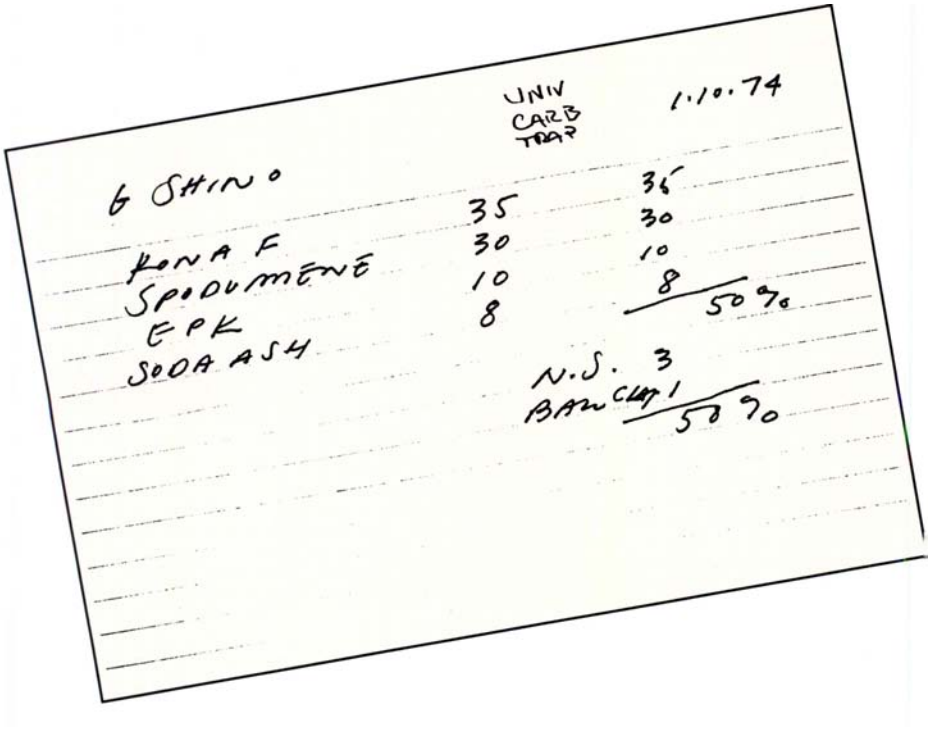
Black Shino

by Mel Jacobson



At the University of Minnesota in 1974, M.F.A. student Ginny Wirt developed a Shino glaze that would trap carbon.

Last spring, I had the pleasure of talking with Ginny Wirt, the first person in the United States to make what has become known as American Shino. During the winter of 1974 while at the University of Minnesota working on an M.F.A., she experimented with recipes to develop a glaze that would trap carbon—and she found it (see notecard photocopy above). Although Ginny left the clay world and is now a Washington, D.C., architect, that initial recipe led to a proliferation of variations throughout the Western world.

The origins of Shino lie in the hills of Mino and Seto, Japan. Much admired by tea ceremony masters, it is considered to be the very first white glaze used in Japan. As with all such glazes, the complete history is hazy. It is unknown when it appeared, but shards have been found that date to as early as A.D. 1460. For those interested in the full history of the glaze, look to the writings of Ryoji Kuroda in his book *Shino* (Kodansha International, ISBN 0-87011-631-2).

Japanese Shino is a thick white glaze made from nearly 100% feldspar. Additions of ash may be used as a flux. It can pinhole and crawl a great deal. To the Western eye, it often appears as a thick frosting, and is not generally considered beautiful, but to the tea masters, a glaze such as Shino—with its uncontrollable pinholing and crawling—is considered aesthetically pleasing.

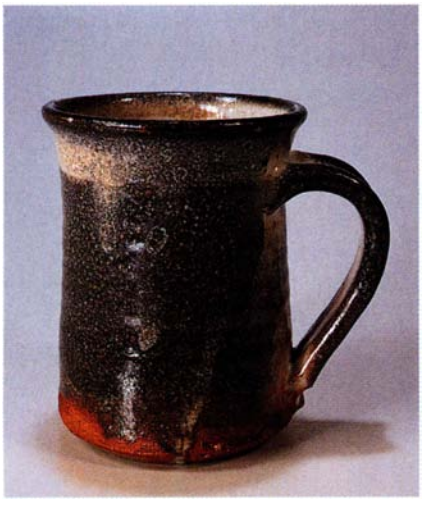
Ranging in color from soft white to pink to dark orange or iron red, American Shinos descended from the Wirt original are typically shinier with smaller imperfections on the surface. Color is greatly affected by the underlying clay body. White stonewares and porcelain give lustrous pinks to light orange. Iron-bearing clays will deepen the color dramatically. Iron washes brushed onto the pot s surface will burn through the glaze and leave a strong pattern.

Because this glaze melts early and its surface is soft, it is possible to trap carbon in the melt. When to reduce seems to be the critical element in obtaining the black or gray streaks and spots that distinguish American Shino. Most potters begin reduction at about Cone 011 or around 1650°F.

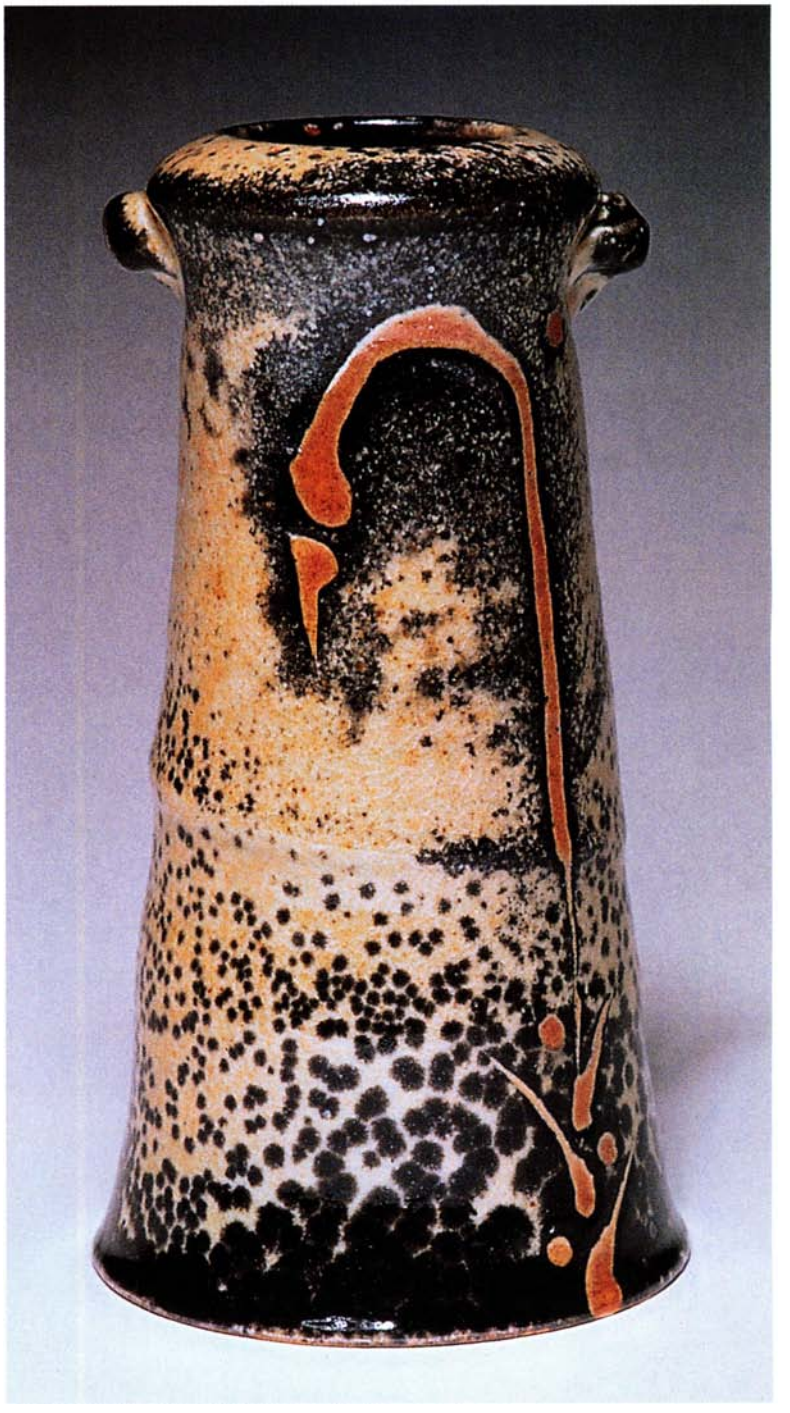
Soda ash (sodium carbonate) is the ingredient responsible for this early melt. When present in sufficient amounts, the soda ash migrates to \ the surface of the pot and forms salt-like crystals. Dannon Rhudy of Texas has taken this concept a step further by brushing a heated solution of soda ash and water directly onto the pot, which enhances the carbon trapping, resulting in deep blaclcs. She was influenced by experiments that Nils Lou of Oregon had done involving placing pots to soak overnight in a solution of water, soda ash and salt (see his article on "Self-Glazing Porcelain" in the April 1984 CM). When wood fired in his anagama to Cone 14, these pots were a rich deep red to pink in color.

My work with Shino has been based on turning the entire surface, or at least big sections of it, jet black. I combine most of the Shinos that I use with my basic Orange Glaze (see page 55 of the December 1997 CM). I have found that this high rutile glaze works very well with Shino, as long as Shino is the base. Many other glazes do not blend well with Shino, and severe blistering or crawling can occur.

Using the Rhudy method, I blend as much soda ash into boiling water as it will tolerate, and use a very old, small, electric hot plate to keep the soda ash mixture in solution. As soon as it cools, it reverts back to a thick crystalline state. With a large, flat, soft brush, I layer an



Mug, approximately 5 inches in height, wheel-thrown stoneware, with Shino glaze and soda ash wash, fired to Cone 11, by Mel Jacobson.



"Vase," 9 inches in height, wheel-thrown porcelain with slip brushwork and Shino glaze, by Malcolm Davis, Washington, D.C.

even coat of hot soda ash over the entire Shino-glazed surface. When it has dried, I repeat the process. Letting the glaze dry for several days before firing enhances the crystal growth.

Most Shino glazes will tolerate a very hot Cone 10 firing; it is common for my kiln to reach Cone 11. By using an oxygen probe, I can control the amount of reduction during all stages of firing.

To determine when to begin reduction, I place a Cone 010 at the end of my cone pack, adding a small depression to catch the melting cone. About 40 minutes of reduction is necessary to achieve good carbon trapping. I close the damper slightly, close down my primary air, and add small pieces of wood to the chamber. Back pressure sends a light cloud of carbon into the room. Very good ventilation is necessary at this phase; I do not stay in the kiln room during early reduction.

Typically, my oxygen probe reads about .08, and that is heavy reduction. The wood addition may be more mys-

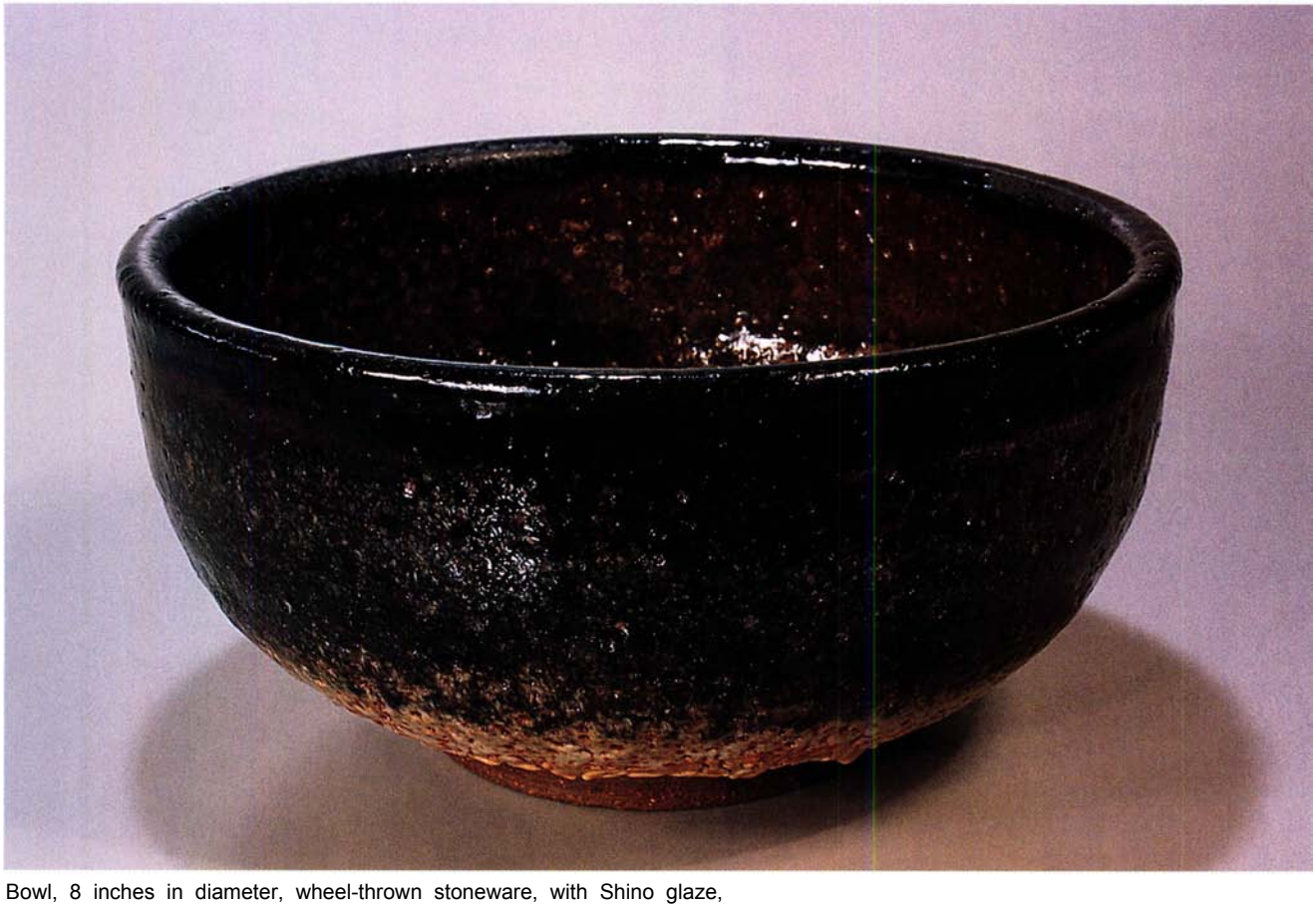
tical than scientific, but I do it anyway. After the 40 or so minutes, I adjust the kiln to fire normally—that is, at 90 on the oxygen probe (it has a set of incremental numbers to indicate temperature as well as atmosphere; 90 is about 1750°F, the point at which most potters start glaze reduction). I keep the probe reading at about .06, until Cone 10 starts over. At this point, I clear the kiln of carbon and continue to fire to Cone 11 bending. This last phase must be watched closely, as it happens quickly.

Then I close down the kiln and allow for slow cooling until Cone 08. Because some of the pots are accented with copper reds, I usually reignite the Idln for about 10 minutes to make sure they go through that critical cooling stage twice. Copper glazes turn red during the cooling at about 1750°F. It is important not to rush through this stage. I have found that going through this stage twice makes sure that the reds turn fully.

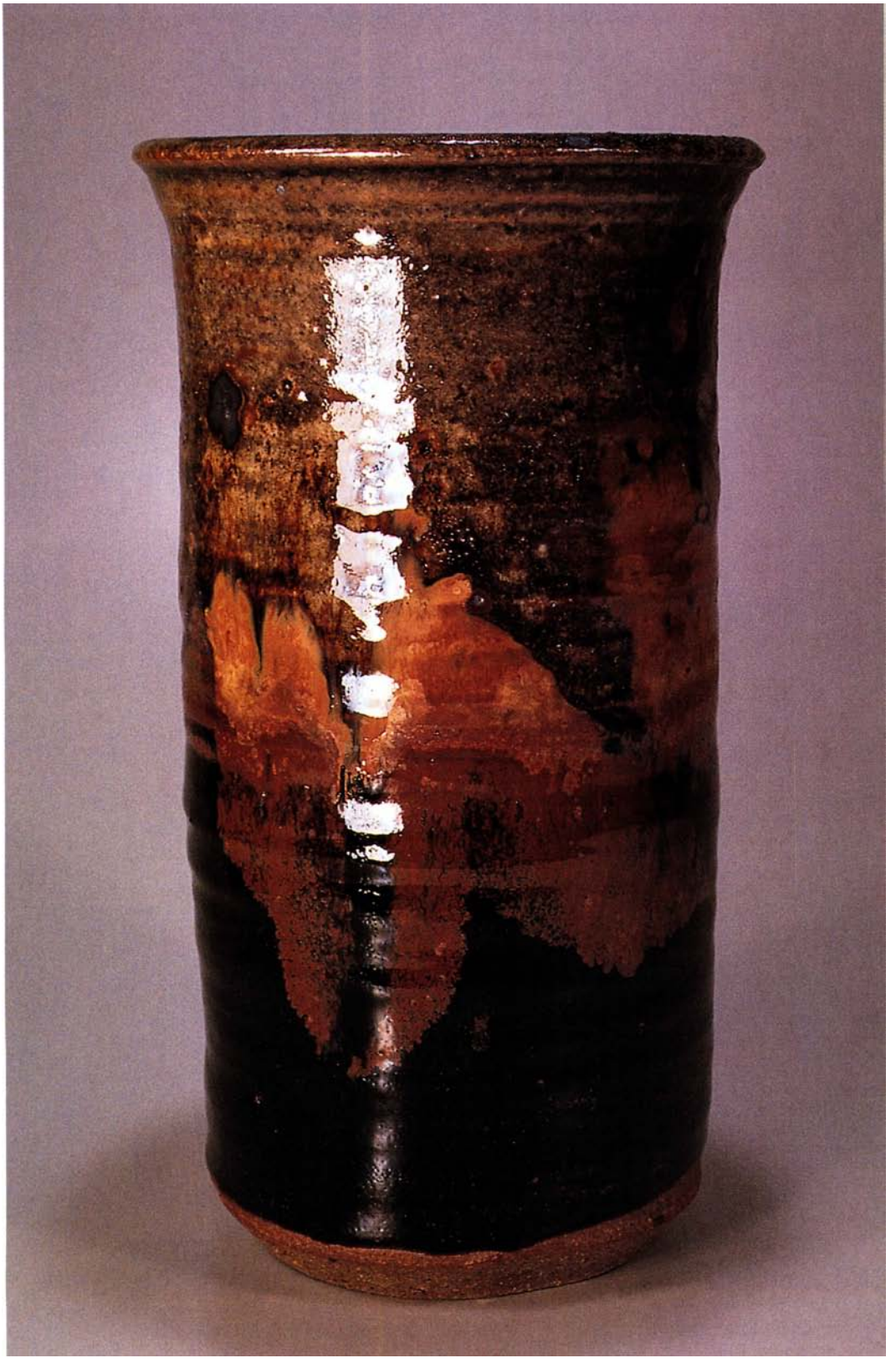
I have tested Shinos on a porcelain body, a combination of two-thirds porcelain/one-third stoneware, and an iron-rich stoneware. Each has its own place in the black Shino experience. In most cases, I have been able to achieve the total black look. On many of my early tests with added soda ash, I was able to actually see the individual brushstokes.

Regardless of the firing technique, American Shino has become a much-loved glaze among contemporary potters. Malcolm Davis of Washington, D.C., has worked with Shino recipes for a number of years and has learned to control the glaze to perfection. His many variations of the original Wirt recipe have been circulated widely and have had a dramatic impact on further carbon-trap glaze developments.

Many of the fine wood-fired pots we are seeing have thin layers of Shino to enhance the color. I do believe that soda ash layering will create a new look on many other kinds of glazes as well. The testing just needs to be done. **A**



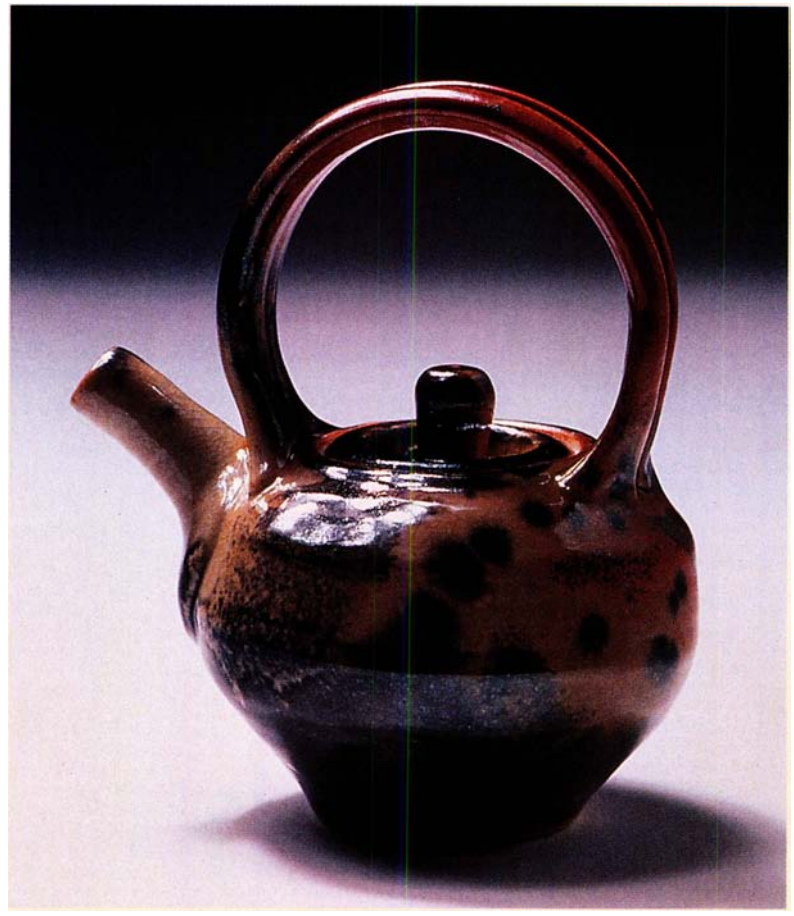
Bowl, 8 inches in diameter, wheel-thrown stoneware, with Shino glaze, refired for additional carbon trapping, by Mel Jacobson.



Vessel, 12 inches in height, wheel-thrown stoneware, with carbon-trap Shino at the top, Mel's Orange and temmoku glazes on the lower half, fired to Cone 11, by Mel Jacobson.

A Shino Analysis

by Tom Buck



Teapot, 6½ inches in height, porcelain, with Shino glaze, by Malcolm Davis, Washington, D.C.

When one analyzes a number of Shino recipes, it soon becomes apparent that their makeup differs markedly from the more common stoneware glazes fired to Cone 10, particularly when one calculates their Seger/unity formulas.

Most stoneware glazes (Cone 10, reduction) are fluxed by calcium oxide (CaO) and/or magnesium oxide (MgO), and their combined molecular levels are typically 0.7-0.9 moles in the Seger: 1 mole flux oxides (CaO, MgO, plus some K_20/Na_20, others); 0.4-0.55 moles alumina ($A1_20$); and 3.5-5.6 moles silica ($Si0_2$).

All Shino glazes break this pattern. They are fluxed by the alkali metal oxides: lithium oxide (Li_20), potassium oxide (K^O), sodium oxide, and their sum is 90+% of the flux oxides. This high level persists in two types of Shinos: Type 1 has 1 mole flux oxides, 0.7-0.9 $A1_20_3$ and 3.0-3.9 $Si0_2$; Type 2 has 1 mole flux oxides, 1.0-1.1 $A1_20_3$ and 4.2—4.8 $Si0_2$. Of the following 28 glazes (from a list compiled by Malcolm Davis), all but four fall into either the Type 1 or Type 2 category.

The Type 1 glazes include: GWU Gold Shino 1, Bill Laws Lustre, Orange Shino-Type Carbon-Trap, GWU #87 Shino C, K Shino (#1013 Peach to Red), Moon Rocks Shino, V&O Shino III, Columbia Visual Arts Center Shino, Dolly's Russian Hotel and Jack Troy's Carbon-Trap Shino.

Type 2 include: Malcolm Davis Shino, GWU Gold Shino 2, GWU Shino Pearl, Paul Davis Shino, Jeremy Kalin's Green Shino, Linda's Pink Shino, EF 6 Pink Shino, #1227 Ferguson Shino, JR #1044 "Shell" Shino, V&O Shino II, GWU Shino (RIT Carbon Trap), David Shaner's Carbon-Trap Shino, JP's #1188 White/Orange/Pink Carbon-Trap Shino, Todd Osborne Shino, Coleman Shino #48 and Paul Woolerys Shino.

One glaze, Simon's White, landed between the two types with 1 mole flux; 0.91 $A1_20_3$; 4.2 $Si0_2$. One glaze was well outside the two types: Bruce's Shino Crackle with 1 flux; 1.5 Al_20_3; 5.40 $Si0_2$. All the recipes exhibited a low silica-to-alumina ratio: 3.3-4.9, with most at 4.0-4.2. In practical terms, this value predicts that the surface will be matt (non-gloss).

With few exceptions, these recipes showed low levels of iron oxide, ranging from almost none to 0.4 moles, with most of the Fe_20_3 coming from the clay portion of the recipe. Very low levels of iron oxide result in white Shinos; as the iron content increases, so does the shade—from pink to orange to red. Because of the large amount of alkali oxides in Shinos, the expansion/contraction will generally be high, sometimes provoking crazing and cracking on clay bodies that have low expansion/contraction.

To make Shinos, potters rely on four raw materials: nepheline syenite; soda feldspar (Kona F-4, others); soda ash and spodumene (lithium feldspar) in varied proportions; lithium carbonate is often used if spodumene is not available. They also add ball clay or kaolin and/or bentonite. A few recipes also include added red iron oxide (1%), Barnard or Redart clay (up to 15%) for color effects, and a few add small amounts of zirconium silicate (Zircopax, Ultrox), or yellow ocher and rutile, and cobalt and chromium compounds, although doing so departs from the classic style.

While a good Shino recipe (Type 1 or 2) is needed to achieve the desired look, the firing is also critical to the results. Under zero or light reduction, the glaze will yield mostly a white finish, or if enough red iron oxide is present, an orange or red tone. To trap carbon for a black Shino, moderate to heavy reduction is needed.

Malcolm Davis Shino Glaze
(Cone 10, reduction)

Soda Ash	17.27%
Kona F-4 Feldspar	9.82
Nepheline Syenite	40.91
Edgar Plastic Kaolin	18.18
Kentucky Ball Clay (OM 4)	13.82
	100.00%

For use on porcelain, add 6% Cedar Heights Redart.

GWU Gold Shino Glaze 1
(Cone 10, reduction)

Soda Ash	7.62%
Kona F-4 Feldspar	17.55
Nepheline Syenite	44.74
Spodumene	14.44
Kentucky Ball Clay (OM 4)	15.65
	100.00%
Add: Bentonite	1.00%
Red Iron Oxide	1.00 %

GWU Gold Shino Glaze 2
(Cone 10, reduction)

SodaAsh	4.15%
Kona F-4 Feldspar	18.90
Nepheline Syenite	44.55
Spodumene	15.58
Kentucky Ball Clay (OM 4)	16.82
	100.00%
Add: Bentonite	1.00%
Red Iron Oxide	1.00 %

GWU Shino Pearl Glaze
(Cone 10, reduction)

SodaAsh	3%
Kona F-4 Feldspar	15
Nepheline Syenite	50
Spodumene	13
Kaolin	3
Kentucky Ball Clay (OM 4)	16
	100%

Paul Davis Shino Glaze
(Cone 10, reduction)

Nepheline Syenite	53.93%
Spodumene	34.83
Alumina	11.24
	100.00%
Add: Epsom Salts	2.25%
Zircopax	5.62%
Bentonite	4.49 %

Bruce s Shino Crackle Glaze
(Cone 10, reduction)

SodaAsh	3.3%
Kona F-4 Feldspar	9.1
Nepheline Syenite	37.6
Spodumene	12.5
Edgar Plastic Kaolin	25.0
Kentucky Ball Clay (OM 4)	12.5
	100.0%

Jeremy Kalins Green Shino Glaze
(Cone 10, reduction)

SodaAsh	4.00%
Kona F-4 Feldspar	10.80
Nepheline Syenite	45.00
Spodumene	15.20
Cedar Heights Redart	15.00
Edgar Plastic Kaolin	10.00
	100.00%
Add: Chrome Oxide	0.25 %
Cobalt Carbonate	0.25%

Bill Laws Lustre Glaze
(Cone 10, reduction)

Lithium Carbonate	5%
SodaAsh	5
Whiting	2
Nepheline Syenite	53
Edgar Plastic Kaolin	25
Flint	10
	100%
Add: Tin Oxide	2%

Orange Shino-Type
Carbon-Trap Glaze
(Cone 10, reduction)

SodaAsh	12%
Kona F-4 Feldspar	13
Nepheline Syenite	40
Spodumene	9
Cedar Heights Redart	3
Edgar Plastic Kaolin	8
Kentucky Ball Clay (OM 4)	15
	100%

Lindas Pink Shino Glaze
(Cone 10, reduction)

SodaAsh	4.12%
Nepheline Syenite	49.48
Soda Feldspar	7.22
Spodumene	25.77
Kentucky Ball Clay (OM 4)	8.25
Edgar Plastic Kaolin	5.16
	100.00%

GWU #87 Shino C Glaze
(Cone 10, reduction)

Lithium Carbonate	5%
SodaAsh	5
Nepheline Syenite	50
Spodumene	30
Kentucky Ball Clay (OM 4)	10
	100%

EF 6 Pink Shino Glaze
(Cone 10, reduction)

SodaAsh	3.02%
Kona F-4 Feldspar	14.67
Nepheline Syenite	50.25
Spodumene	12.56
Ball Clay	16.48
Edgar Plastic Kaolin	3.02
	100.00%

K Shino (#1013 Peach
to Red Shino) Glaze
(Cone 10, reduction)

SodaAsh	8.1%
Nepheline Syenite	39.3
Spodumene	30.6
Kaolin	4.8
Kentucky Ball Clay (OM 4)	17.2
	100.0%

#1227 Ferguson Shino Glaze
(Cone 10, reduction)

SodaAsh	3.3%
Kona F-4 Feldspar	14.6
Nepheline Syenite	50.0
Spodumene	12.5
Edgar Plastic Kaolin	2.9
Kentucky Ball Clay (OM 4)	16.7
	100.0%

Moon Rocks Shino Glaze
(Cone 10, reduction)

SodaAsh	10.01%
Potash Feldspar	45.64
Spodumene	38.04
Edgar Plastic Kaolin	6.31
	100.00%

JR 1044 "Shell" Shino Glaze
(Cone 10, reduction)

Nepheline Syenite	54.32%
Spodumene	36.15
Zircopax	6.02
Bentonite	3.51
	100.00%

V&O Shino II Glaze
(Cone 10, reduction)

Soda Ash	3.54%
Kona F-4 Feldspar	15.93
Nepheline Syenite	39.82
Spodumene	25.67
Kentucky Ball Clay (OM 4)	15.04
	100.00%

V&O Shino III Glaze
(Cone 10, reduction)

Soda Ash	7%
Kona F-4 Feldspar	34
Nepheline Syenite	15
Spodumene	29
Edgar Plastic Kaolin	15
	100%

GWU Shino
(RIT Carbon-Trap) Glaze
(Cone 10, reduction)

Soda Ash	4.0%
Nepheline Syenite	45.0
Kona F-4 Feldspar	18.4
Spodumene	15.2
Ball Clay	16.4
Bentonite	1.0
	100.0%

For a mustard color, add 5% yellow ocher; for blue gray add 8-10% rutile.

David Shaner s Carbon-Trap
Shino Glaze
(Cone 10, reduction)

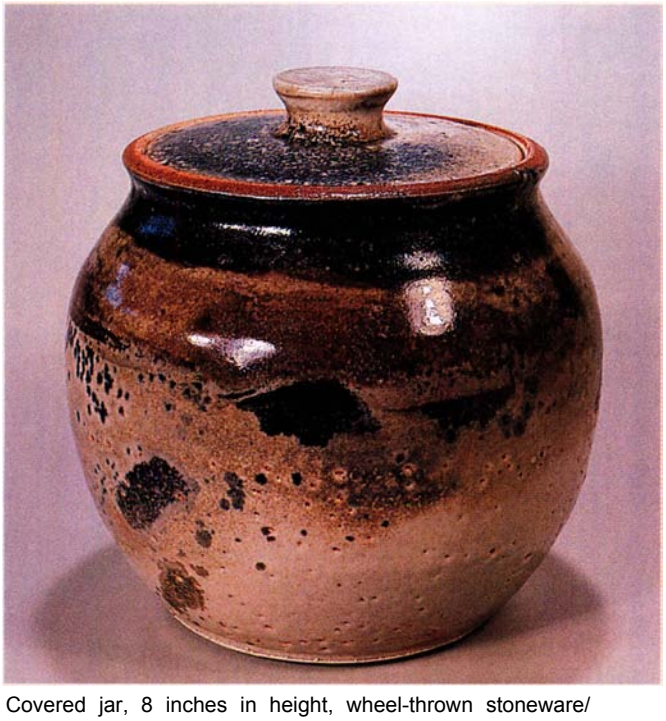
Soda Ash	3.33%
Nepheline Syenite	50.02
Soda Feldspar	14.58
Spodumene	12.50
Ball Clay	16.66
Edgar Plastic Kaolin	2.91
	100.00%
Add: Bentonite	3.00%

Columbia Visual Arts Center
Shino Glaze
(Cone 10, reduction)

Soda Ash	9.64%
Kona F-4 Feldspar	42.17
Spodumene	36.14
Kaolin	12.05
	100.00%

JP s #1188 White/Orange/Pink
Carbon-Trap Glaze
(Cone 10, reduction)

Soda Ash	4.21%
Nepheline Syenite	47.37
Potash Feldspar	15.16
Spodumene	16.00
Kentucky Ball Clay (OM 4)	17.26
	100.00%



Covered jar, 8 inches in height, wheel-thrown stoneware/ porcelain mixture, with Shino glaze and soda ash wash, by Mel Jacobson, Minnetonka, Minnesota.

Todd Osborne Shino Glaze
(Cone 10, reduction)

Soda Ash	4.48%
Nepheline Syenite	50.45
Spodumene	17.04
Ball Clay	16.82
Kaolin	11.21
	100.00%

Coleman Shino #48 Glaze
(Cone 10, reduction)

Soda Ash	3%
Kona F-4 Feldspar	15
Nepheline Syenite	50
Spodumene	13
Kaopaque 20	3
Kentucky Ball Clay (OM 4)	16
	100%

Dolly's Russian Hotel Glaze
(Cone 10, reduction)

Soda Ash	5.0%
Kona F-4 Feldspar	53.6
Nepheline Syenite	7.7
Spodumene	19.0
Barnard Clay	7.7
Kaolin	7.0
	100.0%

Jack Troys Carbon-Trap Glaze
(Cone 10, reduction)

Soda Ash	7.77%
Kona F-4 Feldspar	33.98
Nepheline Syenite	14.56
Spodumene	29.13
Ball Clay	4.85
Kaolin	9.71
	100.00%

Paul Woolery s Shino Glaze
(Cone 10, reduction)

Gerstley Borate	4.9%
Soda Ash	2.9
Nepheline Syenite	54.5
Spodumene	22.8
Ball Clay	14.9
	100.0%

Simons White Shino Glaze
(Cone 10, reduction)

Soda Ash	5.33%
Kona F-4 Feldspar	48.00
Spodumene	40.00
Kaolin	6.67
	100.00%
Add: Bentonite	2.00 %