

TESTING IN THE PIT



by Sumi von Dassow

- Epsom salts (a source of magnesium, also a glaze flux)
- Ferric chloride (it does wonderful things in raku, though it's awfully noxious)
- Ice-Melt™ (another form of salt)
- Liquid iron plant food (maybe a safer source of iron color than the ferric chloride)
- Miracle-Gro™
- Pearl ash (a source of potassium, another glaze flux and very similar in action to sodium—maybe pearl ash will give similar results to salt)
- Trisodium phosphate (yet another source of sodium.)

With soluble chemicals, I've tried dissolving them in water and soaking wood shavings in the water, then drying them out and using them in my test pots. This is a lot of trouble and didn't seem to make any particular difference in the results, so I'm not bothering with that this time.

Often included in pit-firings, according to my research, are copper wire and steel wool, so one of my little test pots is wrapped in a chore boy copper scrubber and another in steel wool. I don't have any iron filings but in a later pit I'll try to get some to test. Other pots in this pit contain organic material with the shavings. I've often heard of people using banana peels (high in potassium) in pit firing, so I've looked for other high-potassium vegetable materials to try. The three I've thought of are potato peels, avocado peels, and coffee grounds. The last organic I'm trying is used horse stall bedding. I simply filled one

No lime green! I don't want any lime green on my pots!... I want only a little bit of black. How can I get lots of that peach color? What will copper wire do if I put it on my pot? What will banana peels do? What will coffee grounds do?

Participants in a pit firing excitedly place their orders as I load up a pit for firing. Avoiding lime green is easy—just don't put the pot near copper wire. Avoiding black isn't too hard if I just keep the pot out of the wood shavings at the bottom of the pit, but often the pots that don't get much black on them also don't get a lot of other color on them either. As for the peach color, well, we all hope for that and we'll do our best.

WHAT TO TEST

The "what will this or that do" questions will be answered (I hope) by a series of test pots I'm putting in the pit. I've made 20 or so bowls with small pots that fit inside, and each one is filled with a different material or combination of materials. Into most I've placed a handful of wood shavings with a tablespoon or so of some chemical mixed in, then nestled the small pot into the shavings. Here's what I tried.

- Aquarium salt (donated by a student with a saltwater fish tank who changed brands of salt)
- Baking soda (less noxious than salt, perhaps?)
- Borax (well, it's a strong glaze flux, maybe it'll do something)
- Copper sulphate



Figure 1

These are some of the chemicals and other materials to be tested in isolation in the pit firing. In the back row are Miracle-Gro, ferric chloride, copper sulfate, liquid iron plant food, borax, Epsom salts, trisodium phosphate, salt, and baking soda. In the front are coffee grounds, a copper scrub pad, steel wool, banana peels and avocado peels.



Figure 2

Small pots are nestled into larger pots with various combinations of materials inside. Most contain a handful of wood shavings with a tablespoon of some chemical; some contain shavings with two chemicals; and some contain other materials such as banana peels and pieces of copper scrub pad.

of the pots with this instead of the plain shavings. I happen to have access to large amounts of the stuff and, if it's good fertilizer, maybe it's good pot-food, too.

THE GOOD, THE BAD, AND THE UGLY

I've gotten pretty definitive results from some materials and disappointing results from others. Sometimes the pots end up in a relatively cool spot and come out with a lot of black on them, but then, it could be that if the black had burned off there would be spectacular colors underneath. I'll just have to try again to know for sure. I have found a couple of materials that may contribute some color, but they melt in the heat of the pit and form a crust on the pot. These are perhaps not such desirable materials to add to future firings.

The materials yielding positive results include all the salts as well as the baking soda. All give yellow-orange color, with no particular difference between them that I can tell. Even Epsom salt leaves the same salt color. Trisodium phosphate left a pretty salt color, but it also fluxed inside its container and left a crusty deposit behind. Salt can have this effect, too, especially the coarser kinds of salt—a possible reason to use baking soda instead. Pearl ash fluxed in the pit, as well, but borax was the worst offender in this regard.

Banana peels left peach-colored marks; coffee grounds produced a vivid orange. Ferric chloride gave spectacular results though concerns about toxic fumes would make me hesitate to use it widely in a pit. I need to keep trying iron fertilizers, and get some iron filings. The test with the steel wool came out black, but I have seen steel wool leave rust-colored patches on pots. The copper scrubber produced black marks where it directly touched the pot, and green fuming near it. I was surprised to find copper sulfate also producing lime green marks obviously the shavings burned away completely and



Figure 3

Here the pit is loaded with pots and ready to fire as soon as the wood is put in on top of the pots. Underneath the pots is a layer of sawdust with salt, Miracle-Gro and copper sulfate mixed in. The test pots are scattered throughout the pit, many on their sides to protect them from ash from above.

the copper re-oxidized. Stall bedding gave promising results in one test, though another came out too black. I'll keep collecting it—at the very least it's a free source of shavings!

PRACTICE MAKES PERFECT

My testing method is far from scientific, as it's hard to be sure that the contents of the bowls were really isolated from the atmosphere in the rest of the pit. Sometimes the success of a test is obvious, as with the banana-peel pot, which bears clear outlines of broken bits of dried banana peel. But over time I'll get better and better answers to my questions, as I try promising materials again and again in each firing. I am gradually building up an understanding of which chemicals and organics are worth putting into our pit.

I'm also learning (sort of accidentally) that different clays are susceptible to being affected by different materials. Specifically, the B-mix clay I usually use will tend to pick up good reds from copper but little of the typical yellow salt color. When coated with a terra sigillata made from OM4 ball clay, the reverse is true.

PLANS FOR THE FUTURE

One hypothesis I've formed is that while chemicals are the most reliable color producers—salt and copper sulfate remain the workhorses in our pit—it is possible that organics, while weaker in effect, are less likely to flux and stick to the pots. It's like the difference between chemical and organic fertilizers in your garden. You need only a small amount of a chemical fertilizer, and if you use too much it will burn your plants. On the other hand, organic fertilizers have a weaker effect, but it's basically impossible to use too much. I just need to get a really good handle on which organic materials are actually effective in a pit, and how close they have to be to the pot to affect it.

So, into my next pit will go another batch of little test pots inside bowls. I hope to find ever more new materials to test, and get more definite answers

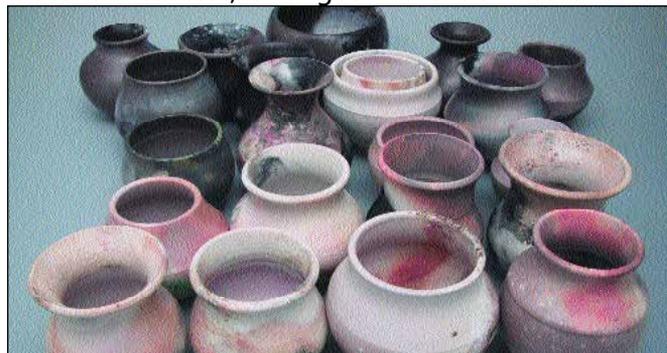
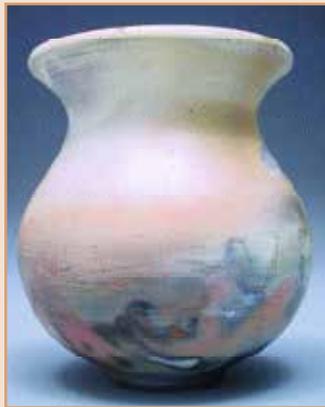


Figure 4

All the small pots, unloaded and ready to be examined after firing. The pots in the front show positive results; mostly yellows from sodium-containing chemicals. The ones in the back are too black to indicate anything either way about the materials tested.



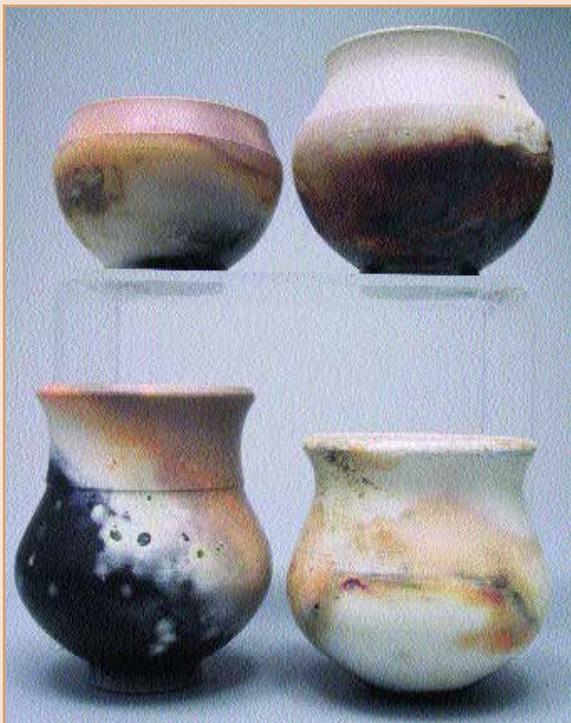
The orange color here seems to be typical of coffee grounds, although there is a little red toward the bottom of this piece so clearly it wasn't quite entirely isolated from the copper in the pit. Nevertheless, I am saving lots of coffee grounds for the next firing!



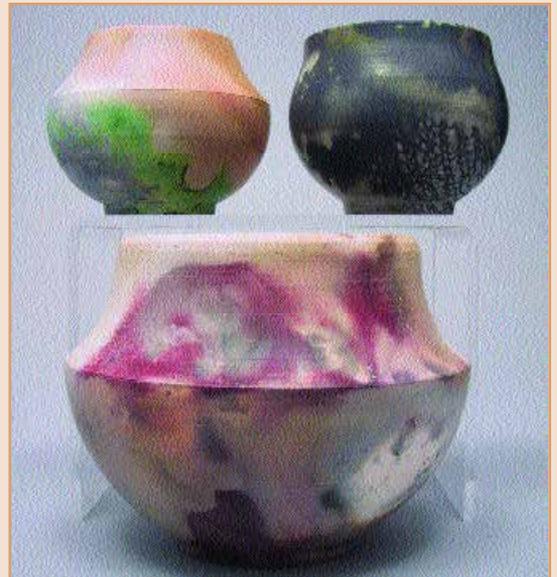
The silhouettes of pieces of dried banana peel are apparent around this pot, as well as a lovely soft orange color. I used dry banana peels to avoid getting the pot damp and possibly having it blow up when the pit got hot. However, a fresh banana peel wrapped around a pot might leave more interesting markings.



The bottom of this pot shows spectacular color from ferric chloride. Next time I'll put the test pots in sideways so one side gets the color instead of the foot! I'll also try ferric sulfate, a fertilizer, in hopes it might give similar color with less noxious fumes.



Clockwise from upper left: Trisodium phosphate, ferric chloride, Miracle-Gro, and Epsom salts. All seem to yield similar yellow colors, although you can see a spot of red from the copper in the Miracle-Gro. I am not entirely convinced the color on the Epsom salt test didn't migrate there from elsewhere in the pit, so I'll have to keep trying.



These three pots show the range of colors that various forms of copper can yield. The larger piece bears the typical red color deposited by fumes from copper sulfate. The small one on the upper left was buried in used horse stall bedding mixed with copper sulfate. Evidently once the shavings burned away the markings from the copper oxidized to this lime green. The other small pot shows clearly the black outline of a piece of copper scrub pad, as well as lime green deposited by fumes from the scrub pad. (After the firing there was no trace of the pad left.) This green color is typical in our pit near copper wire.

Sumi von Dassow is a regular contributor to PMI and the author of our "Off the Shelf" column. She is also the editor of Barrel, Pit, and Sagger Firing, a Ceramics Monthly handbook, and is currently working on another CM Handbook on Raku firing.