Rutile Blue

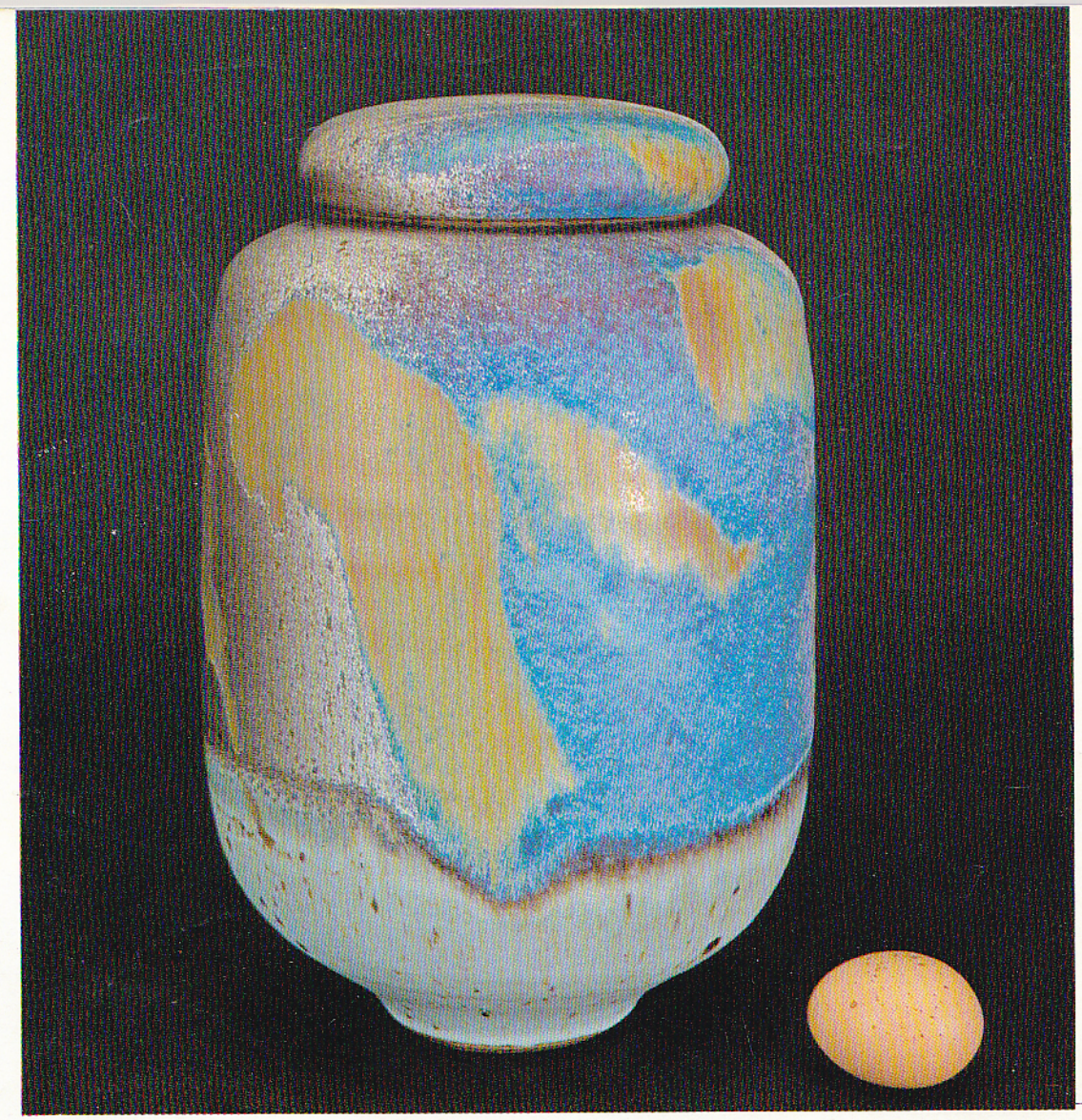
by Peter Shrope

Rutile has long been included in glazes to produce a variety of colors and visual textures. Because of its iron and (trace) vanadium content, the colors most commonly obtained with rutile are in the orange, tan and brown ranges. Rutile's titanium content is refractory and acts as an opacifier, making an ordinarily transparent glaze reflect less light and hence become more matt in appearance. Typical rutile glazes exhibit mottled textures, and for this reason they are popular in the commercial tile industry. In a reducing atmosphere, rutile glazes also yield blue gradations. Varying from a deep purple to a soft violet, rutile blues are brilliant, yet warmer than the typical cobalt blue; they are often mottled, sometimes with tans and browns. These colors are the result of an abundance of rutile in a clear, high-temperature glaze. Additions from 6 to 10% are usually sufficient.

The development of the rutile blue is similar to that of copper red in that it is related to an alumina/silica ratio of at least 1:7. When the silica content is 7 to 10 times that of the alumina, there is a tendency for more of the silica to enter into the glaze melt, making it fluid and transparent. In a reducing atmosphere, the resulting chemical changes in copper and rutile affect these minerals' valences—the change in molecular structure alters the spectrum of light reflected from the fired glaze. Copper changes from cupric oxide (CuO) to metallic copper (Cu) in reduction, causing the color change from green to red. Iron, on the other hand, changes from ferric iron (Fe_2O_3) to ferrous iron (FeO) in reduction, resulting in color ranges from brown to green (celadon). Glazes with low alumina/high silica contents produce blues when saturated with black iron oxide. Tests indicate that during a high-temperature melt, rutile enters into a eutectic with the silica, and loses some of its titanium content, leaving only the iron to be affected by the atmosphere. When rutile is subjected to a reducing atmosphere, its valence is altered, thus causing the color blue rather than brown or tan to be reflected. Some rutile recipes follow:

"Fat-Lipped Bowl," 5½ inches in height, thrown porcelain, with rutile/iron slip decoration.

Photos: Bruce F. Levin, Martha Mae Emerson and the author



"Cosmological Jar," 13 inches in height, thrown, with rutile blue glaze.

Rutile/Iron Slip

Feldspar	25%
Ball Clay	25
Kaolin	25
Flint	25
	100%
Add: Red Iron Oxide	25%
Rutile	50%

Rutile Blue Glaze I (Cone 11, reduction)

Custer Feldspar	28.9%
Whiting	20.6
Edgar Plastic Kaolin	18.9
Flint	31.6
	100.0%
Add: Rutile	7.0%

Rutile Blue Glaze II (Cone 10, reduction)

Dolomite	15.8%
Custer Feldspar	30.0
Whiting	11.1
Edgar Plastic Kaolin	16.8
Flint	26.3
	100.0%
Add: Rutile	8.0%

The amount of reduction when the glaze is at its peak melting temperature is important. Medium reduction will result in pale violet while heavier amounts will give rich, dark purple-blues. The percentages of rutile as well as the glaze formula will also contribute to slight variations of color. The clay body also affects color development. In most brown stoneware bodies the presence of additional iron in the clay contributes to deeper blues. On most porcelain bodies, however, the white background does not help promote blue, making it more difficult to attain. When firing rutile blues on porcelain, more glaze reduction is necessary to obtain results similar to that which medium reduction would produce on a darker stoneware body. With porcelain, the results tend to be more violet than blue.

A versatile material, rutile can give the potter a wide range of colors at high temperatures.

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