

INFORMATION ON SALT/SODA GLAZE FIRING WITH SOME NOTES FROM
CLAYTON BAILEY'S REPORT ON SALT GLAZE EXPERIMENTS

One of the options for glaze firing at the William and Mary ceramics studio is salt or soda firing. This is a high-temperature process of firing during which rock salt, soda ash, or soda bicarbonate is introduced into the kiln at the peak temperature of the firing, usually at what is referred to as Cone 10 or about 2350 degrees fahrenheit. The salt or soda is put into the kiln through the two burner ports and through the spyholes distributed around the kiln, enabling the material to enter the kiln chamber from a variety of directions and heights. The salt/soda volatilizes in the heat of the kiln and chemically begins to form a glaze on the surfaces of the clay objects in the kiln. The more salt/soda introduced into the kiln, and the longer the "salting" period, the thicker the glaze will develop on the clay surfaces. Clay objects within the kiln that had no glaze on the surface will develop a glaze from the salting process. They will also turn color from gray to tan to warm or dark brown, usually with varying colors on the same piece. Objects which had some glaze will have the salting effect on both the glazed and unglazed surfaces. And those objects which had slip or engobe washes on the surface will develop a glaze on top of the wash, "wetting" it and giving it the appearance of a glaze.

Glaze development is dependent both on temperature and time factors. As the glaze develops (becomes thicker) it goes through a number of changes which seem to be fairly predictable. In the earliest stage the surface of the clay is dry and has the appearance of unglazed stoneware. As glaze begins to form, it first appears transparent and has a silky sheen. The glaze then becomes darker as it thickens. At one point it is a smooth shiny glaze which closely resembles Albany slip. Gradually a mottled glaze becomes more and more pronounced. Beyond a certain point the texture becomes less distinct and colors again darken. This second stage of glaze formation seems to produce richer colors as well as an extremely mottled surface or sometimes a haresfur appearance (due to running of the glaze).

Because the salt/soda travels through the kiln chamber following the path of the flame, the clay surfaces which are the most exposed will receive the greatest effects of the salting. Pieces stacked near the edges of shelves will likely receive the most salt. Those stacked near the center may receive less salt because they are partially blocked by the pieces surrounding them. The salt does not travel down into the interiors of pieces, so those areas are generally lined with a traditional glaze before stacking the kiln for firing. Work to be fired in the salt/soda kiln usually has a combination of glaze, slip, or wash applied to it. Combinations such as these offer the greatest potential for variations in color and surface effects from this type of firing process.

Below are some suggested recipes for glazes, slips, and washes that work in salt/soda firing.

Not all of our Cone 10 high-fire glazes work well in salt/soda. Those glazes which seem to work best are:

Georgia Green-Black
Carbon Trap
White Satin Matt

Creamy Shino
Clear
Herb's Brown Black

Glaze Recipes:

Temple Salt Glaze #1

Potash Feldspar	410 grams
Dolomite	120
Whiting	70
Ball Clay	330
Red Iron Oxide	100

(Black when thick and yellow when thin.)

Temple Salt Glaze #2

Potash Feldspar	650 grams
Whiting	130
Ball Clay	80
Bentonite	20
Flint	100
Dolomite	20
Red Iron Oxide	60
Rutile	60

Iron Yellow - St. John

Potash Feldspar	410 grams
Whiting	70
Dolomite	120
Flint	330
Ball Clay	70
Red Iron Oxide	100

Temple Albany Ash

Hardwood Ash	200 grams
Albany Slip	200

Wood Ash Glaze

Hardwood Ash	75 grams
Potash Feldspar	41
Kaolin	20
Ball Clay	7.5
Zircopax or equivalent	10

Slip Recipes:

Base Salt Slip

Kaolin	50 grams
Ball Clay	50
Nepheline Syenite	62.5
Flint	75
Borax	12.5
Bentonite	5
ADD:	
Chromium	10
Cobalt	7.5 for blue-green
Cobalt	12.5
Rutile	12.5 for green
Cobalt	15
Rutile	5 for blue

C Slip Base (wet, dry, bisque)

Kaolin	400 grams
Ball Clay	400
Nepheline Syenite	500
Flint	600
Borax	100
Bentonite	2% of recipe
Brown	500 base recipe 250 Red Iron Oxide
Blue-Green	500 base recipe 20 Green Chromium oxide 15 Cobalt Carbonate
White	500 base recipe 75 Superpax or equivalent
Yellow	500 base recipe 200 Rutile

Farrell Black Slip

Albany Clay	85 grams
Chromium Green Oxide	10
Cobalt Carbonate	5
Ball Clay	30

Michael's Black Slip

Albany slip clay	90 grams
Cobalt	5
Nepheline Syenite	5

Base R Engobe (white)

Ball Clay	150 grams
Fire Clay	75
Potash Feldspar	150
Flint	125

Yellow-pearly	10% Rutile
Blue-pearly	30% Rutile
Blue-bright	6% Cobalt Carbonate
Green	5% Cobalt Carbonate and 5% Rutile

(Use 3% borax if used in small quantities.)

Brother Bruno White Slip

Flint	400 grams
Kaolin	300
Potash Feldspar	100
Gerstley Borate	150
Zircopax	150

Byron's addition: 6 heaping teaspoons full Nepheline Syenite to two quarts of base slip.

Base Slip - flashes well

Ball Clay	75
Potash Feldspar	10
Flint	15

Washes (oxides, etc. diluted with water):

Kaolin Wash (orange)

Kaolin (Avery, if available)	75
Nepheline Syenite	25

Other Washes:

Manganese Dioxide - metallic black in salt; with copper flashing manganese takes on a metallic red tone.

Iron Sulfate - tends to make characteristic glazes darker brown.

Silicon Carbide - shiny runny glaze.

Silicon Carbide with 1/2% copper - bright red.

Cobalt Carbonate - blue glaze and tends to volatilize and color adjacent pots and surfaces.

Copper Carbonate - mossy green colors.

Chromium Oxide - rough black. Will not glaze.

Flint - clear glossy glaze.