or ball milling for two hours.) This terra sigillata can then be colored with oxides or stains.