EXPERIMENTS IN MANGANESE GOLD AND IRIDESCENT GLAZES

Part II

By John Britt

Experiments in Manganese Gold and Iridescent Glazes Part II (Cone 5 – cone 7 Electric)

(Manganese, Iron, Cobalt, Copper, Barium, Bismuth and Molybdenum oxides)

Two caveats to start with:

1. ***Manganese can be a dangerous fume hazard so these glazes must be treated with care.*** *I have kilns that are outside, so I do not get fumes in my studio. Also, follow guidelines in SDS sheets. Wear gloves when handling and glazing and keep the studio clean of splashes of glaze everywhere. Many of the other ingredients are toxic too.*

2. ***Some ingredients are awfully expensive,*** *like the Molybdenum sulfide, lithium carbonate and the bismuth frit FZ-915. Both cost about $30-$40 a pound. I have some glazes in here that do not require them, but some do.*

3. ***Please do not share this article or recipes on public forums just yet.*** *I spent about 5 months on the first PDF and then another 4 months on this midrange PDF. This was during Covid-19 lockdown and I was doing it pretty much full time, making thousands of test tiles drip trays, lifters, wadding each tile, making test pots (as tiles are just the first test), doing 400 firings, grinding shelves, taking photographs, documenting, and researching countless recipes and reading books. It was a huge project. If I cannot recoup some of that money/time I will not be able to continue sharing research like this with you guys. Most people will not tell you anything or they will just lie about their recipes because of the immense effort to achieve these results. But I want to be able to share research like this with you, so everyone does not have to start from scratch.*

4. ***Like I said in the first PDF, I decided to publish these recipes even though I have not completed this research project. Although, I added 4 more months to this project, I have still not completed it -as there is no end to testing. Every test opens up new avenues for more testing!*** *Nevertheless, I am putting out a small grouping of recipes and showing tiles of what I wasn't able to fire on pots. Test tiles are just the first step and then you have to work with the glaze for a while, figuring out how to get it to work on pots, various combinations, etc.. But that could take a lifetime! So rather than put these in a box and never look at them again I decide to include some promising tiles in case you wanted to chase that rabbit! But there is enough here to get you going.*

This was a essentially a 9-month long project I started after I healed from my bicycle accident that resulted in 7 fractures and a severe concussion. I pretty much thought it was all over, but after taking the doctor's advice – sat still for 3 months- I was able to heal. Then when I got my energy back, I thought: What do I want to do that I haven't yet done in ceramics?

I have always liked Hideaki Miyamura's work and have never really done much with manganese gold and purple glazes other than test a few for my books. I thought this would be a fun project and, no matter what the outcome was, I would learn a lot. I really had no idea what he was doing except that I noticed that he did crystalline as well as the gold and iridescent glazes, so I assumed he was also fired in cooling soaks. That was just a guess, but it did get me started.

Rather than go through the entire process like I normally do, I though this time that I would just show images and the recipes and talk a bit about them.

I have posted the recipes ***raw***, meaning I didn't retotal them. I just put them in as I mixed them so you can retotal if you want but you don't have to. The only time you need to retotal is if you are analyzing them or you want to share them with others. They should work for you as they are.

The main reason I didn't retotal the recipe is because they are so high in colorants like manganese dioxide or manganese carbonate and I didn't know if I should treat manganese, cobalt, copper, and iron oxides, as fluxes or colorants (in many of the tests manganese acts like calcium oxide creating rivulets). Also, I used a bit of bismuth oxide and molybdenum oxide and there is not much literature on them. So that is why they are ***raw*** recipes.

The one thing this experiment did was to emphasize the interdependence of clay body, thickness of the piece, bisque firing, formula, recipe, mixing, specific gravity, application, glaze thickness on the pot and firing to getting a successful glaze. Getting a glaze to work is a difficult thing that involves all these aspects working in unison. Some glazes are very forgiving and these are what most potters use for obvious reasons. But the really fussy glazes are on a knifes edge and even slight variations in any of these factors will cause them not to work well or not at all.

Simply having a formula is not enough; you need the recipe because that is how the oxides in the formula are supplied and it matters to the final product. The simplest example is the mesh size, and whether it is in the carbonate or oxide form. Using manganese carbonate gives a different effect than granular manganese, or manganese dioxide 60/80, 80/100, 200 Mesh and 325 mesh.

There are many ways to fire. If I fire fast, it may not melt all the manganese dioxide 80/100 leaving speckles or streaks. But if I fire slowly it may all melt uniformly. Both of these glazes will have the same formula yet look totally different. What is slow and what is fast? (I list the firing cycles below.) What are the cooling soaks? Do we need to refire? Or Flash fire? All those are listed below.

Then there is the application. The first consideration is specific gravity (basically the thickness of the glaze slop). There is also the pH, which influences the viscosity or more commonly the flocculation or deflocculation of the slop. (Do you need Epson salts?) As we know both flocculation and deflocculation will affect how thick the glaze will go on the pot. So a glaze that deflocculates over time will become thin in the bucket but have the same specific gravity! That means a three second dip will give a completely different result with a flocculated or deflocculated glaze slop.

As you can see this is a massive thing to communicate to you in a small document because I may not even know all the factors that are in play. So, you will need to be nimble in your approach and try various things if, at first, you aren't successful.

The good thing about ceramics is anyone can do it, but you have to get started and actually make tiles, glazes and do the work to find things out. Simply asking a million questions is often just a delaying technique. If you must have all the factors identified and verified before you start, then you will never start. Just treat these recipes as a starting point and get going! Then don't stop until you are successful!

MATERIALS:

This project caused me some headaches because I discovered in the middle of it that some of my materials were of unknown origin, like my manganese dioxide, which I have never used very much of, and it just said "*manganese dioxide"* on the label. When I went to buy more, I discovered that there are, in fact, 5 choices of manganese: Granular manganese, Manganese dioxide 60/80, Manganese dioxide 80/100, Manganese dioxide 200, Manganese dioxide 325 and Manganese carbonate. Also, I had varying vintages of these, namely from 1970-1990 and then some more recent bags. For example, when I went to buy Manganese carbonate from Uspigment.com, it was much lighter (a light tan) than the vintage stuff I was using, which was a dark brown. Fortunately, they performed about same. But all these things were extremely traumatic because I was in the middle of testing and having some success but then I needed to retest with new materials.

Turns out the same was true of my zinc oxide. I had some vintage yellow zinc oxide which turns out to be Sphalerite, zinc ore, and is only 80% pure. I could not find that again but I did find the white zinc oxide. Turns out that there are many varieties of white zinc which have variations in particle size/surface areas. (See photo pg. 14 -Tile Image 4 with two different zinc oxides.)

I only knew the name Dentox, which was sold by Highwater Clays, but now they sell US Zinc 205 unpressed. There is also ZoCo 103 and ZoCo 102, which have different surface areas and Lansco 896 Zinc sold by Laguna. There used to be Cerox 506 but I do not think it is still available. My friend John Tilton told me he has 30 types of zinc oxide which he has tested. This concerned me, but the bottom line is I purchased new zinc oxide from Highwater Clays (U.S. Zinc 205). And for good measure I got some ZoCo 103 zinc oxide from Kentucky Mudworks. Thankfully, they both worked well for me.

As soon as I write this it is probably out of date, but you should be aware that a suppliers source of minerals changes depending on availability and price so what you get today may change tomorrow depending on local, regional and global conditions. Also, large suppliers will list lot number of materials. Those who have very fussy glazes will find specific lots so they get the most reliable and highest purity product. This applies to stains as well as minerals.

Not surprisingly, there are also variations in titanium dioxide. I got mine from Highwater Clays and it is a food grade titanium dioxide called Kronos. It appears to work fine. I have heard of people having trouble with the titanium sourced from China but not sure of the details, The reason I am explaining this is because I am sure your materials are different from mine. You should be aware of this if you have troubles replicating these glazes. Consider the possibility that your materials may be a cause and maybe get newer stuff.

I got the molybdenum sulfide, manganese dioxide 325 and manganese carbonate from Uspigment.com. I got the titanium dioxide, manganese 60/80, 80/100 and 200 from Highwater Clays.

I bought the Frit FZ-915 from Fusion Frit in West Carrolton Ohio. [They sell 50-pound bags, but will break open bag for you and sell you a smaller amount, like one pound for $32 and an added $15 fee, plus shipping. (If you have trouble finding or purchasing this frit let me know. I have purchased a 50-pound bag and will sell one pound lots for $40 (plus shipping) while it lasts].

FIRINGS:

I did a lot with firing cycles. Below are the cycles and I show an image and list the cycle by abbreviation. The thinking was that it matters how fast a pot is fired vs. a test tile. Some tiles look great because they are open on all sides to the heat, while a pot is usually mostly closed and doesn't get the same heat work. I did a variety of holds and different speeds of firing because some glazes like fast firing, while others like slowly heating up to get the best results. I could not put in all the possible firings that you can do but this is a start and you can experiment on your own. Hopefully, finding better cycles to make these glazes your own. Remember that each kiln fires differently!

My friend Jim Robinson had a quote from someone, "Each firing, you are firing with a different kiln!" That is so true and why you have to be flexible with your thinking and responding to firings and results. After every firing, the elements have more wear and the thermocouple degrades.

I now change my K type thermocouple when it looks bad rather than waiting for it to fail. I also think about changing elements after about 100 firings. You decide your maintenance schedule.

But watch the kiln and see if the firings slow down with the same programed cycle. This will give different results. I did buy a nice L&L Jupiter kiln designed for crystalline firings with S type thermocouples and heavy duty elements and that has made a big difference. I also have a Skutt Glaze Tech test kiln which speeds up the learning process. But you can do these things in your kiln as I have spent 36 years firing before I got these two sweet kilns.

Just so you know, some of these cycles are on purpose and others are happy accidents. Sometimes I thought I fired E1 when, in fact, I fired Fast Glaze fire with factory settings. I only realized it after the firing said complete 4.5 hours when usually it was 6.0 hours. I did keep notes and corrected things for you but just so you know, everything wasn't a grand plan.

For example, I accidently fired one of the flash firings to 1800°F and held for 2 hours when I was usually firing to 1400°F and holding 2 hours. These things often come about because I am thinking of trying something from memory and then it comes out when I am programming the kiln. (You see I soak the Gold Shinos in oxidation at 1800°F for multiple hours, and I used to often refire iron glazes to cone 07 to spice them up. So I think this came out when I was programming the kiln. Thankfully, I noticed it.)

Anyway, it isn't important how these cycles were developed, I just wanted you to know that when you are firing you will probably mess up too, but keep good notes and never fire unattended. That way you will know what happens and how to reproduce it.

I am only including the firings for these glazes. The first PDF on "Experiments in Manganese Gold and Iridescent Glazes Part 1" had other cycles (cone 6 -11). But for simplicity sake I kept this to the midrange.

FIRING CYCLES

Factory presets:

Fast Fire cone 6

Factory fast fire cone 6 with a 15 minute hold
(570°F per hour 1978°F then 200°F per hour to peak)

Fast Fire cone 7

Factory fast fire cone 7 with a 15 minute hold
(570°F per hour 1978°F then 200°F per hour to peak)

Ramp Cycles:

E1 cone 4 (No hold at peak)
200 – 200°F Hold 15 minutes
500 – 1978°F
150 – 2150°F

E1 cone 5 (No hold at peak)
200 – 200°F Hold 15 minutes
500 – 1978°F
150 – 2175°F

E1 cone 6 (No hold at peak)
200 – 200°F Hold 15 minutes
500 – 1978°F
150 – 2225°F

E1 15 cone 6
200 – 200°F Hold 15 minutes
500 – 1978°F
150 – 2225°F Hold 15 minutes

C1 cone 6
200 – 200°F Hold 15 minutes
500 – 2225°F Hold 15 minutes
500 – 1978°F Hold 4.0 hours

C2 cone 6
200 – 200°F Hold 15 minutes
500 – 2225°F Hold 15 minutes
500 – 1978°F Hold 4.0 hours
500 – 1850°F Hold 1.0 hour

C4 cone 6 (Also called E3 in the Midrange book)
200 – 200°F Hold 15 minutes
999 – 1978°F
150 – 2225°F Hold 15 minutes
500 – 1900°F
150 – 1400°F

C5 cone 6 (originally called E5, which is on some tiles, but I changed the name to make it consistent)
200 – 200°F Hold 15 minutes
999 – 1978°F
150 – 2225°F Hold 15 minutes
500 – 2150°F
75 – 1900°F Hold 30 minutes

C6 cone 6 (originally called E6 which is on some tiles but I changed the name to make it consistent)
200 – 200°F Hold 15 minutes
999 – 1978°F
150 – 2225°F Hold 15 minutes
500 – 2100°F Hold 2.0 hours
500 – 2050°F Hold 2.0 hours
500 – 2000°F Hold 30 minutes

Flash firing cycles

Even though I didn't fire many Flash Cycles in this series I included them in case you wanted to try.

These are after the glaze cycle. The kiln is cooled and then the next day they are put back into the kiln and flash fired very quickly to these temperatures and holds.

You do not have to fire this fast. You can fire at 500°F per hour to 1400°F or whatever you think is best. I am just reporting what I did. If you are firing a large plate you will definitely break it at this speed. But my work was able to sustain this. If you have thick or heavy work, you may need to slow it down because a thin piece heats up much faster than thick work so the effects will be different.

Flash Firing 1- 700°F per hour to1400°F hold 15 minutes

Flash Firing 2- 700°F per hour to1400°F hold 30 minutes

Flash Firing 3- 700°F per hour to1400°F hold 1 hour

Flash Firing 4- 700°F per hour to1400°F hold 2 hours and 15 minutes

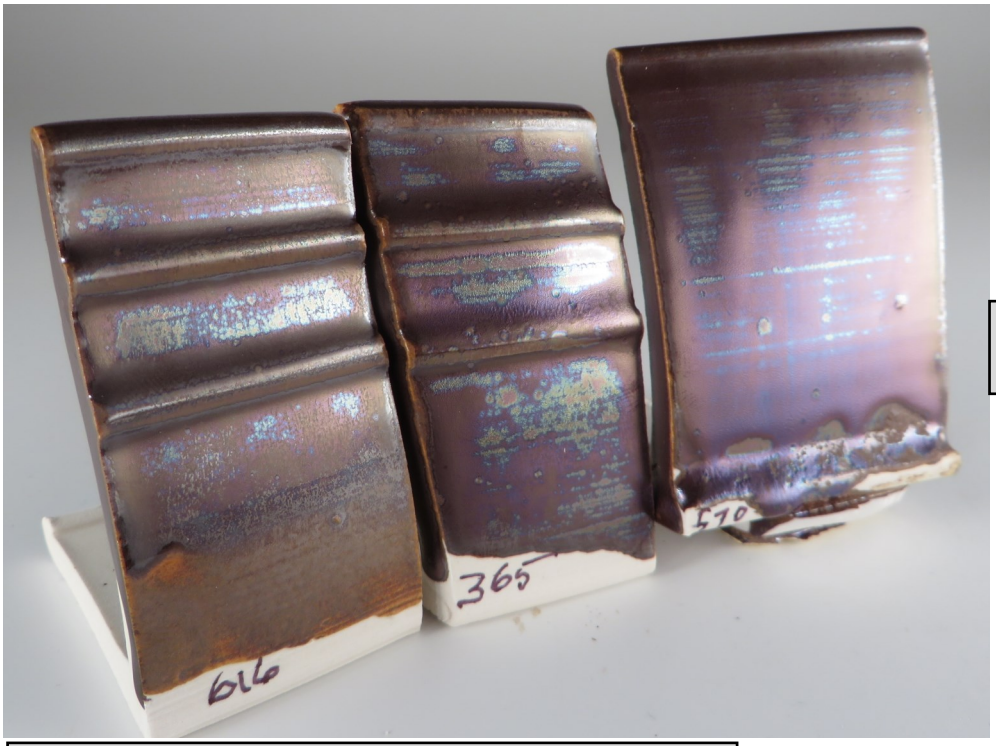
Flash Firing 5- 700°F per hour to1800°F hold 2 hours

Clay bodies

I mainly used Frost porcelain cone 6 for these tests. I also used Standard 365 with success. I tried Laguna/Miller #616 but had some pinholing problems which meant that I probably needed to bisque fire longer. (See my PDF on How to Stop Pinholing available on my website). What I did with my Miller #616 pieces was to rebisque fire them and that solved my pinhole issue. So next time I will pay more attention to the bisque schedule. With Frost cone 6 the bisque is not so fussy because there are no impurities to burn out. Other porcelains will use ball clay to improve the plasticity and ball clays are variable and can have sulfur impurities. Basically I wanted to reiterate that the clay body makes a big difference!

I did some tests with other porcelains, porcelaneous stoneware (B-Mix), standard stoneware and dark stoneware and the results were lackluster, without the vibrancy of Frost cone 6.

Here are some images of one glaze on 6 clay bodies:

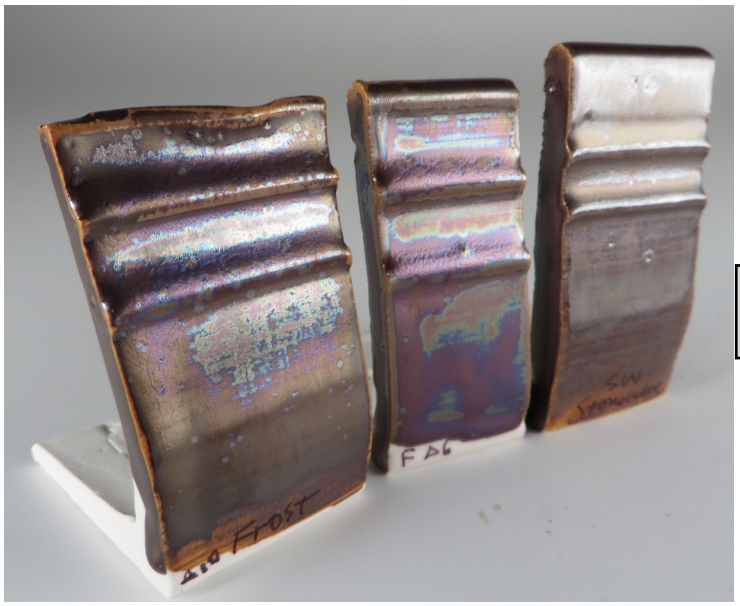


Tile Image 1

Left; Miller 616 Porcelain (cone 6)

Middle: Standard 365 Porcelain (cone 6)

Right: Laguna 570 Porcelain (cone 10)



Tile Image 2

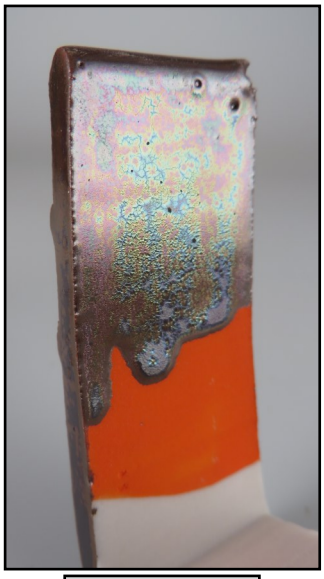
Left; Frost Porcelain (cone 10)

Middle: Frost Porcelain (cone 6)

Right: Star White Stoneware (cone 6)

I think you can see from the tiles on this page and the previous page (Tile Images 1 and 3) that each tile has a different response to this glaze. Frost Porcelain cone 6 is very nice, as is Laguna 570 (cone 10) and Standard 365 (cone 6). I prefer to use clays rated to the cone I am firing to and in this PDF is it cone 5/6. The previous PDF on "Manganese Gold and Iridescent Glazes Part 1" were a bit higher, mainly cone 7-12 so I used high fire bodies for those. For this PDF I recommend Frost cone 6, Standard 365 or Miller #616 (but bisque to cone 04).

Another area of investigation would be putting slip on a clay body. You could try to use a clay like B-mix and put a slip over it in the greenware state, or an underglaze after bisque. I have only done a few experiments with this technique but know potters who do it regularly because some of these New Zealand clay bodies are very non-plastic and terrible to work with, so they use more forgiving bodies and cover them with the white or colored slips.



Tile Image 3

Here is a sample of some of the tests I did with underglazes. The image on the left is with Flame Orange V-389. I also tested Real Orange V-384 and Red V-382.

They all appeared to work pretty well. The concern was that it would "brown" out the glaze like some of the clay bodies did but that was not always the case.

Lots to experiment with here!

Specific Gravity

I did not list any specific gravity unless I marked it. Generally, it was in the range of 145-155 sp.gr. I just mix to the consistency of 2% milk or whole milk and then go from there. There were just too many glazes to measure each time. (1200 glazes!) You will have to determine that yourself. Don't let that stop you! You don't need to always know the specific gravity to try out some glazes. Just do a thin dip tile, a double dip tile and a triple dip tile and use drip trays!!! Remember they RUN. Then record your results with your specific gravity.

Flocculation/Deflocculation

You have to watch these glazes as they easily deflocculate because they don't contain much clay and contain lots of things that like to deflocculate (namely frits and molybdenum sulfide). So you may glaze something tonight and then go to glaze something again in the morning and the glaze is all thinned out (deflocculated). They will have the same specific gravity but will apply very thinly. I try to watch if the glaze slop "marbles' when I stir it and watch the glaze dry as it is on the pot. If it dries immediately and produces "hanging drips" then it is deflocculated. You just have to add some Epsom salts and you will see it thicken.

Application Thickness

I dipped all the test tiles, but I poured it on the pieces shown because I was using small amounts of glaze. I did not measure the application thickness unless I marked it. You will have to experiment to determine that. Some like a thick coat, while others like a thin coat. Some I measured to gram per square inch because I wanted to see what a thin coat would do, but found it was too variable. Mostly I just did one coat, then a second coat higher up. Like dipping a test tile.

Many people spray these kind of glazes which is a great way to get thin coats or overcoats with multiple layers of glazes. Try spraying.

Bisque Firing

I bisque fired to cone 05 for Frost and Standard 365. Cone 04 for Miller 616.

Drip Trays

I fired everything on drip trays!! You should too, until you get things figured out. One mistake and result in many ruined kiln shelves.

I rolled out very thin slabs that I cut into reasonable sections. After bisque firing, I applied kiln wash so I could reuse them. Some other drip trays were thrown as small bowl/plate shapes. I made collars and sometimes used the traditional collar and drip tray together. Sometimes I used the same clay while other times I used stoneware for the rings as it helps the ring release form the Frost clay (of course with the alumina/kaolin paste in between).

There is not one good way to prevent dripping from getting into the seam of crystalline work. Sometimes you can use a mix of glue, EPK and alumina and it works perfect! But other times is sticks badly. You must cut and grind them. No matter what anyone tells you it is hard unless you do it for years and then you will find a way—that I guarantee otherwise you will get into a more predictable business like selling insurance.

I finally settled on using seashells with clay wads under them (or they collapse) and put those on a drip tray or use three prong trivets with seashells on each one. I put raku clay in the shell to hold it to the prongs of the trivet. Then, after firing, I ground them with a green wheel on a bench grinder for the chunky stuff and finished them with a diamond pad glued to a throwing bat on my pottery wheel. It is an easy way to grind bottoms with a bit of water to keep the dust down. This works best if you leave the bottoms flat (don't cut the foot ring) because the diamond pad on the potters wheel will take everything off and you will have a flat smooth surface.

Most recently, I cut soft fire bricks into little Lego shaped rectangles and cubes and put those under the pots. Sometimes using seashells or kiln wash on them also. I did anything possible to reduce grinding. If you are successful and start using one or two glazes you will discover the best method for you. Because if not, it is so difficult to see your best pieces break because they are stuck to the stupid drip tray that you will either have to take prescription medications, copious amounts of alcohol, listen to old time country music or a combination of the above which will allow you to face another day! Some days, after I opened the kiln, I just cracked open a bottle and turned on my Vern Gosdin "Chiseled in Stone" album. (Just kidding- the success you achieve will help you forget the failures.)

Of course, if you get the application exactly right, there is no grinding!

TESTING

I would like to say a few words on how I did my testing of glazes to find variations. There are many ways to test and everyone has their favorites. You could use the UMF (Unity Molecular Formula) to find zones of crystallization or best gloss, etc. You could test using the Currie grid method, a triaxial blend, a quadriaxial blend, various line blends, etc. or any one of a number of color blending methods.

But in this case, I have found a glaze that works very well in the firing I was doing and so I just needed to tweak, it a bit to see if I could find another avenue to produce more interesting colors. Then I just used my favorite method that I call Easy Glaze Testing. (I have a video on my Johnbrittpottery Youtube channel describing it in detail. https://www.youtube.com/watch?v=Bmt55y-mbtc&t=9s)

Basically I multiply whatever I consider my "base" by 10x to make 1000 gram batch. I can use a base or a base with some colorants which means it will exceed 1000 grams but I don't get complicated, I just multiple by 10x. Then I mix it up with water to a certain consistency by eye (you could measure the water and/or measure specific gravity after). Then I sieve it through a 80 mesh sieve. Now I take that volume of glaze and divide it into 10 clear solo cups usually by eye, but in this case, I weighed each of them to get them very close to perfect.

Then I add my colorants, opacifiers or oxides to each cup. I usually write this all down first so I know what I am doing and record it accurately. I also label all my tiles at this time, too. I usually will do a small progression in each cup rather than just dipping one tile. So for example if I wanted to see what cobalt carbonate would do, I would take a small amount, because I know it is a very powerful colorant and flux, perhaps 1.5 grams. I weigh that out and put it on the counter and then get 3 of my test tiles that are labeled. Then I will take a razor blade and even out the 1.5 grams of cobalt carbonate and "cut" it into three equal sections by eye. I put in one section and blend with an immersion blender and then dip a tile. Then I put in the second section, blend and dip a tile. And finally I put in the last portion and blend and dip a tile. Then, I finish up the other 9 cups and when I am done, I have quickly made 10 progressions of my original base glaze. I have 30 tiles to fire.

I use this method because it is quick and generates a lot of possibilities very easily. If I find something I like I try the recipe on more tiles and see if it works. If it does, then I put it on a pot and see if it works in various firings.

CHOICE OF COLORANT, OXIDES AND OPACIFIERS

To choose my colorants, oxides or opacifiers I use my experience to determine what might work. But I also just try stuff because this is about discovery, and not limiting my preconceived possibilities. Since I have 10 cups it forces me to do more than I want to and choose differently than I would if I have only 5 cups. Picking 10 things is actually hard. I may start with the Alkaline oxides (Na, K, Li), the source of which is soda ash, pearl ash and lithium carbonate respectively.

[*As a brief explanation to what I am thinking, each material you add has physical as well as chemical properties and so those make a difference in the glaze. For example, as I said above, I may want to add some sodium oxide to see if that will influence color. One easy way to do that is with soda ash. Soda ash is soluble so that creates other problems or possibilities depending on how you look at it. The soda ash will not be homogenously mixed throughout the glaze coat but rather will be transported to the surface of the glaze coat as the water carrying the soluble soda ash evaporates. The water will drop the soda ash on the surface. This gives me a different affect than if I use an insoluble source of sodium oxide like a sodium feldspar. (E.g. Minspar or nepheline syenite which are technically somewhat soluble but definitely better than soda ash which is completely soluble.) I try to use to my knowledge of materials and oxides (both their chemical properties and physical properties) to my advantage when deciding on which sources of materials and oxides I choose.*]

Then, I may think of the Alkaline Earth oxides which include calcium, magnesium, barium and strontium and zinc oxide. I may then go to boron, silica, alumina, then the opacifiers (titanium dioxide, tin oxide, and zirconium silicate). I often can't find pure sources but that doesn't stop me from adding groups of oxides like feldspars, frits, etc. Next, I go through the list of colorants. I would start with the most common like copper, cobalt, chrome, nickel, manganese oxides and then move on to the more obscure ones like vanadium, or one if I have a bunch of money lying around, the lanthanoids, etc. And then I have to decide if I should use the carbonate, oxide or the sulfate form. You can see that very quickly I have plenty to test. This is why I may run this 10 cup test 1-4 or more times. And that is how this PDF was generated.

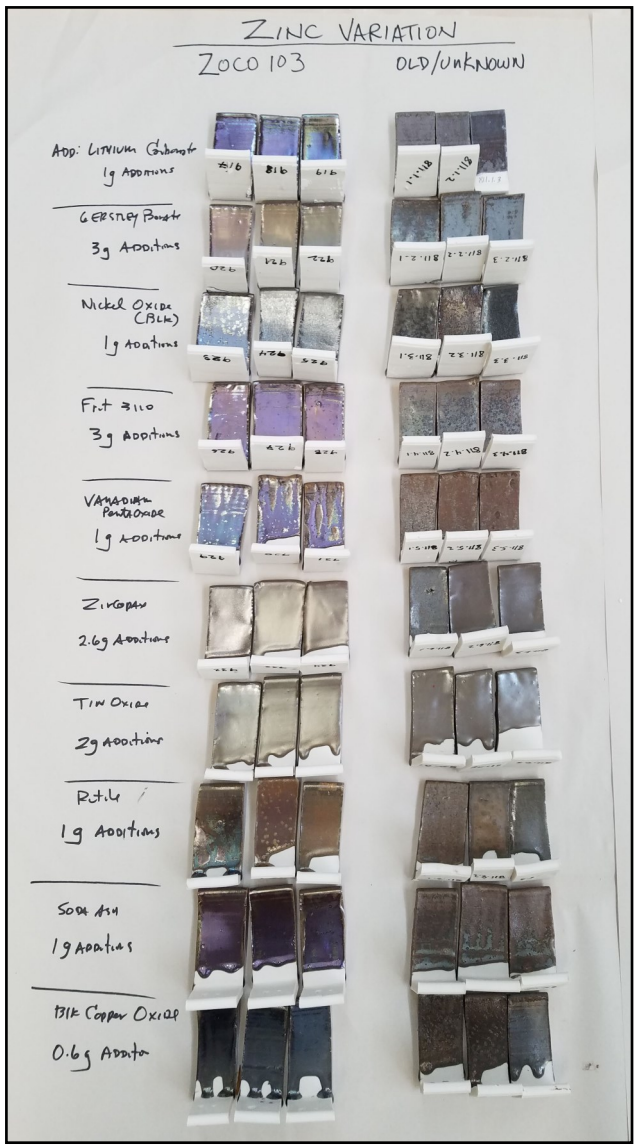
But fear not-here is plenty more to for you test! You need to get busy! You can take any of the glazes and run these type of bends with that glaze. For example if you take the glaze John's #811 and find out you like the Frit 3110 at 6.6 grams. (Tile Image 5, page 15) Then you can make that glaze up and add 10 things to that. In the next 6 pages I will show images and explain how I conduct the testing.

You can see it in the following tile groupings . (Tile Images 4 –11.)

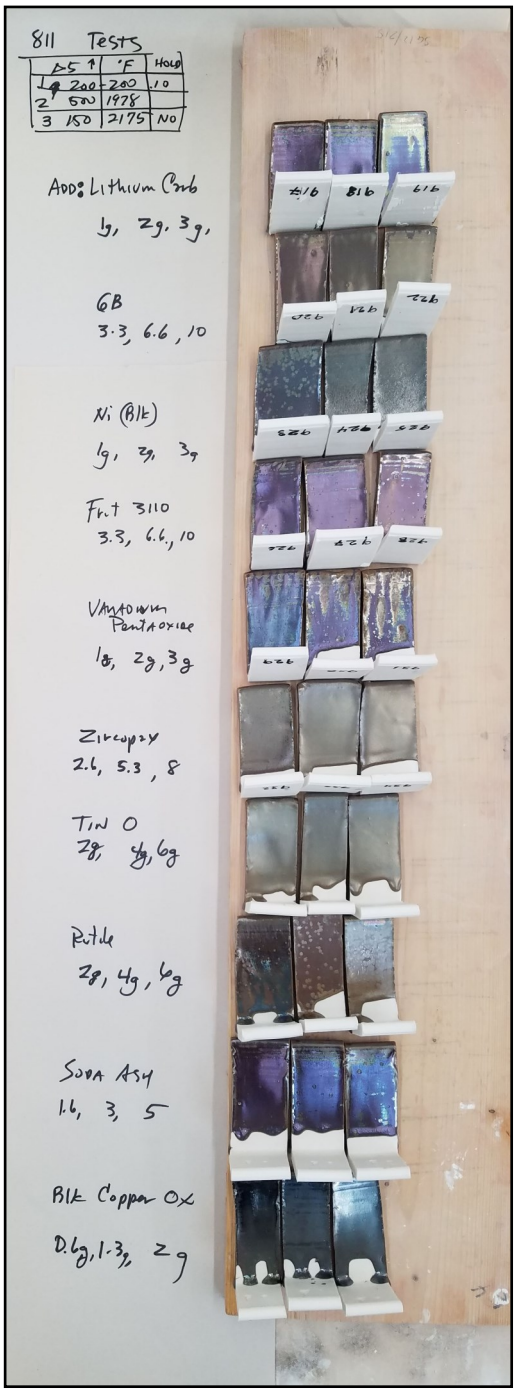
ATTENTION!

Here is a color blend I did using the base 811 (recipe in Tile Image 8 –9 as well as the Recipes Section page 41and beyond) and I added different fluxes, colorants and opacifiers to see if I could induce different effects. I am showing this because it shows the importance of the type of zinc oxide you use to getting the results detailed in this PDF. On the right is an old zinc oxide I had. (Sometimes I get materials from people retiring and I am not sure if the source.) Presumably this is the yellow type (sphalerite), and on the left is the US Zinc 205 from Highwater. The difference is obvious.

Very little needs to be said except pay attention to your sources of materials like, Zinc oxide, Manganese oxide and carbonate, titanium dioxide, rutile, etc. It may make the difference between getting the effect or not.



Tile Image 4



Tile Image 5

You can see in this Image that I added:
1. Lithium carbonate 1-3 grams,
2. Gerstley borate 10 grams in three tiles,
3. Nickle oxide (Blk) 1-3 grams, etc.

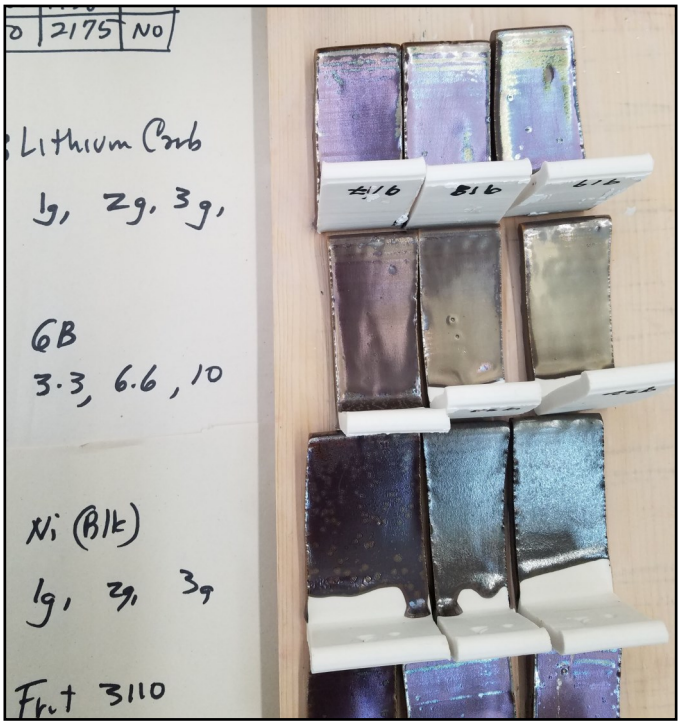
Remembering that 1-3 grams isn't always 1-3% because my "base" was a colored glaze with 32 manganese carbonate, 6 titanium and 4 molybdenum sulfide. So the total is 142 grams in the "base."

Just so we don't get lost in the weeds, this is just a description of how I actually run some color blends to generate variations. We can figure the math out later.

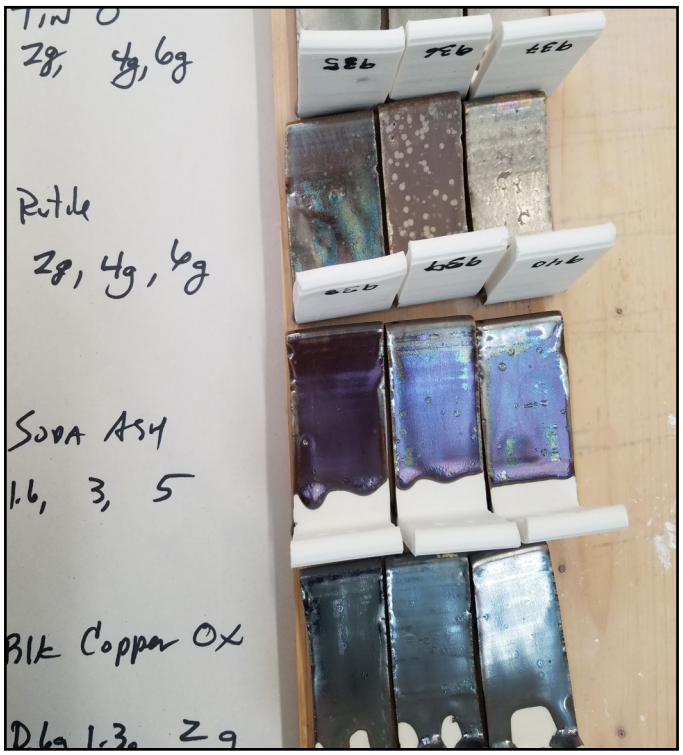
From this I may choose to experiment with Soda Ash, Gerstley borate, Lithium carbonate, rutile, vanadium, etc.And now I know a target amount to either use or to refine and test further.

If you don't have the same illness I have you may just take what you think has promise, like the 10g added Frit 3110 and fire it and see if it works for you. Glaze some pots and be done. But if you develop the "illness" then clearly it makes total sense to make up that recipe, divide it into 10 cups and add your own colorants, or oxides, like lithium carbonate, rutile, soda ash, etc. Ad infinitum.

This is a pretty quick and easy way to generate a wide range of possibilities.



Tile Image 6



Tile Image 7

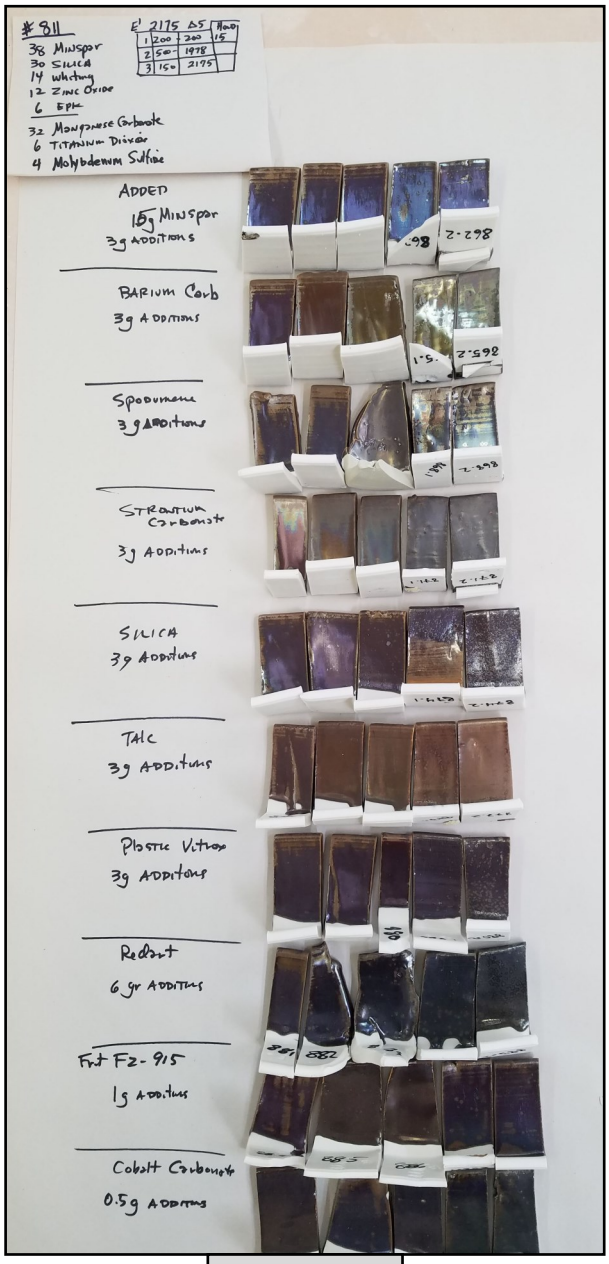
Here is a close up of some of the tiles from the previous page (Tile Image 5). It shows more detail of the possibilities.

One thing these tiles show is variations in thickness make a big difference, as you see from the top of the tile which is clearly a different color from the bottom. Then there is a difference between a thin coat and a coat that has been "pulled" thin by the second dip during the firing. This is often hard control but can be tested by putting on a very thick coat (with drip trays for running) and retrying. And then perhaps try refiring the same piece again. This "pulls" more down and can often be what is needed.

You can see the tile at 2 grams of rutile is very promising. So now I would redo that test with smaller increments of rutile, for example 0.5, 1.0, 1.5, 2.0, 2.5 and 3.0 grams added.

Then I would also vary the application to see if one coat of glaze shows the effect better than two and from there proceed. Because, if thinness is necessary, we may have to weigh the grams per square inch of glaze to reproduce the effect. This simply means to zero the scale with the tile on it and dip one coat. Then record the weight. (You can do the math later by measuring the tile and getting the square inches, then dividing by weight to give grams per square inch.) Then add some water to the cup and get another tile and zero the scale, weigh the tile and dip for the same amount of time. Then record the weight. Do this several more times and you will have systematically determined the grams per square inch. If one is successful you can now reproduce it.

I rarely do this but sometimes it is necessary.



Tile Image 8

You can see in this Image that I added various things to the 10 cups of John's 811:

1. 3 gram increments of Minspar for a total of 15 grams.
2. 3 gram increments of Barium carbonate for a total of 15 grams.
3. 3 gram increments of Spodumene etc.

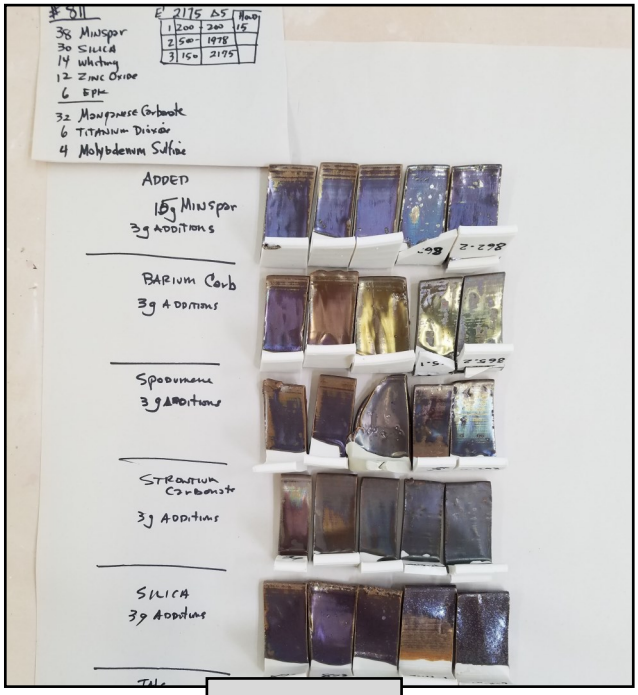
(Remembering that 1-3 grams isn't always 1-3% because my "base" was a colored glaze with 32 manganese carbonate, 6 titanium dioxide and 4 molybdenum sulfide. So the total is 142 grams in the "base.")

From this, I may choose to experiment more extensively with Minspar, Barium carbonate, Spodumene, etc. or a combination and now I know a target amounts to try.

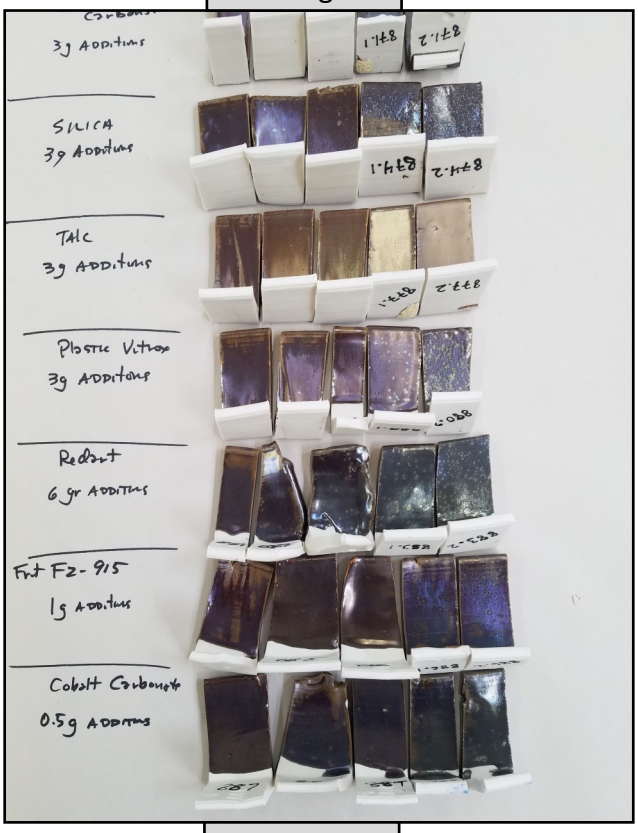
Or you can just take only the ones you think have promise like the 9 g added Barium carbonate and fire it to see if it works for you.

If it does, then you can make up 10 x of that recipe divide it into 10 cups and add your own colorants, or oxides, like lithium carbonate, rutile, soda ash, etc. Several of the pots in the next section were from variations of the barium set. (Pages 41,52,54,and 59)

It is a pretty quick and easy way to generate a wide range of possibilities.



Tile Image 9



Tile Image 10

Here is a close up of some of the tiles from the previous page (Tile Image 8). These two images show a bit more detail of the possibilities.

You can see the tiles with Minspar additions all show promise. You could even add more! As did the Plastic Vitrox. These are both feldspars.

So this would lead me to presume that you could do the same with Nepheline syenite, Custer feldspar, Mahavir feldspar, Petalite, Cornwall stone, etc. All the feldspars.

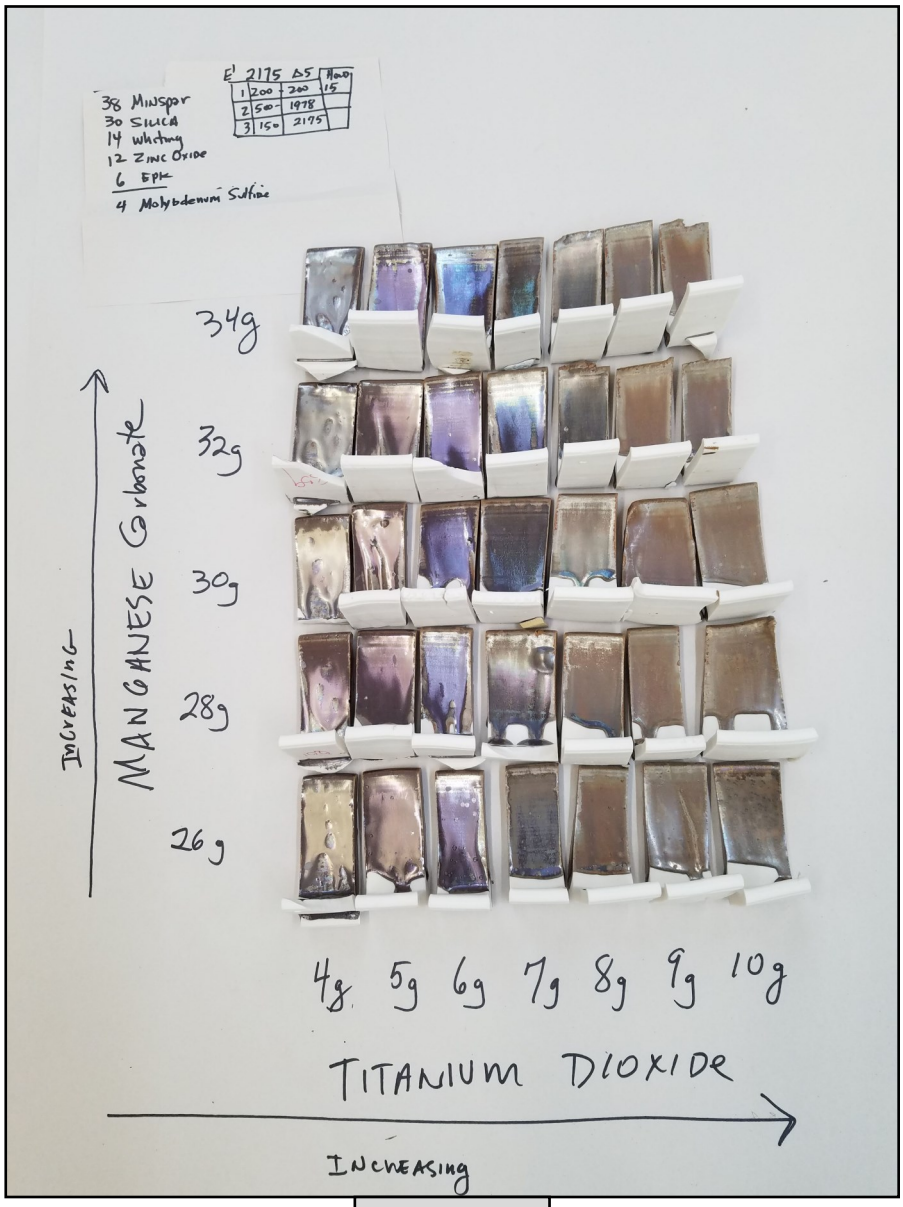
Also, the Silica looks good at about 9 grams but then stiffens. (It is hard to photograph the details of these tiles as the lighting really makes a difference.) For example the Talc looks good but is, in fact, a bit brown for what I wanted.

The Plastic Vitrox looks promising as does the Frit FZ-915 and is getting really nice around 12-15grams. One thing you could do with that set is to retest with added titanium dioxide and manganese carbonate and molybdenum sulfide. Adding 15 grams of FZ-915 means that we have "diluted" the existing "base" glaze by 15% and perhaps by adding a bit of those three things back we could get a better color response.

The cobalt carbonate set looks pretty good by only at the low end so I may try a set with 0.25-0.75 g. cobalt carbonate and then add the silica or the feldspar etc.

The other option is to take the Barium carbonate set at about 10 grams and then add things to that. I did that and show some of the good results in the Recipe Section (John's #865, page 42)

You can see the sky is the limit on manipulating these variables.



Tile Image 11

GRID PROGRESSION

Here is another method of testing I used. I took the recipe that is in the upper left corner and multiplied by 5x. I poured that into 5 cups and then added the manganese carbonate amounts on the left side of the image, (26g, 28g, 30g, 32g and 34g to each cup respectively). I blended those up real well with the immersion blender. Then I got out my tiles, labeled them and added titanium dioxide. First, I added 4g and blended it and dipped a tile. Then I added 1 more gram, blended it and dipped a tile, etc. I stopped a 7 grams and fired it and observed the pattern above. Since I still had the cups I then added 3 more up to 10 grams total. (I usually only draw a maximum of 3-4 tiles for 100 gram test as they become unreproducible but I wanted to see if the titanium dioxide killed the color.) You can clearly see that around 5-6 grams of titanium dioxide is the best for the purple color. Sometimes toward the top of the set it can go as high as 7grams. But definitely more is not always better because after 7 grams it kills everything. A very valuable test!

THE RECIPES

1. John's OG-4, thrown and assembled, Frost cone 6 porcelain, E1 15 cone 6.

John's OG-4 One to two coats

40.00 Custer Feldspar
40.00 Frit 3110
20.00 Alberta Slip

35.00 Manganese Dioxide (200 mesh)
15.00 Copper Carbonate

Detail: John's OG-4, thrown and assembled, Frost cone 6 porcelain, .

COMMENT: This is a beautiful glaze! But it can be fussy. (Small amounts of cobalt carbonate can push it toward silver.)

APPLICATION: Vary the application thickness to find the spot where it works. As you can see in the image above, if it is too thick with get black and crinkly but you may be able to simply refire it. That sometimes causes the glaze to pulls down, thinning itself and creating the effect. Needs to be on Frost cone 6 porcelain.

FIRING: This Ewer was fired E1 15 cone 6. But also try Fast Fire cone 7.

2. John's OG 4; 2 coats; with one coat of John's #445 over; Standard 365 porcelain, E1 15 cone 6.

John's OG-4 TWO COATS

40.00 Custer Feldspar
40.00 Frit 3110
20 Alberta Slip

35.00 Manganese Dioxide (200 mesh)
15.00 Copper Carbonate

Then add one coat of cover glaze:

John's #445 ONE COAT

22.02 Mahavir Feldspar
12.12 Nepheline Syenite
20.00 Silica
15.96 EPK
16.57 Frit 3110
6.87 Zinc oxide
6.46 Whiting

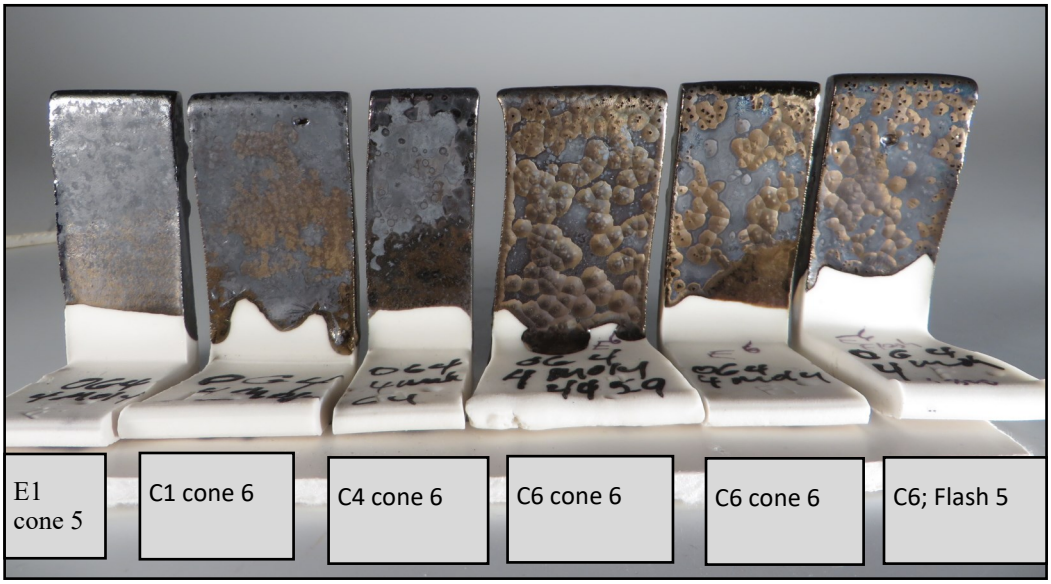
Add:

5.0 Titanium dioxide
5.0 Copper carbonate
5.0 Molybdenum sulfide
21.0 Manganese carbonate
2.0 Cobalt oxide
5.0 Lithium carbonate
10.0 Frit FZ-915

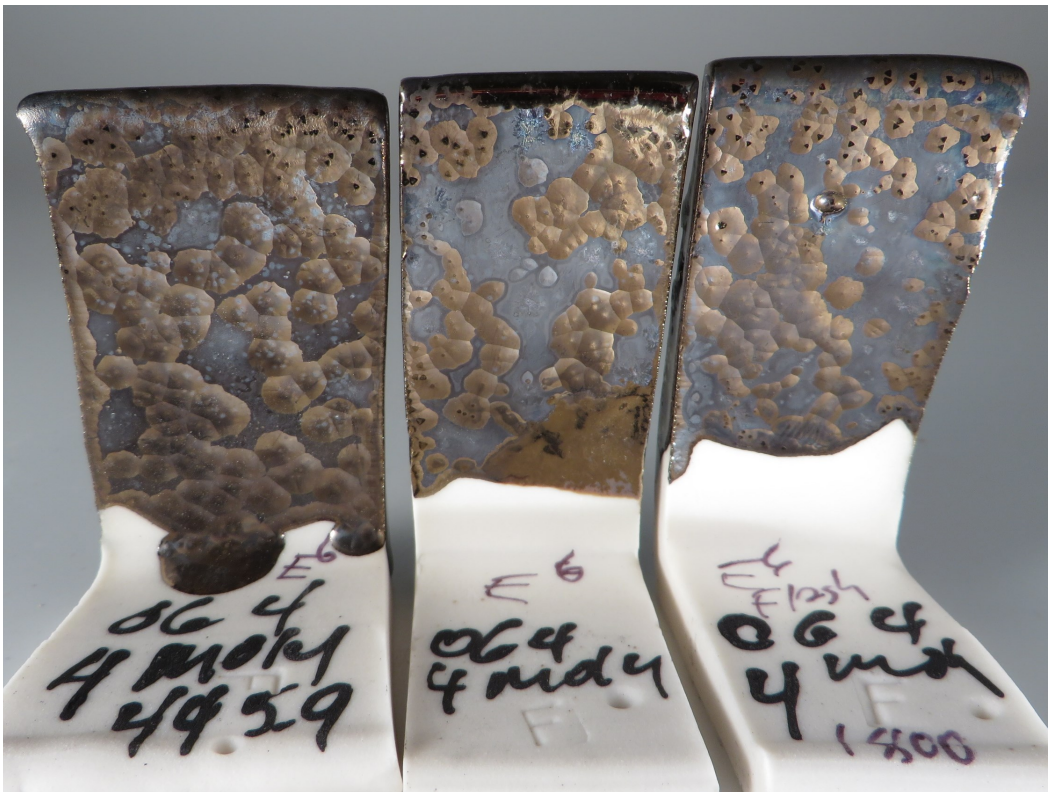
2. Detail: John's OG 4; 2 coats; with one coat of John's #445 over; Standard 365 porcelain, E1 15 cone 6.

3. Ewer, Thrown and assembled, OG-4 with 4 Molybdenum Sulfide and John's #445 over, Frost cone 6 porcelain, fired to C6.

4. Vase, Thrown and assembled, OG-4 with 4 Molybdenum sulfide and John's #445 over, Frost cone 6 porcelain, fired to C6.



Here are 6 tiles showing variations in firing cycles. All tiles are OG-4 with 4 Molybdenum sulfide except the 4th tile from left also has the John's #445 cover. Clearly the C6 cycle is best for this glaze. That cycle is one where it is held over 2000°F for 4.5 hours. The second firing (Flash 5) may help the triangles spots to become more defined but I am not positive.



John's OG-4 (Plus 4 Moly) TWO COATS

40.00 g. Custer Feldspar
40.00 g. Frit 3110
20.00 g. Alberta Slip

35.00 g. Manganese Dioxide (200 mesh)
15.00 g. Copper Carbonate
4.00 g. Molybdenum sulfide

Then add one coat of cover glaze:

John's #445 ONE COAT

22.02 g. Mahavir Feldspar
12.12 g. Nepheline Syenite
20.00 g. Silica
15.96 g. EPK
16.57 g. Frit 3110
6.87 g. Zinc oxide
6.46g.Whiting

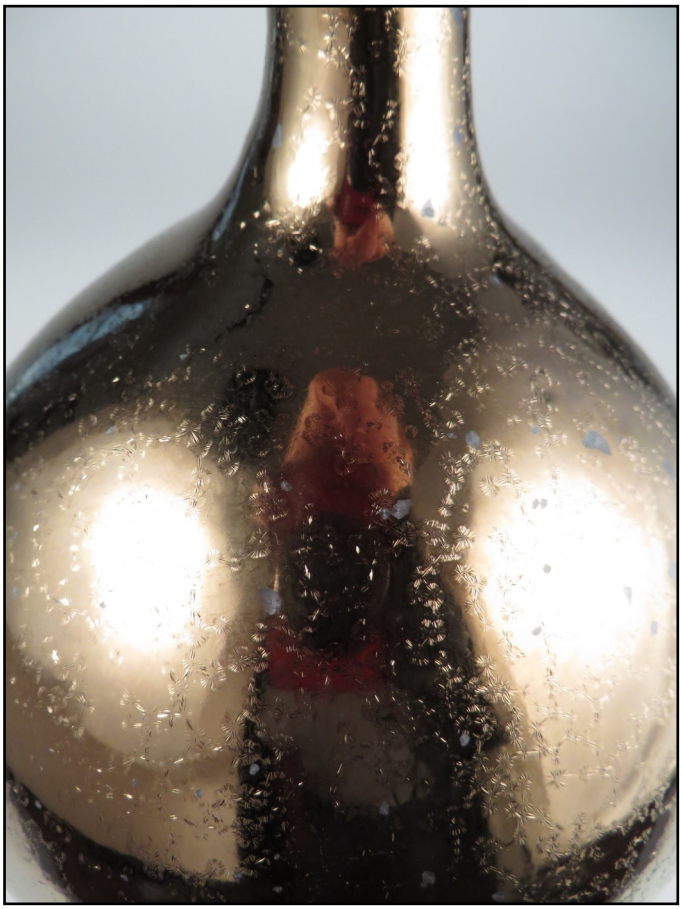
Add:
5.00 g. Titanium dioxide
5.00 g. Copper carbonate
5.00 g. Molybdenum sulfide
21.00 g. Manganese carbonate
2.00 g. Cobalt oxide
5.00 g. Lithium carbonate
10.00 g. Frit FZ-915

COMMENT: This glaze (OG-4 plus 4 moly) and then the combination (OG-4 plus 4 Moly/ John's #445 over) is AMAZING! You really need a video to see it moving in the light. The tiles show the variations in different firing cycles.

APPLICATION: As always with these glazes application is very important. Too thick and it will be all black and too thin and it will not produce the effect. Experiment.

FIRING: These Vases were fired to C6 cone 6.

5. Vase, Thrown and assembled, Old Gold with John's #439 over, Standard 365 cone 6 porcelain, fired in E1 15 cone 6.



Old Gold TWO COATS

80.00 Custer Feldspar
20.00 Alberta Slip

35.0 Manganese dioxide (200 M)
15.0 Copper carbonate

John's #439 ONE COAT

22.02 g. Mahavir Feldspar
12.12 g. Nepheline Syenite
20.00 g. Silica
15.96 g. EPK
16.57 g. Frit 3110
6.87 g. Zinc oxide
6.46g. Whiting

Add:

5.00 g. Titanium dioxide
5.00 g. Molybdenum sulfide
29.00 g. Manganese carbonate

COMMENT: This is from an overlapping series I ran where I put on two coats of Old Gold (or variant) and then put another glaze over it, in this case John's #439. You can try one or two coats of Old Gold and/or one or more coats of the cover (John's #439). Lots of variations are possible but use drip trays as always.

APPLICATION: As always with these glazes application is very important. This glaze combination is pretty consistently gold but the texture varies with thickness variation, sometimes producing rough crystals on the surface.

FIRING: This combination is a consistent solid gold in most of the firing cycles. I used E1 15 cone 6 most consistently.

6. Vase, Thrown and assembled, John's OG-2 with John's #445 over, Standard 365 cone 6 porcelain, fired in E1 cone 5.

John's OG-2 TWO COATS

80.00 Nepheline Syenite
20.00 Alberta Slip

35.00 Manganese Dioxide (200 mesh)
15.00 Copper Carbonate

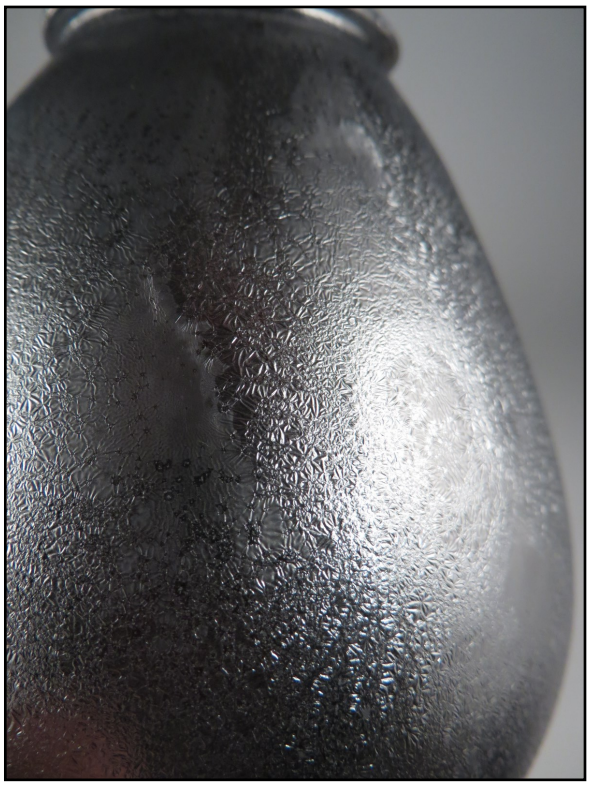
Then add one coat of cover glaze:

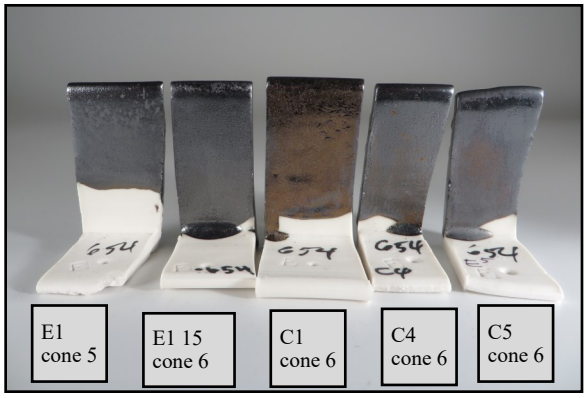
John's #445 TWO COATS

22.02 Mahavir Feldspar
12.12 Nepheline Syenite
20.00 Silica
15.96 EPK
16.57 Frit 3110
6.87 Zinc oxide
6.46 Whiting

Add:

5.0 Titanium dioxide
5.0 Copper carbonate
5.0 Molybdenum sulfide
21.0 Manganese carbonate
2.0 Cobalt oxide
5.0 Lithium carbonate
10.0 Frit FZ-915





Comment: This is from an overlapping series I ran where I put on two coats of John's OG-2 (or variant) and then put another glaze over it, in this case John's #445. This was interesting because the only difference was substituting Nepheline Syenite for Custer feldspar in Old Gold (original). It turned completely silver! This one varied the most in firing cycles so I did not always get silver (See firing C1, C4 and C5)

FIRING: These are pretty consistently solid crystalline silver in most of the firing cycles I tried but I used E1 15 cone 6 most consistently.

7. John's OG-3; 2 coats; with two coats of John's #445 over; Standard 365 porcelain, E1 15 cone 6.

John's OG-3 TWO COATS

80.00 Minspar
20.00 Alberta Slip

35.00 Manganese Dioxide (200 mesh)
15.00 Copper Carbonate

Then add one coat of cover glaze:

John's #445 TWO COAT

22.02 Mahavir Feldspar
12.12 Nepheline Syenite
20.00 Silica
15.96 EPK
16.57 Frit 3110
6.87 Zinc oxide
6.46 Whiting

Add:

5.0 Titanium dioxide
5.0 Copper carbonate
5.0 Molybdenum sulfide
21.0 Manganese carbonate
2.0 Cobalt oxide
5.0 Lithium carbonate
10.0 Frit FZ-915

3. Detail: John's OG-3; 2 coats; with two coats of John's #445 over; Standard 365 porcelain, E1 15 cone 6.

8. Ewer, Thrown and assembled, John's OG-3 with John's #445 over, Frost cone 6 porcelain, fired in E1 15 cone 6.

John's OG-3 TWO COATS

80.00 Minspar
20.00 Alberta Slip

35.00 Manganese Dioxide (200 mesh)
15.00 Copper Carbonate

Then add one coat of cover glaze:

John's #445 ONE COAT

22.02 Mahavir Feldspar
12.12 Nepheline Syenite
20.00 Silica
15.96 EPK
16.57 Frit 3110
6.87 Zinc oxide
6.46 Whiting

Add:

5.0 Titanium dioxide
5.0 Copper carbonate
5.0 Molybdenum sulfide
21.0 Manganese carbonate
2.0 Cobalt oxide
5.0 Lithium carbonate
10.0 Frit FZ-915

Tile on left is one coat of OG -3 and one coat of John's #445. Goes slivery with crystals.

Comment: This is from an overlapping series I ran where I put on two coats of John's OG-3 (or variant) and then put John's #445 over it. This was interesting because the only difference was substituting Minspar for Custer Feldspar in the Old Gold (original). This gave some subtle differences from the other OG types.

FIRING: This glaze is reliable in most of the firing cycles. I used E1 15 cone 6 most consistently.

9. Vase, Thrown and assembled, John's OG-5 with John's #445 over, Frost cone 6 porcelain, fired in E1 15 cone 6.

John's OG-5 TWO COATS

35.00 Custer Feldspar
20.00 Alberta Slip
30.00 FZ-915

35.00 Manganese Dioxide (200 mesh)
15.00 Copper Carbonate

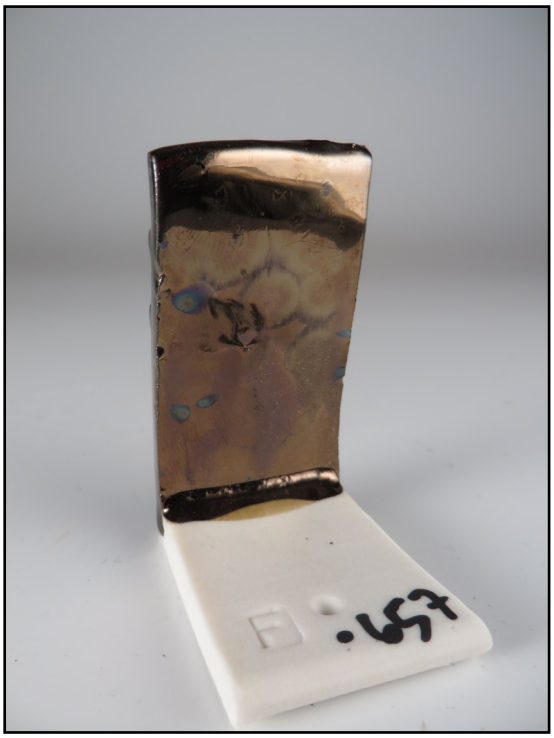
Then add one coat of cover glaze:

John's #445 ONE COAT

22.02 Mahavir Feldspar
12.12 Nepheline Syenite
20.00 Silica
15.96 EPK
16.57 Frit 3110
6.87 Zinc oxide
6.46 Whiting

Add:

5.0 Titanium dioxide
5.0 Copper carbonate
5.0 Molybdenum sulfide
21.0 Manganese carbonate
2.0 Cobalt oxide
5.0 Lithium carbonate
10.0 Frit FZ-915



Comment: This is from an overlapping series. Two coats of John's OG-5 (or variant) and then John's #445 over. This was the result of a miscommunication but it turned out to be one of the nicest glazes. Very smooth and nice gold with moly "circles" visible. It is even good with one coat of OG-5 and one coat John's #445.

FIRING: This glaze is reliable in most of the firing cycles. I used E1 15 cone 6 most consistently.

10. Vase, Thrown, John's #811, Frost cone 6 porcelain, fired in E1 15 cone 6.

John's #811 TWO COATS

38.0 Minspar
30.0 Silica
14.0 Whiting
12.0 Zinc oxide
6.0 EPK

Add:

6.00 Titanium dioxide
4.00 Molybdenum sulfide
32.00 Manganese carbonate

COMMENT: This is in glaze derived from the Grid Progression on page 19, Tile Image 11. It is the upper left with 32g manganese carbonate and 6g titanium dioxide. Many of those would have been similar but I thought this was the best to start with. Then many of the next glazes are from the recipe John's #811 with additions.

APPLICATION: 2 coats

FIRING: This Vase was fired E1 15 Cone 6 . But also try in E1 cone 5 (no hold).

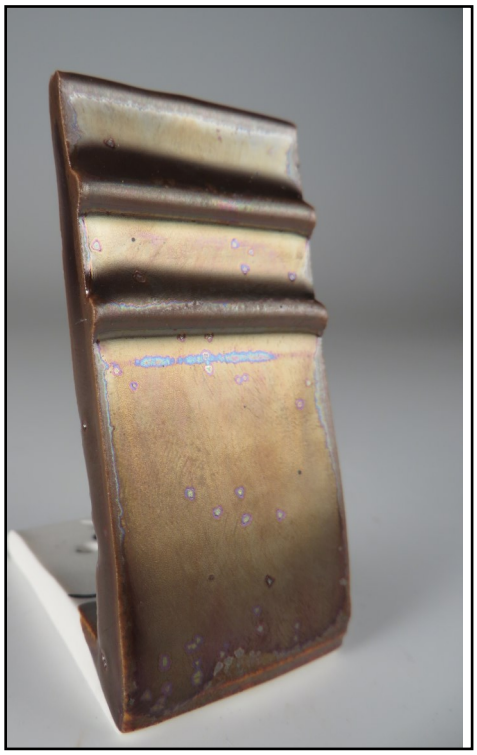
11. Vase, Thrown, John's #865, Frost cone 6 porcelain, fired in E1 15 cone 6.

Comment: These are all John's #865. This shows the variety of surfaces depending on thickness and firing cycle.

Left: Thin application (One coat) E1 15 cone 6.

Bottom left: Thicker application (two coats) E1 15 cone 6.

Bottom right: Tile; Two coats; E1 cone 5 (no hold).



John's #865 TWO COATS

38.0 Minspar
30.0 Silica
14.0 Whiting
12.0 Zinc oxide
6.0 EPK
10.0 Barium carbonate

_____

Add:

6.00 Titanium dioxide
4.00 Molybdenum sulfide
32.00 Manganese carbonate

This is John's #864 which has 6.6 g. barium carbonate, fired to E1 cone 5 . You can try various amounts of barium carbonate and firing cycles to see which are best for your work.

COMMENT: This glaze, John's #865, was developed from a color run I did by taking the base John's #811 and then adding things to it. (See Tile Image 8 on page 17 and Tile Image 9 on page 18.) This had 10% barium carbonate. Wonderful surface and fairly reliable.

The tile above on the right had a bit less, only 6.6 grams of Barium carbonate.

APPLICATION: 2 coats. Thinner application yields more purply colors while thicker can be golden with small moly crystals.

FIRING: This can be fired to cone 5 or cone 6 with a soak. Likes E1 cone 5 (no hold at peak).

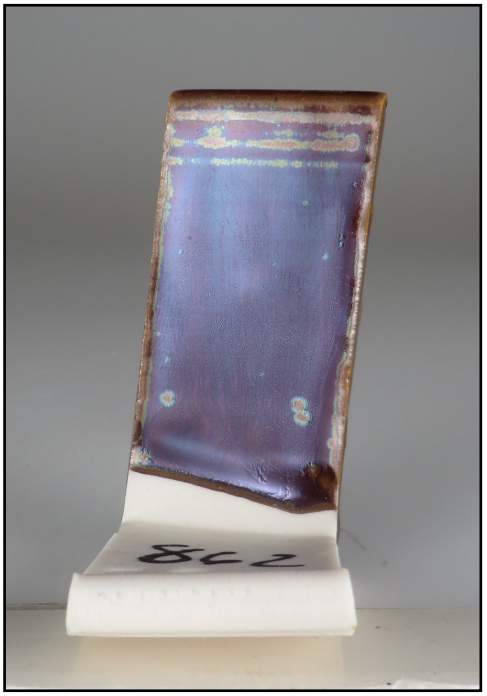
12. Vase, Thrown, John's #862, Frost cone 6 porcelain, fired in E1 cone 5 (no hold at peak).

John's #862 TWO COATS

48.0 Minspar
30.0 Silica
14.0 Whiting
12.0 Zinc oxide
6.0 EPK

Add:

6.00 Titanium dioxide
4.00 Molybdenum sulfide
32.00 Manganese carbonate



COMMENT: This is in glaze from a color run I did by taking the base John's #811 and then adding things to it. This had 10% Minspar added. (See Tile Image 8 on page 17 and Tile Image 9 on page 18.) Many were good but I chose this one with 10% more Minspar.

APPLICATION: 2 coats.

FIRING: This Vase was fired E1 cone 5 (no hold at peak). But also try in E1 cone 6 (no hold at peak).

13. Vase, Thrown, John's #880, Frost cone 6 porcelain, fired in E1 cone 5 (no hold at peak).

John's #880 TWO COATS

38.0 Minspar
30.0 Silica
14.0 Whiting
12.0 Zinc oxide
6.0 EPK
10.0 Plastic vitrox

Add:

6.00 Titanium dioxide
4.00 Molybdenum sulfide
32.00 Manganese carbonate

COMMENT: From John's #811 with 10% Plastic vitrox. (See Tile Image 8 on page 17 and Tile Image 10 on page 18.) Here I put in two images of the same piece (on the previous page 46) because the back looked a bit different and the lighting can make things look a lot different and I wanted you to see that.

APPLICATION: 2 coats.

FIRING: This Vase was fired E1 cone 5 (no hold at peak). But also try in E1 cone 6 (no hold at peak).

14. Vase, Thrown, John's #874, Frost cone 6 porcelain, fired in E1 cone 5 (no hold at peak).

John's #874 TWO COATS

38.0 Minspar
40.0 Silica
14.0 Whiting
12.0 Zinc oxide
6.0 EPK

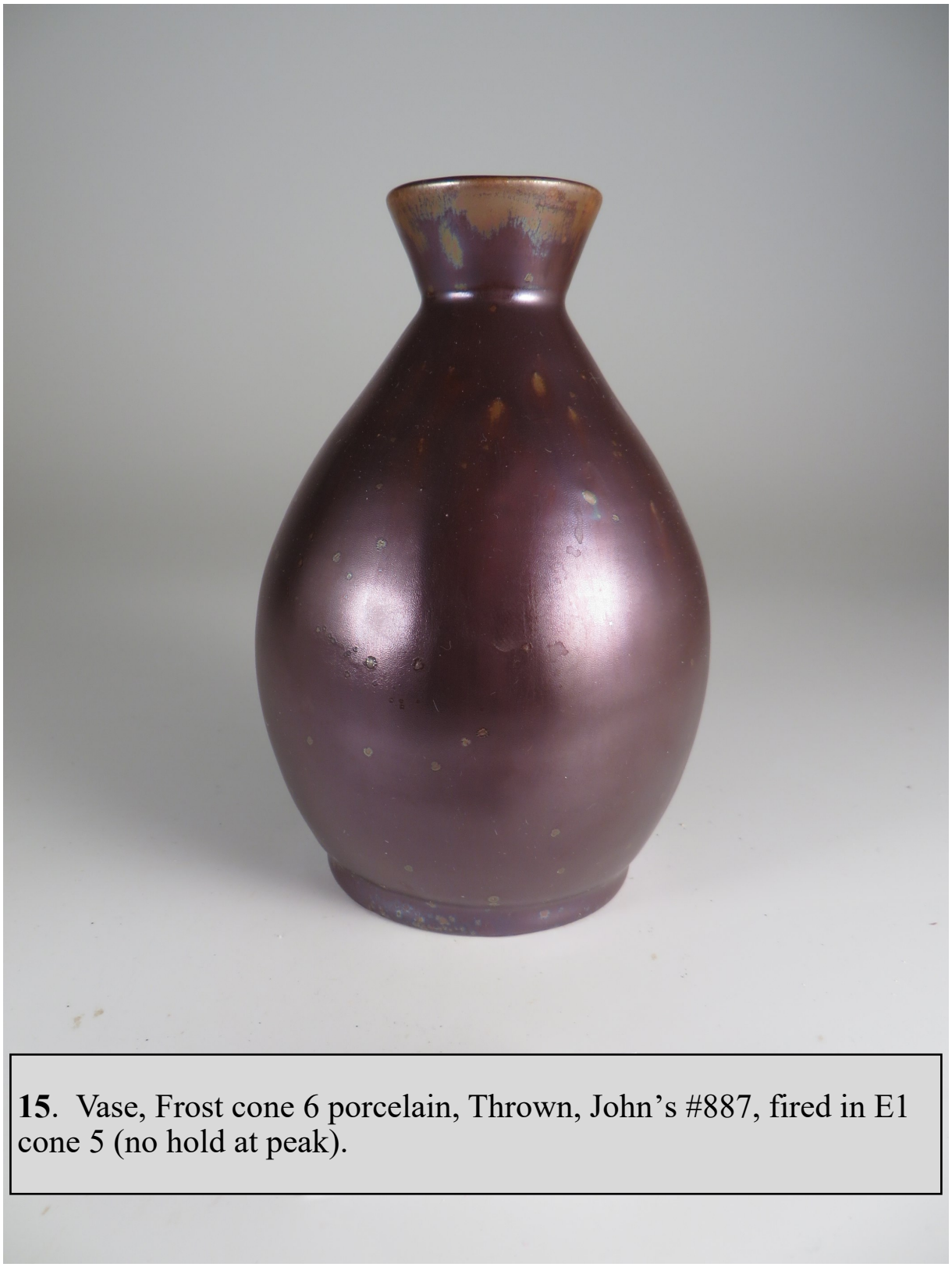
Add:

6.00 Titanium dioxide
4.00 Molybdenum sulfide
32.00 Manganese carbonate

COMMENT: This particular glaze was derived from John's #811 with an addition of 10 g. silica. (See Tile Image 8 on page 17 and Tile Image 10 on page 18.) I put in two images of the same piece because the back looked a bit different and the lighting can make things look a lot different and I wanted you to see that.

APPLICATION: 2 coats.

FIRING: This Vase was fired E1 cone 5 (no hold at peak). But also try in E1 cone 6 (no hold at peak).



15. Vase, Frost cone 6 porcelain, Thrown, John's #887, fired in E1 cone 5 (no hold at peak).

John's #887 TWO COATS

38.0 Minspar
30.0 Silica
14.0 Whiting
12.0 Zinc oxide
6.0 EPK

_____

Add:

6.00 Titanium dioxide
4.00 Molybdenum sulfide
32.00 Manganese carbonate
0.5 g Cobalt carbonate

COMMENT: This particular glaze was derived from John's #811 with an addition of cobalt carbonate 0.5 g. (See Tile Image 8 on page 17 and Tile Image 10 on page 18.)

APPLICATION: 2 coats.

FIRING: This Vase was fired E1 cone 5 (no hold at peak). But also try in E1 cone 6 (no hold at peak).

16. Vase, Thrown, John's #901, fired in E1 cone 5 (no hold at peak), Miller #616 cone 6 porcelain,

John's #901 TWO COATS

38.0 Minspar
30.0 Silica
14.0 Whiting
12.0 Zinc oxide
6.0 EPK
10.0 Barium carbonate
10.0 Gerstley borate

_____

Add:

6.00 Titanium dioxide
4.00 Molybdenum sulfide
32.00 Manganese carbonate

COMMENT: This particular glaze was derived from John's #865 with addition of 10g Gerstley borate. It has a fantastic surface and the color is somewhere between gold and silver.

APPLICATION: 2 coats.

FIRING: This Vase was fired E1 cone 5 (no hold at peak). But also try in E1 cone 6 (no hold at peak).

17. Vase, Thrown, John's #902, fired in E1 cone 5 (no hold at peak), Miller #616 porcelain,

17. Vase, Thrown, John's #902, (Another sample of the glaze from the previous page 54), Frost cone 6 porcelain, fired in E1 cone 5 (no hold at peak).

John's #902 TWO COATS

38.0 Minspar
30.0 Silica
14.0 Whiting
12.0 Zinc oxide
6.0 EPK
10.0 Barium carbonate
5.0 Soda ash

_____

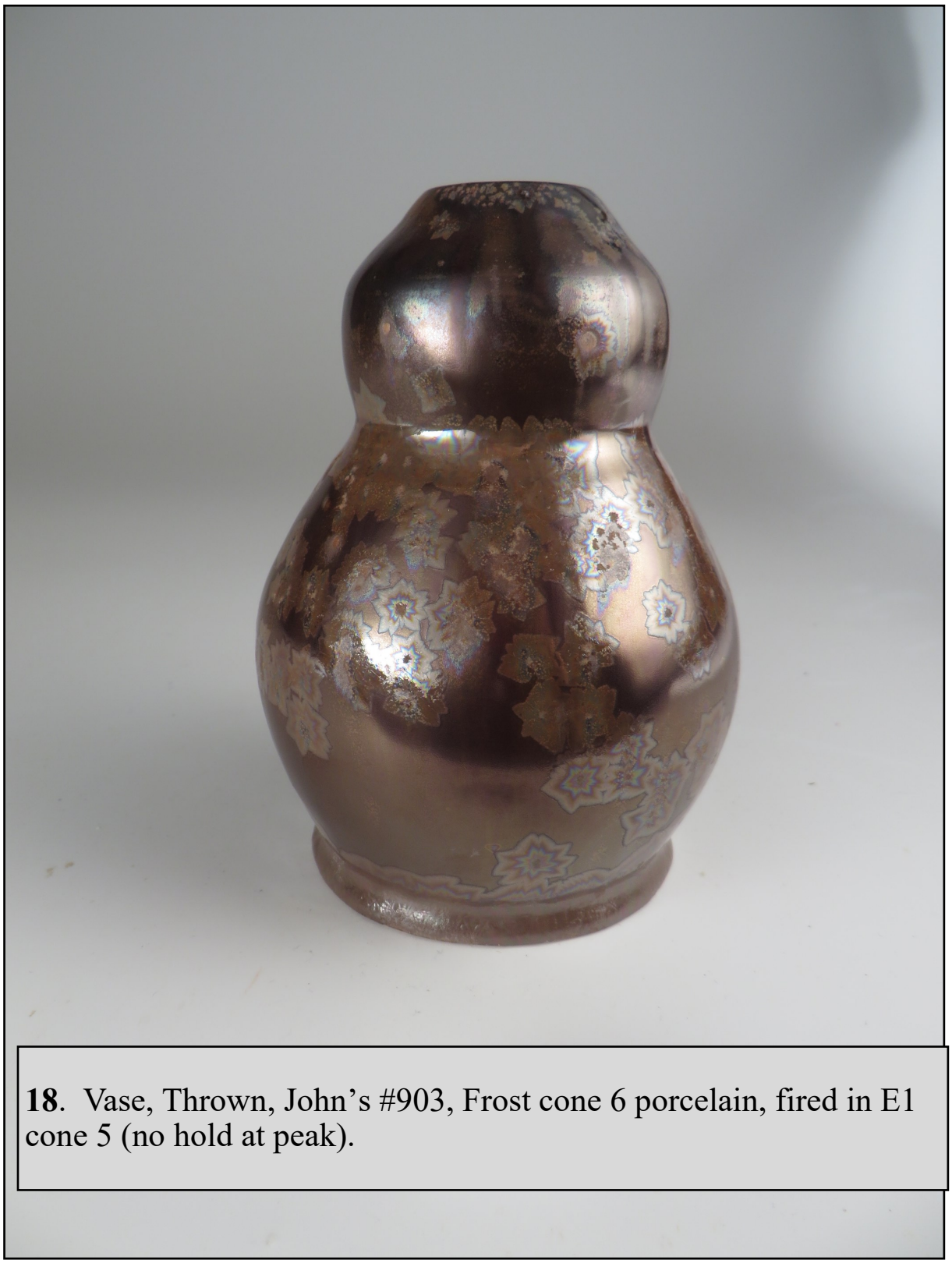
Add:

6.00 Titanium dioxide
4.00 Molybdenum sulfide
32.00 Manganese carbonate

COMMENT: This particular glaze was derived from John's #865 with addition of 5g. Soda ash. It has a fantastic surface and is metallic iridescent. You can get similar effects by spraying on a wash of soda ash. (2 tablespoons soda ash in a cup of hot water.) (See Robin MacKay's Vase 3 page 74)

APPLICATION: 2 coats.

FIRING: This Vase was fired E1 cone 5 (no hold at peak). But also try in E1 cone 6 (no hold at peak).



18. Vase, Thrown, John's #903, Frost cone 6 porcelain, fired in E1 cone 5 (no hold at peak).

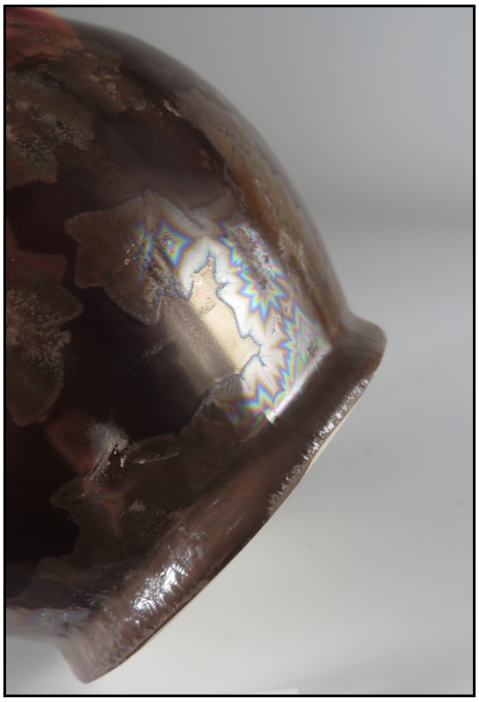
John's #903 TWO COATS

38.0 Minspar
30.0 Silica
14.0 Whiting
12.0 Zinc oxide
6.0 EPK
10.0 Barium carbonate

_____

Add:

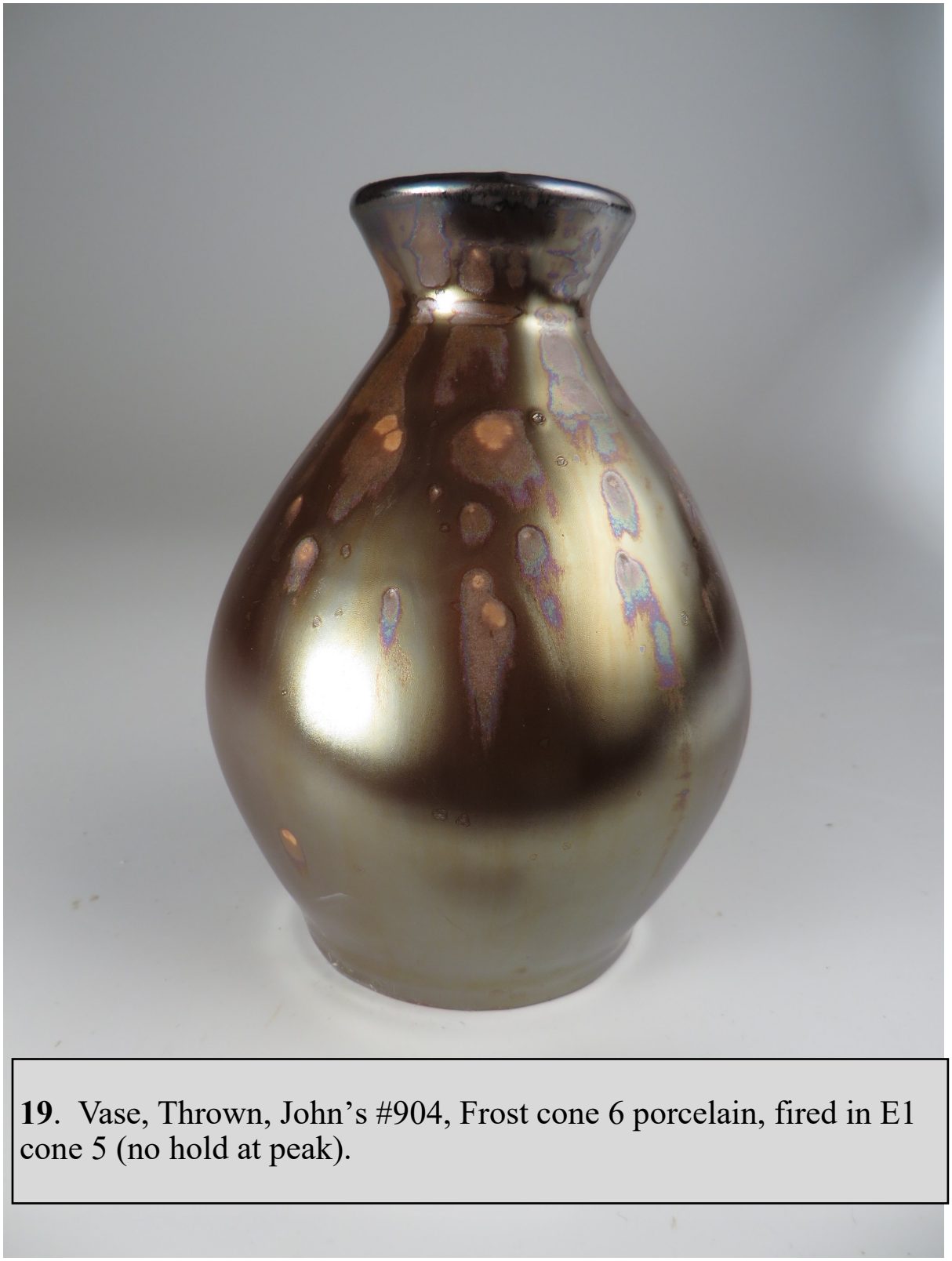
6.00 Titanium dioxide
8.00 Molybdenum sulfide
32.00 Manganese carbonate



COMMENT: This particular glaze was derived from John's #865 with addition of 4 more grams of Molybdenum sulfide (total of 8 grams) It has a fantastic surface and is metallic iridescent in the right lighting. Looks brown but has what look like rainbow Bart Simpson speech balloons.

APPLICATION: 2 coats.

FIRING: This Vase was fired E1 cone 5 (no hold at peak). But also try in E1 cone 6 (no hold at peak).



19. Vase, Thrown, John's #904, Frost cone 6 porcelain, fired in E1 cone 5 (no hold at peak).

John's #904 TWO COATS

38.0 Minspar
30.0 Silica
14.0 Whiting
12.0 Zinc oxide
6.0 EPK
10.0 Barium carbonate
5.0 Pearl ash

Add:

6.00 Titanium dioxide
4.00 Molybdenum sulfide
32.00 Manganese carbonate

COMMENT: This particular glaze was derived from John's #865 with addition of 5g Pearl ash. It has a fantastic surface and is metallic iridescent in the right lighting.

APPLICATION: 2 coats.

FIRING: This Vase was fired E1 cone 5 (no hold at peak). But also try in E1 cone 6 (no hold at peak).

20. Vase, Thrown, John's #927, Frost cone 6 porcelain, fired in E1 cone 5 (no hold).

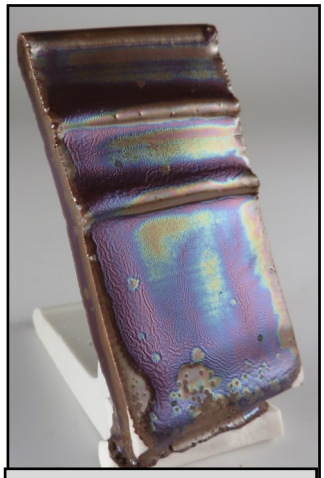
20. Vase, Thrown, John's #927, fired in E1 cone 5 (no hold), Standard 365 cone 6 porcelain.

John's #927 TWO COATS

38.0 Minspar
30.0 Silica
14.0 Whiting
12.0 Zinc oxide
6.0 EPK
6.6 Frit 3110

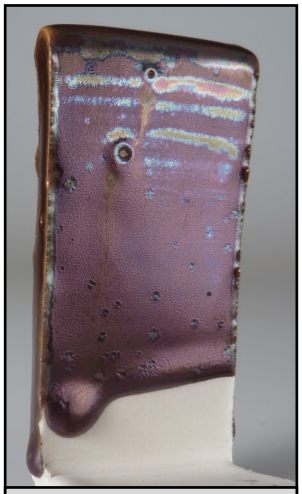
Add:

6.00 Titanium dioxide
4.00 Molybdenum sulfide
32.00 Manganese carbonate



6.6 g. Frit 3110

The tile on the left is John's #927 which has 6.6 g of Frit 3110 and the tile on the right is the #928 but with 10 g. of Frit 3110. Basically is was the third tile in the Color Run shown in Tile Image #5 page 15.



10 g. Frit 3110

COMMENT: This particular glaze was derived from John's #811 with addition of 6.6g Frit 3110 (or 10g.). It has a fantastic surface and is metallic iridescent in the right lighting.

APPLICATION: 2 coats.

FIRING: This Vase was fired E1 cone 5 (no hold at peak). But also try in E1 cone 6 (no hold at peak).

21. Vase, Thrown, John's #938, Frost cone 6 porcelain, fired in E1 cone 5 (no hold).

John's #938 TWO COATS

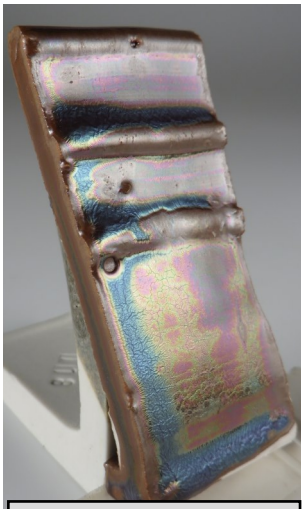
38.0 Minspar
30.0 Silica
14.0 Whiting
12.0 Zinc oxide
6.0 EPK

Add:
2.00 Light Rutile
6.00 Titanium dioxide
4.00 Molybdenum sulfide
32.00 Manganese carbonate

Two coats

The tile on the left is John's #938 which has 2.0 g of Light Rutile.

It has two coats and the tile on the right has one coat. It is very sensitive to thickness



One coat

COMMENT: This particular glaze was derived from John's #811 with addition of 2.0 Rutile. It has a fantastic surface and is metallic iridescent in the right lighting.

APPLICATION: 2 coats.

FIRING: This Vase was fired E1 cone 5 (no hold at peak). But also try in E1 cone 6 (no hold at peak).

22. Vase, Thrown, John's #1135, Miller #616 cone 6 porcelain, fired in E1 cone 5 (no hold),

John's #1135 TWO COATS

38.0 Minspar
30.0 Silica
14.0 Whiting
12.0 Zinc oxide
6.0 EPK
6.6 Frit 3110
4.0 Soda ash

Add:
1.00 Rutile
6.00 Titanium dioxide
4.00 Molybdenum sulfide
32.00 Manganese carbonate

COMMENT: This particular glaze was derived from John's #927 with addition of 4g Soda ash and 1.0 grams of rutile. It has a fantastic surface and is metallic iridescent in any lighting! Awesome!

APPLICATION: 2 coats.

FIRING:
This Vase was fired E1 cone 5 (no hold at peak).

During this project I worked with a group of people including Robin MacKay and Anita Ries. They helped me to see if my results were reproducible (See acknowledgements page 78) as well as helping with research ideas, discuss problems and solutions, etc.

In doing so they both made up the glazes and tried them at their studios. As I said, I don't really trust just a test tile because it is often hard to repeat so they put the glazes on their pots.

The follow are just several of Robin's pots. She had many that were outstanding but the size of this PDF precludes adding them all. She is a much more talented potter than I am and you should check out her other things on her Instagram page:

@robinmackayceramics

Robin MacKay Vessels

Vase 1, Robin MacKay, Thrown, Robin's Revised OG-4 with 4 Moly using 325 Mesh Manganese Dioxide subbed for Manganese Dioxide 200 Mesh, Standard 365 porcelain, Robin's Revised Slow cool cycle. (page 71)

Robin's Revised OG-4 (Plus 4 Moly) TWO COATS

40.00 Custer Feldspar
40.00 Frit 3110
20.00 Alberta Slip

35.00 Manganese Dioxide (325 Mesh)
15.00 Copper Carbonate
4.00 Molybdenum sulfide

Robin MacKay's Firing Cycle 1

C4 cone 6 (REVISED)

150 – 200°F Hold 15 minutes
350 – 1978°F
150 – 2220°F
500 – 1900°F
150 – 1450°F

COMMENT: This particular glaze was derived from John's OG-4 (Plus 4 Moly) on page 29. Instead of using Manganese dioxide (200 mesh) she used Manganese dioxide (325 Mesh).

APPLICATION: This was applied with 2 coats dipped

FIRING: This Vase was fired in Robin's revised Firing Cycle 1 above. Every kiln is different and she adjusted my cycles to her own to get these results. You will need to do the same.

Vase 2, Robin MacKay, Thrown, OG-4 with 4 Moly, Dipped 2 coats, Standard 365 porcelain, fired in Robin's Cycle 2 (page 73).

John's OG-4 (Plus 4 Moly) TWO COATS

40.00 Custer Feldspar
40.00 Frit 3110
20.00 Alberta Slip

35.00 Manganese Dioxide (200 Mesh)
15.00 Copper Carbonate
4.00 Molybdenum sulfide

Robin MacKay's Firing Cycle 2

E1 cone 6 (REVISED)
150 – 200°F Hold 15 minutes
350 – 1978°F
150 – 2220°F

COMMENT: This Vase 2 was glazed with John's OG-4 (Plus 4 Moly) using Manganese dioxide (200 mesh). See pages 25-28

APPLICATION: This was applied with 2 coats dipped

FIRING: This Vase was fired in Robin's Firing Cycle 2 above. Every kiln is different and she adjusted my cycles to her own to get these results. You will need to do the same.

Vase 3, Robin MacKay, Thrown, John's #874 on bottom with John's #877 overlapped, Standard 365 porcelain, fired in E1 cone 4 (no hold) and then re-fired in E1 cone 5 (no hold). .

John's #874 TWO COATS

38.0 Minspar
40.0 Silica
14.0 Whiting
12.0 Zinc oxide
6.0 EPK

Add:
6.00 Titanium dioxide
4.00 Molybdenum sulfide
32.00 Manganese carbonate

John's #877 TWO COATS

38.0 Minspar
30.0 Silica
14.0 Whiting
12.0 Zinc oxide
6.0 EPK
10.0 Talc

Add:
6.00 Titanium dioxide
4.00 Molybdenum sulfide
32.00 Manganese carbonate

E1 cone 4 (no hold)

150 – 200°F Hold 15 minutes
350 – 1978°F
150 – 2150°F

E1 cone 5 (no hold)

150 – 200°F Hold 15 minutes
350 – 1978°F
150 – 2175°F

COMMENT: The glazes really morph softly from gold/bronze into the purple. And it feels like brushed velvet!

APPLICATION: This vase was glazed on the bottom first with two coats of John's #874 and then the top was dipped with two coats of John's #877.

FIRING: This Vase was fired twice, First in E1 cone 4 (no hold) and then refired immediately after heating the piece and reapplying the glazes (because it didn't look good) followed by lightly spritzing with a mist of soda ash and water (2 tablespoons in a cup of hot water). Then refired in E1 cone 5 (no hold). You may get away with just firing it once in E1 cone 5 (no hold). As always you have to adjust to your kiln.

CONCLUSION

I hope you find some glazes in here which inspire you to try more variations. As I said, I have provided these as starting points for you to experiment. You could easily take any glaze and vary the types of manganese dioxide or carbonate or try several mesh sizes in each glaze. You could take one with 20g manganese carbonate and do a progression up to 50g and I am sure you would find several other nice results. Then you could apply each thin, thinner, and thinnest and find more great glazes. Not to mention firing variations.

Another area that is fertile for exploration is combinations of glazes. You can see the great stuff I got with John's #445 over and under glazes. You could find a bunch of cone 6 glazes and run those in combination or just random other glazes in your studio. Sea-foam Green is a great place to start. The sky is the limit with combinations, over, under, thick and thin. BUT keep good notes because occasionally you will find a winner. If you find anything you want to share please let me know. Always interested.

I have the thousands of tiles but as you all know a tile is only the first step and I hate to just show tiles because it is super depressing to find out you cannot replicate it after you tell everyone how great it is! So I usually wait for a couple of successful pieces.

ACKNOWLDGEMENTS

I would like to thank my wife, Cheryl, for her support and proofing skills but don't blame her for my errors. She is required to listen my "ideas" during car rides and act appropriately interested. For that I apologize. But I will say that she, in fact, does listen because she will occasionally cuts me off and finishs my sentence and often offers a better suggestion that I never considered!

I would also like to thank Robin M. MacKay and Anita Ries for their support in this project. They tested a bunch of the recipes to see if they traveled well. We found the same problems with materials that I experienced so please take that to heart. It is very disheartening when all your efforts are ruined by a bad batch of materials or just running out of something and getting something new and then everything is ruined. You feel as if you are back to ground zero and it takes the wind out of your sails. Robin and Anita were very helpful as sounding boards for tests and retests, researching ideas, thinking of their own ideas and finding solutions, etc. They also provided inspiration when I was getting tired, every tired. I included some of Robin's images to see the beautiful work that she makes! Plus they laugh at my jokes.

Catherine Walworth also helped with proofing and Terry Gess helped mix some glazes when I was getting tired. Melanie Risch, helped take photos, mix tons of progressions, dipped test tiles and some pots that you see in this PDF. She also helped me see what a person unfamiliar with this type of glaze needed to know make it successful, like specific gravity, and flocculation/deflocculation, etc.

It is always fun to have other potters read your stuff, give their viewpoints, suggestions and encouragement when you are working alone in your studio, especially during the long Covid-19 lockdown. Hope you enjoy.

BOOKS

I have two glaze books published by Lark Book/Sterling Books:

- **"The Complete Guide to High Fire Glazes : Glazing and Firing at Cone 10"**
- **"The Complete Guide to Mid-Range Glazes; Glazing and Firing at Cones 4-7"**

DVDs

Understanding Glazes
Fundamentals of Wheel Throwing
Beyond the Basics: Tumbles, Cups and Yunomis
Beyond the Basics 2: Kurinuki
Fundamentals of Glazing: The Basics

E-BOOKS (Downloadable PDF's on a variety of topics):

Experiments in Manganese Gold and Iridescent Glazes in Electric Oxidation cones 6-12-Part

Experiments in Mid-range Crystalline Glazes

Quest for the Illusive Leaf Bowl and other Assorted Article

I Need a Cone 6 Glaze that Doesn't Craze Is it Food Safe?

All that Glitters is not Goldstone

Should I Slip and Score?

Is it Food-Safe?

Over the Counter Glazes

Gold Shino : Iron Golds and Iridescent Glazes at cone 10-12 Reduction

And my pots are on my Etsy Shop: https://www.etsy.com/shop/johnbrittpottery

All are available on my website: JOHNBRITTPOTTERY.COM

John Britt is a potter, teacher and glaze mechanic who lives in the mountains of western North Carolina although he grew up in Dayton, Ohio. John is primarily a self-taught potter who, for 36 years, has worked and taught extensively, both nationally and internationally, at universities, colleges and craft centers, including the Penland School of Crafts where he served as the Clay Coordinator and then, as the Studio's Manager.

He is the author of the "The Complete Guide to High-Fire Glaze; Glazing & Firing at Cone 10" which was published by Lark Books in 2004, and his most recent book "The Complete Guide to Midrange Glazes: Glazing and Firing at Cones 4-7" which was published October 2014.

He also has and many e-books (PDF's): Like this one or "The Quest for the Illusive Leaf Bowl and Other Assorted Articles", "How to Stop Pinholing","Aventurine Glazes", etc. He also has a DVD produced by Ceramics Daily entitled: "Understanding Glazes: How to Test, Tweak and Perfect Your Glazes". He produced four of his own videos: "Fundamentals of Wheel Throwing", "Beyond the Basics" and "Kurinuki" and the most recent "Fundamentals of Glazing Techniques".

He was the juror for the book; "500 Bowls," Technical Editor for "The Art and Craft of Ceramics", the "Ceramic Glaze: The Complete Handbook" by Brian Taylor and Kate Doody and most recently "Amazing Glazes" by Gabriel Kline. He has written numerous articles for ceramics publications including: Ceramic Review, Studio Potter, Clay Times, Ceramic Technical, New Ceramics, The Log Book and was a frequent contributor to Ceramics Monthly.

He can be reached at: johnbrittpottery@gmail.com