

A Pit Firing Color Palette

Eduardo Lazo

Appears in the Nov/Dec 2016 issue of Pottery Making Illustrated.

[Home](#) / [Pottery Making Illustrated](#) / [Pottery Making Illustrated Article](#)



Pit-fired and barrel-fired ceramics take advantage of absorbent bare clay surfaces for decorative effects. In addition to imprints from smoke, you also get fuming from the combustibles and added refined chemicals. Contemporary pit- and barrel-firing techniques often yield vibrant and exciting colorful designs imprinted on unglazed clay forms by dancing flames carrying fumes from specific combustible materials and chemicals.

Pit firing has as many variations as there have been potters doing it throughout the ages. The following information introduces you to a contemporary color palette that results in multiple color development—not just black, brown, or gray—on the clay surface. Pieces fired to low bisque temperatures are placed within a carefully constructed bonfire framework so that the pieces are fumed by chemicals and vapors from various combustibles as they are exposed to oxidation and reduction atmospheres.

Alternative Pits for Single Person Use

A traditional pit is dug to provide ample room for as few as a couple dozen pots to as many as

several hundred. I use a more contemporary approach. When firing by

myself or with one other person, I often use a 55-gallon oil drum that has been perforated with 1-inch air holes every 8 inches or so. Alternatively you can use an iron or concrete fire ring, typically seen at outdoor campsites. The bases of the rings should be at least 12 inches below ground level.

Combustibles and Chemicals

Beyond the common pit-fire surface treatments—burnishing, naked clay, terra sigillata, colored slips, commercial stains, oxides, horsehair designs, masking techniques, metal wire, cloth wraps, and various bisque and aluminum saggars—you can use a

wide variety of combustibles and chemicals in a pit fire to encourage a wider color palette not often associated with pit- or barrel-firing results. The table below, along with the following bullet points, list some of the materials that have proven reliable.

Vegetation from the sea and from coastal land impregnated with sea salts containing many trace elements gives unique coloration to the ware. Cow pies serve three functions: When dry, they easily burn to earthenware temperatures; they impart various colors (black, green, gray, brown, and sometimes blue) on their own when they burn; and burnt cow pies cover the ware with a clinging yet easily removable ash layer, which promotes a local reduction necessary to form copper reds.



Color Palette Development Chart	
Combustibles and Chemicals	Expected Colors at Cone 018–014
Hardwood sawdust	Black, dark gray
Hardwood coals	Black, smoky gray, blue-grays
Cow pies from grass-fed cows	Gun-metal black, jet black, golden yellows
Cow pies from grain-fed cows	Dark greens, grays, blacks, browns, blues
Driftwood	Blue-grays, aqua shades, gray-blacks
Seaweed roots	Browns, rust, honey
Kelp leaves	Yellow, orange, peach
Kelp pods	Orange, brown
Saline grown leaves, twigs, grass	Golden yellows, greens
Table salt	Orange, yellows
Sea salt	Salmon, orange, yellow, gold, peach
Copper carbonate	Green, black, maroon, reds
Cobalt carbonate	Blues
Ferric chloride	Iron reds, yellows, oranges

“Magic Dust” is a term I coined to describe a mixture of 1/3 copper carbonate and 2/3 salt that is used to enrich the pit fuming atmosphere. Magic Dust is liberally sprinkled on the combustibles (minimum two cups of Magic Dust per square yard of combustibles), but don’t get any directly on

the ware because salt will corrode through the surface. Care must also be taken with seaweed pods as they contain high concentrations of salt that will transfer to the pot. Don’t let seaweed come in direct contact with your pot’s surface.* A very small amount of cobalt carbonate (less than 0.5%) added to the Magic Dust encourages blue vaporization colors. This solution can be sprayed or brushed onto the piece before it’s bisque fired or on the inside walls of saggars.*

Pit Construction and Firing

Proper layering of combustible materials in small-sized pits is critical: clear the base of rocks or glass; build a glowing coal bed. Add cow pies or damp seaweed to tamp the fire; add seaweed roots and Magic Dust. Add large driftwood pieces at the ground level; add more seaweed and Magic Dust covered with small driftwood. Next, add pots with thin kelp, sea grasses, small driftwood, seaside leaves, twigs, and a weed layer. Add another seaweed and

Magic Dust layer covered with small driftwood. Then add more pots with thin kelp, sea grasses, small driftwood; top with dry seaweed. Finally add leaves, twigs, weeds, and cow pies. The mound should resemble a beehive from the ground up.

The pit will burn actively for an hour or so. Because of the liberal use of cow pies, be aware that this pit creates a lot of smoke for 15–25 minutes. Don't disturb the ash layer covering the pots when trying to promote local reduction for copper reds. This pit construction permits pockets of reduction within an overall oxidizing atmosphere.



When the pit reaches about 1100°F (593°C), green copper fumes can easily be seen rising from the flames. Salt becomes active around 1400°F (760°C). Colors will swirl within the pit and chlorine vapor will be visible. The pit will have an orange glow and will easily reach 1860°F (1016°C).

When the pit cools to about 500°F (260°C), you can elect to cover it with steel sheets to protect the ware from the wind and yet not

influence the fumed colors. Allow the pit to cool naturally and undisturbed as colors do form in the cooling cycle. Removing even one pot from the pit influences the development of color on the other ware in the pit as the equilibrium is disturbed. As the pit cools, an ash layer makes everything appear gray. Be patient, the color is there under the ash.

Pos-Firing Surfaces

Once an ambient temperature is reached, remove the pots from the pit and gently brush away the ash layers (1, 2). Empty any ash from the interiors. Carefully remove any residues adhering to the surface. Single-edged razor blades or credit cards are useful in removing fragments that stick to the pot. Be careful not to scratch the delicate surface. Don't wash the pots by flooding them

with water. You don't want any salt on the surface to permeate the body of the piece.

Pots need to be treated to prevent or slow absorption of water from the atmosphere and to preserve the surface colors.** I like to apply two layers of wood micro-crystalline wax or floor paste wax for a semi-gloss sheen (3). Use a soft shoe brush or cotton cloth to bring out the shine. When first applied, the wax will seem to streak and discolor the surface. This will vanish in a few hours. The floor wax odor will persist for about a week. If a more reflective surface is desired, I use an acrylic floor finish diluted with water to a 25% acrylic solution.

*Warning: Wear a protective canister mask, goggles, long sleeves, pants, and closed shoes when firing and sprinkling Magic Dust as materials are respiratory tract, eye, and skin irritants.

**Pit-fired pots are decorative only and not food, flame, or oven safe.

Excerpted from Naked Raku and Related Bare Clay Techniques, Edited by Eduardo Lazo, available on the Ceramic Arts Daily shop at <https://mycan.ceramicartsnetwork.org/s/shop>.





Pit Firing and Foil Sagger



Links to Pit Firing and Sagger Firings

<https://www.marianwilliamspottery.com/2013/08/05/pit-firing-step-by-step-instructions/>

<https://thepotterywheel.com/firing-clay/>

<https://ceramicartsnetwork.org/pottery-making-illustrated/pottery-making-illustrated-article/Sagger-Firing-with-Soluble-Salts-253321#>

<https://www.upin smokepottery.com/sagger-firing.html>

http://www.pitfire.com/sagger_firing_2.htm

<https://www.youtube.com/watch?v=Ol3hPN5qI24>