

A Beginner's Guide to Glass Alchemy Colored Borosilicate

by Drew Fritts

When I was asked by Glass Line to review the new borosilicate colors being produced by Glass Alchemy, Ltd., I was surprised -- I'm primarily a soft glass artist. Although I've certainly used borosilicate glass, it has primarily been clear Pyrex®. I declined the invitation several times because I didn't feel that I could make a fair comparison to the colored borosilicates that are already on the market. Finally, I agreed to review the product on the condition that I wouldn't do a "comparison" -- that I would discuss only how this product performed based on my experiments, and nothing more. I tell you this up front so that you won't be disappointed when you get to my comments about each color. I don't compare it to some other color with which you might be familiar.

I decided first to go to the Glass Alchemy, Ltd. web site (www.glassalchemyarts.com) to find out more about their product. I was impressed by the series of bright opaque colors they intend to bring out soon. One of the reasons I work primarily in soft glass is because I like to use a lot of truly opaque colors in my marbles. Historically these colors have been more readily available in soft glass than in borosilicate.

I decided to put together a test plan while I waited for Glass Alchemy ["GA" hereafter] to send samples of currently available colors. At this writing there are 31 GA colors available, with many more due to be released.

I wanted to test each color for the following qualities:

1. Compatibility with clear Pyrex®
2. Compatibility with other GA colors
3. Working characteristics (does it strike, boil, scum, etc.?)
4. Striking colors -- are they random or repeatable?
5. Effect of long periods of heating in the torch, as required by many of my marbles

Most of all, I wanted to see if someone like me (without a lot of borosilicate experience) could not only achieve the effects that the company talks about on their web site, but achieve them consistently.

TESTING

I conducted my tests without referring to the company's descriptions of each color. I first wanted to form my own opinion. Then I'd look to see what, if any, differences there were between my results and the description given on the GA web site.

I started by cutting two 2-inch lengths of each color. I labeled all of the test pieces with a DecoColor™ Liquid Silver™ Opaque Paint Marker that doesn't burn off in the annealer. (I get mine at an office supply store.) I set aside one piece of each color as a control. I put the remaining pieces in my annealer at 1000° F. for about 8 hours and then allowed them to cool over night. Meanwhile, I pulled stringers and generally got the feel of each color.

The next day I pulled the 2-inch lengths out of the annealer and was surprised to find that only one of the striking colors was the color I had expected it to be -- 138 Ruby Strike. The rest were all very dark. Some of them were not even remotely close to the color indicated by their identifying number.

I immediately called GA and talked to Henry, who calmly explained to me that borosilicate striking colors don't work the same as soft glass striking colors. Many of them just keep striking darker and darker until they are either cooled or they reach saturation. I asked him how something like a marble, that needs to be annealed well, could be struck to the desired color without jeopardizing the annealing process. He told me that I needed to watch the things I put into the annealer and when they got to the color I wanted, cycle the annealer down. He also said to plan my production so that the items that needed the shortest annealing (both size and color) were put in last.

This striking behavior posed a fundamental problem for me. I make marbles all day and I don't really want to be turning my annealer off after only a couple marbles just so I can get them to stay a certain color. Also, I wasn't sure what the annealing curve looks like for borosilicate marbles! So, I decided to call on a couple experienced borosilicate workers and pick their brains.

A Beginner's Guide to Glass Alchemy Colored Borosilicate

by Drew Fritts

First I called Lewis C. Wilson (<http://www.crystalmyths.com/>) and had a very informative discussion. Lewis sent me some pictures of some fabulous sculptures, collaborations between Lewis and Doug Remschneider, in which many of Lewis' portions were done using the GA colors. He explained that to get some color effects he uses what he called "selective striking." This means that he strikes selected parts of a piece in the torch to get them to turn a particular color. Some of the colors can be "shaded" in this manner or even taken through several different colors to give blends. The piece can then be put into an annealer that has its temperature set at the very bottom of the annealing / striking range. This allows the piece to anneal with very limited color shift.

Still wanting to know more, about marbles specifically, I decided to contact one of my favorite borosilicate marble makers, Douglas M. Ferguson <http://home.att.net/~douglas-melizard/ferguson2001.htm>. Douglas told me "First, you have to forget everything you know about soft glass. ...[If you anneal as you would with soft glass] the colors do strike dark ... forget about soft glass annealing. Boro is very forgiving. Work it, put it into the kiln and make sure you anneal it about 20 to 60 minutes at 1050° F. Then you can remove it from the kiln and place in vermiculite and cover completely. This seems to work fine for me. I can bounce my marbles off the floor and have no problems. You can work with the times for the desired color effect. Sometimes I will leave marbles in the kiln for the whole time period I am working and then shut the kiln down when I leave. It depends on the effect I want."

Well, that did it. All three people told me basically the same thing: "Selective Striking" and "Selective Annealing" are the way to go. So, the next day I pulled out my old crock-pot, turned on my annealer and went to work.

BACK TO TESTING

Armed with this new information, I decided that the easiest way to accomplish most of my tests was to make simple beads. I could test compatibilities and easily control temperature, striking, flame atmospheres, flame annealing and oven annealing. Most importantly, I could easily move things to the crock-pot after they had been "selectively annealed."

The exceptions to this approach were the blowing tests and those involving long intervals of heat needed in marble making. For those tests I actually blew bubbles and made marbles. As it turns out, there are a few colors that don't like to be worked in high heat for long periods – more about those later.

For the blown bubble tests I used a 1/4" diameter, heavy wall, stainless steel pipe with a bulb pump and valve from a blood pressure apparatus. I connect the valve to the pipe with a length of surgical tubing and use the pump to blow the bubbles. For more on this setup, see my web page: <http://frittsartglass.com/articles/Blowpump.html>.

I had to decide at what temperature to set my annealer to do "selective" annealing. Since all annealers are not created equal, I'm not going to specify a temperature here. Rather, I'll suggest that you run some tests to determine the temperature that is best for your equipment. A lot of factors come into play when talking about temperatures in annealers, not least of which are the accuracy of the thermocouple / pyrometer and the size of the oven. Size will determine how much effect ambient and radiant heat have on the items being annealed.

I decided to set my annealer so that a piece of #381 Warm Yellow rod struck very slightly over a period of about two hours. This color is a good indicator because it strikes rapidly and put me on the low side of the annealing range. I wanted to be as close to the bottom of the annealing range as possible so that I didn't need to constantly check the progress of objects striking in the annealer.

COLOR-SPECIFIC NOTES

The following are my notes on each of the colors that were available at the time of this writing. To avoid repetitive text I'll start with some definitions that will be used throughout the descriptions of each color:

A Beginner's Guide to Glass Alchemy Colored Borosilicate

by Drew Fritts

1. Annealer Strike – One of the two ways to “selectively strike” a piece is to put it in the annealer for some period of time. In the descriptions below, this entry is used to indicate the color range possible if the object is placed in the annealer in its original rod color. If a piece is struck in the flame first, the results will vary.

To strike an object in the annealer, first use an oxidizing flame to heat the piece all the way to white hot to return it to its original rod color. Let the piece cool slightly, and then put it into the annealer. When it has reached the desired color in the annealer, move it to a crock-pot of vermiculite that is set on high, or to a holding oven that is set below the striking temperature.

2. Long Strike – The color of a rod after an 8-hour annealing cycle at 1000° F. as compared to the original rod color.
3. Flame Strike – Another way to “selectively strike” a piece is to use an oxidizing flame to build your piece and then use different flame atmospheres to affect color variations.
4. Striking Cycle – During the process of flame striking the piece is cooled slightly and then reheated in the flame. By “cooled slightly”, I mean that it is allowed to cool enough that the orange glow disappears completely. With each striking cycle the piece will get increasingly dark. If it goes too dark it can usually be reheated to white hot to return it to its original rod color and struck again, however this much heat will tend to deform sculptural pieces and may not be practical. Most of the striking colors can be heated back to their original rod color many times without ill effects. Exceptions will be noted under applicable colors.
5. Over Strike – The use of multiple striking cycles. Typically luster colors will give different results the more they are over struck.
6. Veil – a translucent haze or bloom of color within a piece that has been encased. It can be caused by fuming or bringing out lusters on the surface of a piece and then encasing it. The fumed or luster surface is what is seen as the “veil.”

104 – Red Crayon - Opaque medium red rod

Not a striking color.

Flame Atmosphere: Not affected

Encasing: Appears slightly lighter

Clarity: Contains lots of seed bubbles, many near the surface.

Blown Color: When blown thin it becomes translucent and the seed bubbles cause surface dimples so it should be encased to blow.

Trailing and Drawing: Draws down to about 2mm before becoming translucent. If layered over black it needs to be at least that thick or the black will show through. Trailing isn't good because of the seed bubbles.

Long Strike: Slightly darker, although almost imperceptible.

Additional Comments:

- If worked in a fairly cool flame the seed bubbles will normally recede and not cause a problem. Otherwise they cause surface dimples.
- Encase it to work hot because it boils easily.

106 – Indian Red Crayon - Opaque Reddish Brown rod

Not a striking color.

Flame Atmosphere: Oxidizing or Neutral. It will scum in a reducing flame.

Encasing: Appears slightly lighter

Clarity: Contains seed bubbles, many near the surface.

Blown Color: When blown it stays opaque unless very thin when it becomes translucent. The seed bubbles cause surface dimples so it should be encased to blow.

Trailing and Drawing: Draws down to about 1mm before becoming translucent. Trailing isn't good because of the seed bubbles.

Long Strike: No noticeable change.

Additional Comments:

A Beginner's Guide to Glass Alchemy Colored Borosilicate

by Drew Fritts

- If worked in a fairly cool flame the seed bubbles will normally recede and not cause a problem. Otherwise they cause surface dimples.
- Encase it to work hot because it boils fairly easily.

135 – Red Agate - Semi-Translucent Pinkish-Brown rod

Annealer Strike: Slightly darker reddish brown

Flame Strike: A fairly hard color to strike.

- Oxidizing flame: Carnelian red, similar to antique agate marbles. Requires *Over Strike* to achieve color.
- Neutral flame: Slightly lighter red than oxidizing flame. Again, requires *Over Strike*.
- Reducing flame: Brownish red

Striking Cycle: Hard to strike. Requires significant *Over Strike* to achieve proper color.

Encasing: Appears slightly lighter

Clarity: Contains seed bubbles, many near the surface.

Blown Color: Translucent pinkish red. The seed bubbles cause surface dimples so it should be encased to blow.

Trailing and Drawing: Does not draw or trail well. Stringers and trailing tend to be very lumpy.

Long Strike: Slightly darker reddish brown.

Additional Comments:

- If worked in a fairly cool flame the seed bubbles will normally recede and not cause a problem. Otherwise they cause surface dimples.
- Encase to totally avoid surface textures.

138 – Ruby Strike - Transparent Clear rod

Annealer Strike: Transparent dark ruby red – takes time.

Flame Strike: Not recommended. Flame striking causes translucent pinkish tan streaks. When subsequently annealed the streaks do appear ruby red, but they stay visible rather than allowing the piece to be transparent.

Striking Cycle: Strike to white hot and then “Annealer Strike”.

Encasing: No noticeable effect.

Clarity: Contains some micro bubbles but they don't hinder any of the working properties.

Blown Color: Works clear but strikes to a rich transparent red.

Trailing and Drawing: It trails and draws well although it can be hard to work because it works clear.

Long Strike: Necessary to anneal for a long time to achieve the best color, but not necessarily 8 hours. If under struck it stays clear with wispy transparent red streaks through the thickest portions.

Additional Comments:

- It's beautiful!

182 – Blush - Opaque Beige rod

Annealer Strike: Light to medium brown

Flame Strike: Not affected

Striking Cycle: Not hard to strike but requires *Over Strike* to achieve proper color.

Encasing: Appears slightly lighter

Clarity: Contains seed bubbles, many near the surface.

Blown Color: Opaque medium brown unless very thin. The seed bubbles cause surface dimples so it should be encased to blow.

Trailing and Drawing: Does not draw or trail well. Stringers and trailing tend to be very lumpy.

Long Strike: Slightly darker reddish brown.

Additional Comments:

- If worked in a fairly cool flame the seed bubbles will normally recede and not cause a problem. Otherwise they cause surface dimples.
- Encase to totally avoid surface textures.

204 – Orange Crayon - Opaque Bright Orange rod

Not a striking color.

Flame Atmosphere: Not affected

A Beginner's Guide to Glass Alchemy Colored Borosilicate

by Drew Fritts

Encasing: No noticeable effect.

Clarity: Contains lots of seed bubbles, many near the surface.

Blown Color: When blown thin it becomes translucent and the seed bubbles cause surface dimples so it should be encased to blow.

Trailing and Drawing: Draws down to about 2mm before becoming translucent. If layered over black it needs to be at least that thick or the black will show through. Trailing isn't good because of the seed bubbles.

Long Strike: Very slightly darker orange, although almost imperceptible.

Additional Comments:

- If worked in a fairly cool flame the seed bubbles will normally recede and not cause a problem. Otherwise they cause surface dimples.
- Encase it to work hot because it boils easily.
- It does not color shift to red in the flame or in the annealer.

304 – Yellow Crayon - Opaque Dark Yellow rod

Not a striking color.

Flame Atmosphere: Not affected

Encasing: No noticeable effect.

Clarity: Contains lots of seed bubbles, many near the surface.

Blown Color: When blown thin it becomes translucent and the seed bubbles cause surface dimples so it should be encased to blow.

Trailing and Drawing: Draws down to about 2mm before becoming translucent. If layered over black it needs to be at least that thick or the black will show through. Trailing isn't good because of the seed bubbles.

Long Strike: Very slightly darker yellow, although almost imperceptible.

Additional Comments:

- If worked in a fairly cool flame the seed bubbles will normally recede and not cause a problem. Otherwise they cause surface dimples.
- Encase it to work hot because it boils easily.
- It does not color shift to orange in the flame or in the annealer.

381 – Warm Yellow - Translucent Clear rod

Annealer Strike: Light yellow to dark reddish brown

Flame Strike: A variety of colors from light yellow to amber, to blues and even some purples.

- Oxidizing flame: Yellows and ambers
- Neutral flame: The same colors but with a slight purple luster on the surface
- Reducing flame: Light blue to purple luster

Striking Cycle: This color strikes quickly so for light yellows and ambers it must be reheated very lightly.

Encasing: Encasing over an oxidized yellow or amber will result in a *veiled* light yellow. Encasing over a reduced blue or purple will result in a gorgeous *veiled* pinkish orange.

Clarity: Contains micro bubbles but they don't hinder most of the working properties.

Blown Color: Very pale transparent yellow. The micro bubbles cause a slight surface texture when blown thin so it should be encased for blowing.

Trailing and Drawing: It trails and draws well but is too light to be useful to me in that form.

Long Strike: Continued darkening, and in rod form the color anneals to an extremely dark reddish brown.

Additional Comments:

- It can fume lightly over adjacent colors if not encased.
- If a reducing rather than oxidizing flame is used to build the piece the resulting color will be a dirty caramel color – not too appealing. However, if this color is encased it turns to a very nice milky cream color.
- This color doesn't tolerate long heating sessions, like those needed for large marbles, and turns milky cream color. Once this occurs there is no way I've found to strike it back to clear and start over.

383 – Silver Strike 3 - Translucent Milky rod

Annealer Strike: Medium yellow to chocolate brown

Flame Strike: A variety of colors from medium yellow to oranges, pinks and even some purples.

A Beginner's Guide to Glass Alchemy Colored Borosilicate

by Drew Fritts

- Oxidizing flame: deep yellows, ambers and reddish orange. *Over Striking* can also achieve pink and light purple lusters.
- Neutral flame: The same colors as an oxidizing flame but with the addition of a slightly green luster when *Over Striking*.
- Reducing flame: Light bluish-green to purple luster when *Over Striking*.

Striking Cycle: This color strikes fairly quickly.

Encasing: Encasing over deep yellow or amber will result in a *veiled* light yellow. Encasing over bluish-green or purple will result in a gorgeous *veiled* deep pinkish orange with blue overtones.

Clarity: Very smooth.

Blown Color: Rich transparent yellow with luster.

Trailing and Drawing: It trails and draws well.

Long Strike: Continued darkening, and in rod form the color anneals to a rich chocolate brown.

Additional Comments:

- It tends to fume over adjacent colors if not encased.
- If a reducing rather than oxidizing flame is used to build the piece the resulting color will be a striated milky caramel.
- This color doesn't tolerate long heating sessions, like those needed for large marbles, and turns milky tan. Once this occurs there is no way I've found to strike it back to clear and start over.

385 – Silver Strike 5 - Semi-Translucent Tan rod

Annealer Strike: Tan to a nice dark caramel

Flame Strike: A variety of colors from medium brownish orange, to caramels and even lavender.

- Oxidizing flame: Brownish orange to reddish brown with green and lavender highlights. *Over Striking* can achieve many variations.
- Neutral flame: Similar to oxidizing flame.
- Reducing flame: Similar to oxidizing flame. Very nice lavender possible.

Striking Cycle: *Over Striking* is necessary for most of the possible effects.

Encasing: Encasing over brownish orange will result in a *veiled* light orange. Encasing over lavender or multi-effects tends to result in a *veiled* pinkish orange with some blue overtones.

Clarity: Very smooth.

Blown Color: Rich transparent pinkish orange with luster.

Trailing and Drawing: It trails and draws well.

Long Strike: Continued darkening, and in rod form the color anneals to a dark caramel.

Additional Comments:

- It fumes over the entire piece if not encased.
- If a reducing rather than oxidizing flame is used to build the piece the resulting color will be a striated greenish gray – not a pretty color.
- This color doesn't tolerate long heating sessions, like those needed for large marbles, and turns greenish gray. Once this occurs there is no way I've found to strike it back to clear and start over.

386 – Purple Luster - Translucent Clear rod

Annealer Strike: Light yellow to dark burgundy

Flame Strike: A variety of colors from light yellow to pinks, reds, blues, blue green and deep purples.

- Oxidizing flame: Yellows, pinks, and dark reds with blue and purple lusters
- Neutral flame: Deep blue to purple luster
- Reducing flame: Blue green to purple luster

Striking Cycle: This color strikes quickly so for light yellows it must be reheated very lightly.

Encasing: Encasing over a blue or purple will result in a gorgeous *veiled* pinkish red with blue highlights.

Encasing over blue green will result in pinkish red with a milky *veil*.

Clarity: Contains micro bubbles but they don't hinder any of the working properties.

Blown Color: Rich transparent caramel with purple highlights and luster.

Trailing and Drawing: It trails and draws well.

Long Strike: Continued darkening, and in rod form it turns such a dark red that it is virtually black.

Additional Comments:

- It tends to fume lightly over adjacent colors if not encased.

A Beginner's Guide to Glass Alchemy Colored Borosilicate

by Drew Fritts

- If a reducing rather than oxidizing flame is used to build the piece the resulting color will be a dirty greenish gray – not too appealing.
- It's gorgeous glass

388 – Caramel - Translucent Light Yellow rod

Annealer Strike: Light yellow to dark reddish brown

Flame Strike: A variety of colors from dark amber to pinks, blues, purples and turquoise.

- Oxidizing flame: Ambers, caramels and pinks with blue lusters
- Neutral flame: Caramels with purple luster
- Reducing flame: Blue green to purple luster

Striking Cycle: *Over Strike* creates some very nice effects to a point. If carried on too long the luster turns to a grayish white coating that won't go away easily.

Encasing: Encasing over a blue or purple will result in a *veiled* caramel red with blue highlights. Encasing over caramel results in a *veiled* caramel with milky highlights. Encasing over blue green results in a gorgeous *veiled* caramel red with blue green highlights.

Clarity: Contains a few micro bubbles but they don't hinder any of the working properties.

Blown Color: Rich transparent yellow with purple highlights.

Trailing and Drawing: It trails and draws well.

Long Strike: Continued darkening, and in rod form it turns a very dark reddish brown.

Additional Comments:

- It tends to fume lightly over adjacent colors if not encased.
- If a reducing rather than oxidizing flame is used to build the piece the resulting color will be a striated tan and off-white.
- This color doesn't tolerate long heating sessions, like those needed for large marbles, and turns grayish white. Once this occurs there is no way I've found to strike it back to clear and start over.

406 – Olive Green - Opaque Medium Olive Green rod

Not a striking color.

Flame Atmosphere: Not affected

Encasing: Appears slightly lighter

Clarity: Contains seed bubbles, many near the surface.

Blown Color: Stays opaque unless very thin. It then becomes translucent. The seed bubbles cause surface dimples so it should be encased to blow.

Trailing and Drawing: Draws down to about 2mm before becoming translucent. If layered over black it needs to be at least that thick or the black will show through. Trailing isn't good because of the seed bubbles.

Long Strike: Slightly lighter and more yellow, although almost imperceptible.

Additional Comments:

- If worked in a fairly cool flame the seed bubbles will normally recede and not cause a problem. Otherwise they cause surface dimples.
- Encase it to work hot because it boils easily.

421 – Phthalo Green - Transparent Bluish Green rod

Not a striking color.

Flame Atmosphere: Oxidizing or Neutral flame. Reddish brown streaks form in a reducing flame.

Encasing: No noticeable effect.

Clarity: Very clean

Blown Color: Nice light shade when blown thin.

Trailing and Drawing: Draws and trails well.

Long Strike: No noticeable effect.

Additional Comments:

- Very pretty color

431 – True Green - Transparent Light Green rod

Not a striking color.

Flame Atmosphere: Oxidizing or Neutral flame. Reddish brown streaks form in a reducing flame.

A Beginner's Guide to Glass Alchemy Colored Borosilicate

by Drew Fritts

Encasing: No noticeable effect.

Clarity: Very clean

Blown Color: Very, very light shade when blown thin.

Trailing and Drawing: Draws and trails well but is too light to be useful to me in that form.

Long Strike: Loses just a little yellow and actually becomes slightly "greener".

Additional Comments:

- I'd like to see this color in a higher saturation.

481 – Spring Luster - Transparent Yellow Green rod with Blue Highlights

Annealer Strike: Yellow green to dark reddish brown

Flame Strike: Any color that can be found in a peacock's neck or tail.

- Oxidizing flame: Yellows and greens with rich blue overtones. Stays transparent
- Neutral flame: Same as oxidizing except the blues start to lighten and come out as lusters.
- Reducing flame: Turquoise lusters. If too much *Over Strike* is used nice pinkish tan striations appear.

Striking Cycle: *Over Strike* creates some very nice effects.

Encasing: Encasing really makes this color come alive. It simply intensifies the mix of colors that are present in the glass. Any of the effects, when encased, give a multicolored *veil* with a transparent yellow green base.

Clarity: Contains a few bubbles here and there but they don't hinder any of the working properties.

Blown Color: Bright yellow green.

Trailing and Drawing: It trails and draws well.

Long Strike: Continued darkening, and in rod form it turns a very dark root beer brown.

Additional Comments:

- It fumes over adjacent colors if not encased.
- If a reducing rather than oxidizing flame is used to build the piece the resulting color will be a striated pinkish tan and opal turquoise.
- Absolutely gorgeous glass!
- This color doesn't tolerate long heating sessions, like those needed for large marbles, and turns gray-green. Once this occurs there is no way I've found to strike it back to clear and start over.

512 – Cobalt 2 - Transparent Cobalt Blue rod

Not a striking color.

Flame Atmosphere: Oxidizing or Neutral flame. Scum forms in a reducing flame.

Encasing: No noticeable effect.

Clarity: Very clean

Blown Color: Nice rich blue when blown thin.

Trailing and Drawing: Draws and trails well.

Long Strike: No noticeable effect.

Additional Comments:

- What I consider standard cobalt blue rod

514 – Cobalt 4 - Transparent Dark Cobalt Blue rod

Not a striking color.

Flame Atmosphere: Oxidizing or Neutral flame. Scum forms in a reducing flame.

Encasing: No noticeable effect.

Clarity: Very clean

Blown Color: Very rich blue when blown thin.

Trailing and Drawing: Draws and trails well.

Long Strike: No noticeable effect.

Additional Comments:

- None

515 – Cobalt 5 - Transparent Very Dark Cobalt Blue rod.

Not a striking color.

A Beginner's Guide to Glass Alchemy Colored Borosilicate

by Drew Fritts

Flame Atmosphere: Oxidizing or Neutral flame. Scum forms in a reducing flame.

Encasing: No noticeable effect.

Clarity: Very clean

Blown Color: Very dark blue when blown thin.

Trailing and Drawing: Draws and trails well.

Long Strike: No noticeable effect.

Additional Comments:

- So dark it is virtually black.

517 - Royal Blue - Transparent Medium Blue rod.

Not a striking color.

Flame Atmosphere: No noticeable effect.

Encasing: No noticeable effect.

Clarity: Very clean

Blown Color: Very pale blue when blown thin.

Trailing and Drawing: Draws and trails well but is too light to be useful to me in that form.

Long Strike: Lightens very slightly

Additional Comments:

- A bright blue with lots of reflectance

521 – Phthalo Blue - Transparent Blue Gray rod.

Not a striking color.

Flame Atmosphere: Oxidizing or Neutral flame. Reddish brown streaks form in a reducing flame.

Encasing: No noticeable effect.

Clarity: Very clean

Blown Color: Very pale blue gray when blown thin.

Trailing and Drawing: Draws and trails well but is a little too light for me in that form.

Long Strike: Lightens slightly on the aqua side

Additional Comments:

- Almost an aqua blue

531 - Teal - Transparent Blue Green rod.

Not a striking color.

Flame Atmosphere: Oxidizing or Neutral flame. Reddish brown streaks form in a reducing flame.

Encasing: No noticeable effect.

Clarity: Very clean

Blown Color: Very pale blue green when blown thin.

Trailing and Drawing: Draws and trails well but is too light to be useful to me in that form.

Long Strike: Lightens slightly

Additional Comments:

- None

592 – Brilliant Blue - Transparent Bright Blue rod.

Not a striking color.

Flame Atmosphere: No noticeable effect.

Encasing: No noticeable effect.

Clarity: Fairly clean – some micro bubbles but they don't affect any of the working properties.

Blown Color: Pale blue when blown thin. It shows faint wisps of color as though the color isn't mixed completely in the rod.

Trailing and Drawing: Draws and trails well but is fairly light.

Long Strike: Lightens slightly

Additional Comments:

- Well-named color. It is very bright, has a lot of reflectance and violet overtones.

597 – Blue Luster - Transparent Blue rod

Annealer Strike: Blue to dark reddish orange

A Beginner's Guide to Glass Alchemy Colored Borosilicate

by Drew Fritts

Flame Strike: Some yellows and greens but primarily blues, aqua and turquoise.

- Oxidizing flame: Some greens but mostly blues and turquoise. Worked quickly it can be made to stay transparent, but normally appears as opals.
- Neutral flame: Opal blues, turquoise and striated light gray-green.
- Reducing flame: Same colors as Neutral flame. Metallic luster possible.

Striking Cycle: A little *Over Strike* creates some very nice effects. Too much causes mostly gray-green.

Encasing: Encasing brings out multicolored effects of *veiled* yellows and greens with blue overtones.

Clarity: Contains micro bubbles but they don't hinder any of the working properties.

Blown Color: Very pale blue green.

Trailing and Drawing: It trails and draws well.

Long Strike: Continued darkening, and in rod form it turns a dark reddish orange.

Additional Comments:

- It fumes over the entire piece if not encased.
- If a reducing rather than oxidizing flame is used to build the piece the resulting color will be a striated gray-green and opal turquoise.
- This color doesn't tolerate long heating sessions, like those needed for large marbles, and turns gray-green. Once this occurs there is no way I've found to strike it back to clear and start over.

672 – Blue Violet - Transparent Light Purple rod.

Not a striking color.

Flame Atmosphere: No noticeable effect.

Encasing: No noticeable effect.

Clarity: Very clean

Blown Color: Very pale gray with purple overtones

Trailing and Drawing: Draws and trails well but is too light to be of use in that form.

Long Strike: Loses some of the blue and becomes a light rose violet.

Additional Comments:

- None

775 – Black Plum - Transparent Dark Rose Violet rod.

Not a striking color.

Flame Atmosphere: No noticeable effect.

Encasing: No noticeable effect.

Clarity: Very clean

Blown Color: Pale gray with rose violet overtones

Trailing and Drawing: Draws and trails well but is too light to be of use in that form.

Long Strike: Loses some of the blue and becomes a dark "old" rose.

Additional Comments:

- None

860 – Warm Brown 5 - Transparent Root Beer rod.

Not a striking color.

Flame Atmosphere: Oxidizing or Neutral flame. Grayish brown streaks form in a reducing flame.

Encasing: No noticeable effect.

Clarity: Very clean

Blown Color: Pale root beer

Trailing and Drawing: Draws and trails well but is fairly light.

Long Strike: No noticeable effect.

Additional Comments:

- None

864 – Sienna Brown - Transparent Light Sienna rod.

Not a striking color.

Flame Atmosphere: No noticeable effect.

Encasing: No noticeable effect.

A Beginner's Guide to Glass Alchemy Colored Borosilicate

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Clarity: Very clean

Blown Color: Pale sienna, almost peach

Trailing and Drawing: Draws and trails well but too light to be of use in that form.

Long Strike: No noticeable effect.

Additional Comments:

- Very pretty color – has peach overtones and a lot of reflectance.

931 – Black (Green) - Black rod.

Not a striking color.

Flame Atmosphere: Oxidizing or Neutral flame. Turns gray and boils in a reducing flame.

Encasing: No noticeable effect.

Clarity: Very clean

Blown Color: Very dark forest green

Trailing and Drawing: Draws and trails well if you want forest green, but it's not black.

Long Strike: Lightens but still looks black in rod form or with thickness.

Additional Comments:

- None

974 – Black (Violet) - Black rod.

Not a striking color.

Flame Atmosphere: Oxidizing or Neutral flame. Gray streaks form in a reducing flame.

Encasing: No noticeable effect.

Clarity: Fairly clean. Some micro bubbles, but they're only apparent when blown thin.

Blown Color: Very dark rose violet. Micro bubbles cause surface dimples so it should be encased to blow.

Trailing and Drawing: Draws and trails well if you want dark rose violet, but it's not black.

Long Strike: No noticeable effect.

Additional Comments:

- I use this color for black based marbles because it's not as sensitive to atmosphere as either 931 – Black (Green), or 993 – Black (Blue)

993 – Black (Blue) - Black rod.

Not a striking color.

Flame Atmosphere: Oxidizing or Neutral flame. Turns gray in a reducing flame.

Encasing: No noticeable effect.

Clarity: Very clean

Blown Color: Very dark blue with purple overtones

Trailing and Drawing: Draws and trails well if you want dark blue violet, but it's not black.

Long Strike: No noticeable effect.

Additional Comments:

- A very nice opaque charcoal gray can be made by reducing this color.

CONCLUSION

I was able to answer most of the questions I had at the outset of this project. I found that all of the colors I tested appear to be completely compatible with Pyrex® as well as with other GA colors. The working characteristics of the colors are consistent and well defined, and I tried to document these as best I could. However, your opinion may vary depending on your experience level with borosilicate glass.

With regard to whether the striking colors are random or repeatable, I'd have to say they are both. The more basic striking colors like the red agate, ruby strike, and blush are consistent and repeatable. Within the group of silver striking and luster colors, including warm yellow and caramel, "effects" are definitely repeatable but specific colors will take some practice. Armed with my observations about flame atmosphere you should be able to get very close, but half the fun of these colors is in the random effects that they can generate.

A Beginner's Guide to Glass Alchemy Colored Borosilicate

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Most of the colors were not affected by long periods of heating in the torch. However, the silver striking and luster colors are the exception. These colors are most brilliant when they are not overworked. Used in beads and small marbles of 1" or less, I had some great results with these colors because the working time was short enough. However, when used in a large marble that takes multiple reheats due to layering, twisting, or just the mass of glass involved, these colors tend to strike to an opal tan to greenish gray color. My attempts to get this color to strike back to clear, so that it could then be struck in the annealer, were futile.

Finally, the big question was whether someone with little borosilicate experience could achieve specific effects consistently using this glass. The answer is a resounding "Yes"! After learning how to handle striking and annealing these colors I'm confident that other newcomers to colored borosilicate, as well as seasoned veterans, can also achieve excellent, consistent results with these new rods from Glass Alchemy, Ltd.

ABOUT THE AUTHOR

Drew Fritts has been working with hot glass since 1994. His marbles are sold in galleries nationwide and are in numerous collections around the world.

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