

# GLAZE.PPT

1) What is glaze? Glaze is ground minerals in a liquid suspension that will melt when fired high enough.

2) What is the function of glaze? The function of glaze is:

- a) to seal the pores of the clay;
- b) to create a surface or texture, (usually glassy);
- c) to provide color; and
- d) to make a pot more resistant to acid.

3) What are the components of glaze and their function in the glaze?

- a) Silica is a glass former.
- b) Alumina is a stabilizer, it promotes viscosity and hardness and durability.
- c) Fluxes promote melting. This is necessary since silica and alumina have very high melting points. Silica and alumina are the most refractory materials.
- d) Oxides/Stains are for color. Depends on firing atmosphere other glaze materials (acidity).
  - 1—Iron: brown, tomato red, orange, yellow
  - 2—Copper: green, red
  - 3—Cobalt; blue (strongest color/go easy and most refractory)
  - 4—Rutile: yellow, tan, streaky blue (popsicle)
  - 5—Manganese: brown, black, bronze, pink/purple
  - 6—Chrome: green, brown, pink
  - 7—Umber: walnut brown
- e) Opacifiers make a glaze less transparent. (Ex. Tin, zircopax, zinc)

*Silica and alumina are elements. It is rare that a required glaze component is an element. The necessary ingredients are obtained by grinding minerals composed of a variety of compounds. Studying their chemical formula reveals they contain a wide range of the necessary elements for a glaze. Glaze ingredients are like cooking recipes. The materials you choose "flavor" the results. It is possible to substitute ingredients to alter the effect. Glaze history is a long story of trial and error dependent on the availability of locally found materials.*

4) Where does silica come from?

- a) On the East Coast it comes from flint.
- b) On the West Coast it comes from silica, grinding sand or quartz.

5) Where does alumina come from? Most frequently, it comes from kaolin (i.e. clay). It can also from pure alumina oxide or alumina hydrate.

6) Where does flux come from? Flux is the most complicated component of glaze because there are many materials that will flux. The lowest temperature flux is borax. Since it is very active, not much is used because it causes glazes to run too much. The most common flux is **feldspar** because it is very stable. Feldspar is a rock that has all the components of a glaze. Usually it is better at higher temperatures. Other fluxes are nepheline syenite, whiting, dolomite, talc, bone ash, spodumene, cornwall stone, wollastone, zinc, barium, tin... and frits. The flux is the component that is most responsible for the character of a glaze.

7) **What are frits?** Frits are man made fluxes that is a mixture of minerals bound with silica designed to melt at a specific temperature. They are designed to avoid the discrepancies of naturally found materials. They are identified most by numbers, the ones we use most are 3124 and 3134 and 25.

8) **Why use frits?**

•Frits were designed to be stable. They usually have a wide melting range. They are safer than some ingredients because they bond or encapsulate the dangerous toxins with silica. They're reliable and predictable. Despite the higher cost, industry uses them extensively because there are fewer mishaps.

9) **What are the 2 firing atmospheres?**

- a) Oxidation
- b) Reduction

10) **What does the kiln atmosphere do to the clay and glaze?**

Oxides and clay bodies are chemically transformed resulting in darker, more muted colors sometimes even dramatic changes; such as copper green turning red. Many glazes become more active in the reduction firing. The reduction firing slows the firing down and results in a more thorough heat melt. Along with the blend of fluxes, the kiln atmosphere plays a major role in the results of the glaze.

11) **What is the firing atmosphere of the following kilns?**

- a) All electric kiln – oxidation, the kiln that has cleanest atmosphere
- b) Our raku kiln/in kiln or barrel – reduction (light, heavy or complete)
- c) Our cone 10 kiln – reduction, can also be fired with light reduction
- d) A pit fire – variable, oxidizing and reducing, or all reduction

12) **How do you achieve a reduction atmosphere?** Reduction is achieved in fuel burning kilns by decreasing the oxygen by closing the openings that provide oxygen and/or by increasing the fuel so the fire is seeking oxygen. Sometimes when you reduce, smoke is produced which goes into the glaze and clay body (graying it).

13) **How do we describe glaze?** By the different glaze surfaces, such as;

- a) Matt – not shiny
- b) Glossy – shiny
- c) Satin – semi-shiny
- d) Transparent – see thru
- e) Translucent -- barely see thru
- f) Opaque – can't see thru
- g) Textural (visual or actual)

14) **What happens when glaze is fired too low?** It will be matt; the ingredients won't melt.

15) **What happens when glaze is over fired?** The glaze will run. Some glazes are more stable than others. When a glaze is applied thickly and over fired, it is likely to run badly.