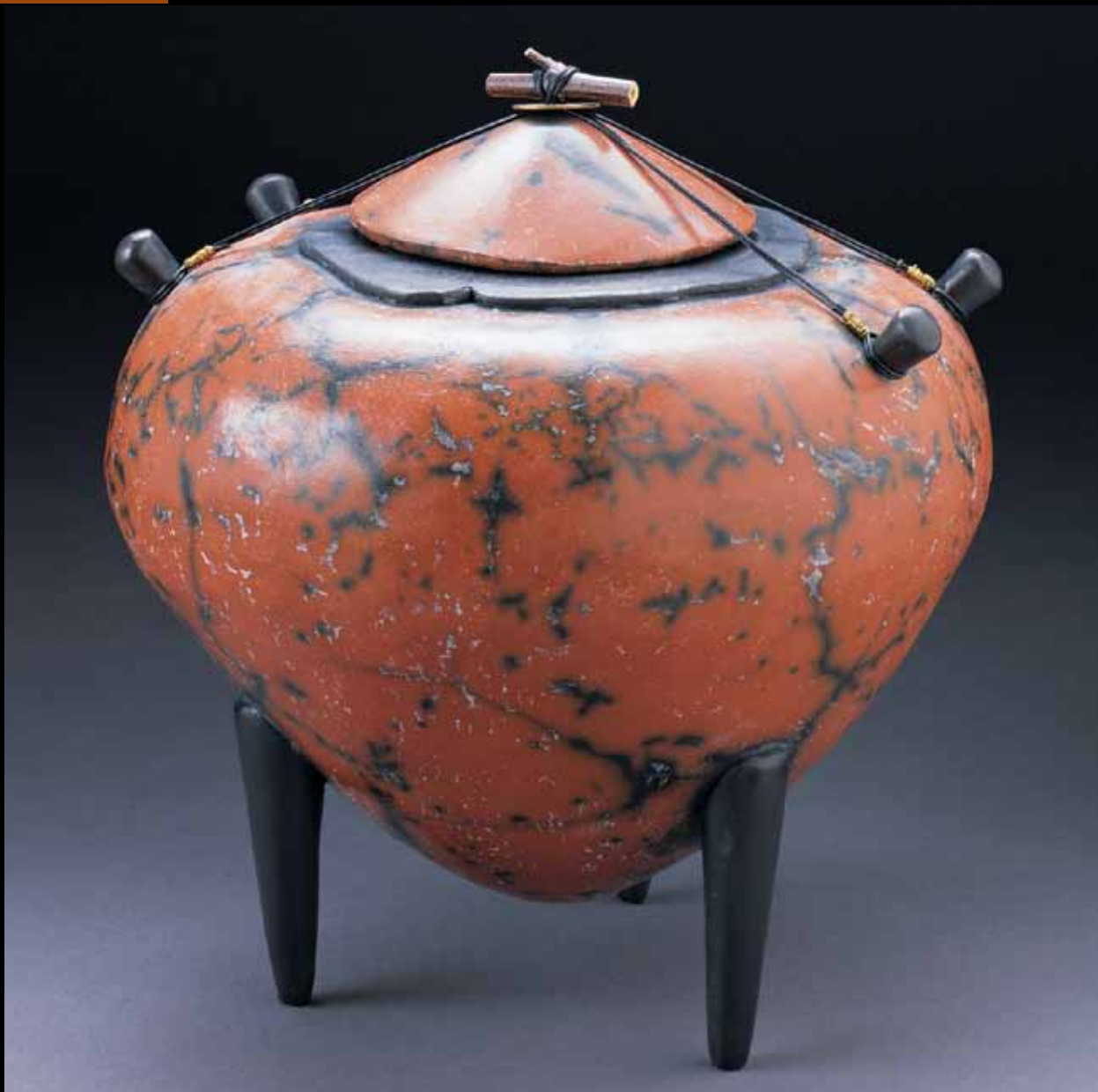


A Ceramics Monthly Handbook



Advanced Raku Techniques

A Collection of Articles from *Ceramics Monthly*

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Gloss Crackle Glazing

by John Ramer Sherrill

Over the past couple of decades, raku pottery has become tremendously popular in the United States. The wide range of glazing and firing methods, and the surprises that lurk in every firing hold the interest of potters year after year.

Many achieve consistent results, but I have talked to dozens of established potters as well as students who have been unhappy with their raku attempts. Most complained that they had been unable to find specific information to properly guide them in their efforts.

For my own early efforts, I obtained several books on the subject, but found them frustratingly long on philosophy and short on technique. I still couldn't properly fire a raku pot, but I could

use my new-found knowledge of Zen to cope with the situation. I don't believe there are many raku enthusiasts who are interested in my philosophy, wondrous as it may be, but I know for certain that some want to know how to do raku.

A wide variety of clays can be used to make raku pottery. Be aware, though, that the clay used will determine much of the character of the finished piece.

As a general rule, earthenware clays should be avoided if you like dark, bold crackle effects. The closer a clay body gets to vitrification, the less effect carbon will have on it in reduction. Iron content also resists carbonization, so terra-cotta clays should be avoided.

We are then left with the light-colored stoneware clays, and nearly all

of these will work well. A stoneware body with just enough iron to give the fired piece a light tan color will have a pleasingly warm appearance. Some of the white-firing clays have an attractive ivory appearance. Experiment with different bodies to find one you like.

Most suppliers sell a body designated as "raku" clay. This is usually a grogged clay that includes Kyanite. It is the clay of choice for really massive raku pieces; however, I never use "raku clay," nor do I recommend it for general use for the following reasons: 1) the grog content can leave your hands bleeding after long wheel sessions; 2) the grog content breaks surface tension in the glazed piece and causes small "cross-hatch" crackle patterns that I find boring; 3) the body color is usually



"Spring Swallow-tails," 15 inches in height, with clear glaze over poly-chrome slips, and burnished lid carbon-blackened during postfiring reduction, by John Ramer Sherrill.

"Webbed Jar,"
14 inches high,
wheel-thrown ovenware clay, raku fired; blackened areas were taped to resist the glaze.



anemic; 4) besides, with ordinary-sized pieces, most stonewares survive the firing as easily as raku clay.

Suppliers also usually have bodies that are designated as "ovenware" clay. These clays, which contain less grog (easier on the hands), often make an ideal raku body. I use ovenware clay almost exclusively.

Raku pots may be wheel thrown, handbuilt or cast. I have heard from several sources that cast pieces cannot be raku fired, but they are no problem.

Some consideration needs to be given to proper drying. As a general rule, drying pots of 3 pounds or less does not require special handling. I often force dry and bisque fire the same day. Flat pieces and large pots must be dried slowly and evenly, though. Large ovenware pots will often survive fast drying, but the stresses that are thereby induced will cause them to crack at a later stage.

If you want a colorful pot, you may use oxides or stains in the glaze, but they may mask the dark crackles to some degree; some almost entirely

obliterate them. For that reason, I use colored slips under a clear glaze. My slip base is simple—1 part ball clay to 1 part Edgar Plastic Kaolin (EPK). Just mix it with water to a cream consistency and add stain. I use commercial stains in percentages ranging from 2% (dark blue and green stains) to as much as 30% (pink stains).

In order to choose the stains that will work well, it is good to know their chemical components. Most commercial stains will block carbon to some extent, with the worst offenders being those that contain iron or vanadium. Vanadium is present in most warm-tone commercial stains, so you should use titanium yellow, praseodymium yellow or zirconium yellow in combination with other vanadium-free stains to formulate your own palette.

Ideally, the slip should be brushed or dipped on at the leather-hard stage, but it works on bisqueware as well. When brushing, you should apply three coats for dark colors (when you don't want the body showing through) and two coats for lighter colors (a warm-tone

body showing through some, such as pale green, can be very attractive). The pot should then be bisque fired in the cone 08 to cone 04 range.

After bisquing, the pot is ready for glazing and the final firing. Glaze should be applied fairly thickly. If you dip, the consistency should be about that of thick cream, and one dipping should suffice. If you brush, the glaze should be somewhat thicker, and two or three coats should be applied. Evenness of application is not particularly important.

It is somewhat traditional to leave the area near the base unglazed. This will turn quite black in a good postfiring reduction, when carbon penetrates the still-hot pot. Other areas may be left unglazed as well. These areas may be random or symmetrical, and can greatly enhance the beauty of the finished piece.

Postfiring reduction is where the novice usually runs into problems. It is potentially a dangerous process, so always take precautions and exercise extreme care. You will be work-

ing closely with temperatures up to 1800°F, so you must train yourself to touch nothing without first considering whether or not it may be hot. After a long raku firing session, I actually catch myself hesitating before entering my home, considering whether or not the doorknob is hot. It is a useful habit to cultivate.

Cover as much of your body as possible (always wear long sleeves), but don't wear polyester. Taste in clothing is not the problem; the problem is polyester will melt and conform to your body like hot glue, heat-resistant gloves are a must. A hat and face mask are not absolutely necessary, but are a good idea. I prefer to remove large pots by hand, but for this, special heat-resistant insulated gloves must be used. For smaller pots, long metal tongs are suitable.

Because red-hot pots are removed from the kiln, it is apparent that many models simply are not appropriate for raku firing. Large kilns of any type, when opened at temperature, radiate heat so fiercely that it would be foolhardy to attempt raku firing. Top-loading kilns are also impractical, as you must position yourself above the kiln in order to reach inside, and the rising heat would be overpowering.

Small (2 cubic feet or less) front-loading electric kilns may be used, but most raku firing is done in gas kilns especially constructed for that purpose. They can be purchased commercially, or they are easily homemade. See "A Wood-Firing Raku Kiln" on page 58, and "A Production Raku Kiln" on page 52.

Raku kilns, unlike conventional kilns, are usually loaded on a single level, and spaces between pots are left a bit wider in order to facilitate their removal. It is certainly possible to use multiple levels, but it isn't worth the hassle, as far as I am concerned.

The final phase of raku firing requires the still-hot pot to be placed in combustible materials inside a fireproof receptacle that can be covered, the tighter the better. The combustible material can be sawdust, straw, leaves, newspapers or anything else that readily catches fire. I prefer a bed of sawdust covered with crumpled newspapers, but I suggest trying

different materials to discover what best suits you. In any case, the bed of combustibles should be prepared in advance of the firing.

Traditionally, the maturity of the glaze is determined visually. The kiln is opened, and the pot surfaces are examined for complete glaze melt. If mature, the glazes will appear wet and reflective. I strongly recommend using a pyro-meter in conjunction with this technique, noting the temperature at which maturation occurs. After a few firings, you will need to look only at the pyrometer to determine unloading time. There is some medical evidence that prolonged or repeated staring into a red-hot kiln can damage vision.

When examining the pot for complete glaze melt, look for bubbles in the glaze, as these can mar an otherwise perfect pot. Even if the bubbles burst when the kiln is opened, unsightly craters will remain. Bubbles are almost always present on my pots because I fire rapidly, so I simply assume their presence, and take steps to remove them.

To accomplish this, partially open the kiln just long enough to drop the temperature by 200°F or so (I give it about a 10-second count). Close the kiln and bring the temperature back

up to near maturity. Give it a couple of minutes for the craters to heal. If you have clusters of bubbles, you may have to repeat the procedure.

Reduction techniques vary quite a lot, so I will simply describe my own; modify as you wish. I remove the pot and place it on some fireproof surface, then wait for cracks to appear in the glaze on the rapidly cooling surface. In bright sunshine, these cracks appear as shiny lines. They will announce their appearance with audible pings or pops.

Only then do I place the pot into the reduction receptacle. This action takes place for a small pot, such as a bud vase, in as little as 10 seconds. A very large vessel (5 pounds and up) may require 90 seconds or even longer. This timing from kiln to postfiring reduction is very important, as it will, in large part, determine what kind of crackle effect will be achieved. I find that the sequence I have described gives deep, dark, widely-spaced crackles usually interspersed with networks of finer lines. Varying the timing should soon show you how to get the effect you prefer.

A lot of pots are lost in the next step, which is called "quenching." After reducing for a minute or more, the pot is removed with tongs and submerged immediately in a container of water. The water hisses and bubbles, and the hot pot rolls about as if in pain. Those with narrow mouths will gyrate wildly, and will sometimes rocket themselves clear out of the container. All this commotion by a suddenly animated pot is undeniably a lot of fun, but I no longer enjoy it because I no longer do it.

These days, I just leave small pots in the tightly covered reduction chamber for about 5 minutes, remove them and place them on the ground to cool. I leave large pots in reduction for up to 30 minutes, long enough for them to drop below the quartz-inversion temperature (1063°F), because that is when a large exposed pot is in serious danger of cracking. As far as I've been able to determine, the only thing I lose by not quenching pots are pots and, yes, a bit of fun.

After the pot cools enough to handle, all that remains is to scrub it vigorously with a metal pad or wire brush. ▲

Recipes

The following gloss glazes are dependable and work well with underglazes and colored slips.

Clear Raku Glaze

(Cone 06)

Gerstley Borate	70%
Plastic Vitrox Clay	30
	100%

Translucent White Raku Glaze

(Cone 08)

Gerstley Borate	80%
Cornwall Stone	20
	100%

Clear to Cloudy Raku Glaze

(Cone 010)

Gerstley Borate	75%
Feldspar (Soda or Potash)	25
	100%



A collection of articles and information published in *Ceramics Monthly* and *Pottery Making Illustrated* dealing with raku beyond the range of most books on this topic. Written by and about accomplished raku artists and experts, this book covers a wide range of topics including techniques, materials, equipment, tools and recipes, as well as firsthand accounts of personal experiences and exploration. Both inspirational and instructional, this book is a valuable tool for any serious raku artist.

ISBN 1-57498-217-6



9 791574 982175

ISBN: 1-57498-217-6
Order Code: CA24



Published by

The American Ceramic Society
600 N. Cleveland Ave., Suite 210
Westerville, Ohio 43082 USA
www.ceramicsartsdaily.org