ART 186 - INTRO TO CERAMICS

TYPES OF CLAYS, GEOLOGIC ORIGINS, WORKING PROPERTIES

GEOLOGIC ORIGIN OF CLAY

Clay is a mineral 'stew' that is the result of the erosion of the earth's crust over vast spans of time. What was originally the mineral feldspar in igneous rocks, primarily granite, breaks down over time and becomes the microscopically fine-particled clay that we form with our bare hands. How this transformation takes place is a matter of geology and time. The effects of erosion over enormous spans of time cause igneous rocks to disintegrate, and the feldspar content is altered to kaolinite, which is the identifying substance in clay. Those clay deposits which remain at or near the site of the parent material (granite) are called residual or primary clays. These so-called residual clays are grainy and lack the smoothness necessary for workability. These clays are said to be non-plastic because they do not shape easily. Those clays which have been transported by water, wind, and ice and deposited in locations distant from the source material are called sedimentary or secondary clays.Compared to residual clays, sedimentary clays are more plastic, and the particles are smaller, more uniform, and more mixed with other materials. Under the microscope, clay particles resemble playing cards in form. They are flat, hexagonal, and thin, like cards. When wet, the particles can 'slip' across each other, as in a deck of cards. This ability to 'slip' is what gives a clay its workability, called plasticity. So, to summarize, potters need plastic clays for wheel throwing and hand building. Mining companies explore the world to find natural deposits of clays to mine and blend for sale to industry and to studio potters.

TO SUMMARIZE:

FELDSPAR IN IGNEOUS ROCKS

breaks down to

SEDIMENTARY CLAYS MIXED WITH OTHER MATERIALS

which are blended into CLAY BODIES

CLAY BODIES

Rarely do potters use a single, sedimentary clay as a working clay. Experience has taught that even better results are obtained when several different clays are blended together. Such a blended clay is called a clay body. By blending, potters could vary the color and texture of their clays as well. There are two general categories of clay bodies:

EARTHENWARE CLAYS	STONEWARE/PORCELAIN CLAYS
Firing temperature rarely exceeds 2050 degrees F.	Firing temperature is from 2050-2400 degrees F.
Clay color ranges from white to terra cotta (brick red)	Clay color ranges from white (Porcelain) to brown (Stoneware)
Texture varies from smooth to rough	Texture varies from smooth (Porcelain, no GROG) to coarse (Stoneware, contains GROG)

Note that the primary difference between the categories is the maximum firing temperature possible. Earthenware clays will MELT if fired to the higher temperatures of stoneware and porcelain. This is extremely important to know when purchasing clay for use. A wrong choice will result in all your work melting in the kiln, ruining what you have made. But that's only the beginning of the disaster. Your pieces will melt onto our kiln shelves, fusing into them at extremely high temperatures. You will destroy the kiln shelf at a cost of $100.00 each!. You will be responsible for this damage. Your pieces will also melt onto people's work in the kiln, ruining them as well. It is impossible to put a price tag on this loss, but you will not be popular in the class if this happens. Avoid the problem by only using the clays sold by the bookstore.

Note that another difference in clays is color. Clays that are tan, brown or brick in color contain iron oxide (terra cotta and stoneware) as the coloring agent. Clays that lack iron oxide are gray to white in color (porcelain).

Note that another difference in clays is texture. Clays vary in particle size, and some are much coarser than others. Frequently coarser clay bodies contain a particulate additive called grog which gives the body roughness. Porcelain clays have little or no grog. Stoneware clays usually have some. Earthenware clays may or may not have grog, so this difference alone does not help us distinguish low- from high-temperature clays. Grog is commonly either sand or fired clay which has been crushed and sized. Lacking the microscopic size and shape of clay particles, grog decreases the plasticity of the clay body, but it does have a beneficial effect on shrinkage. Since it is not clay, grog does not shrink as clay does. Therefore, its presence in clay reduces the overall shrinkage rate of the clay; more grog = less shrinkage, less grog = more shrinkage. So, the presence of a small amount of grog in a clay body may be a good thing. It reduces the shrinkage, yet if not used in too great amounts, it will not significantly reduce plasticity. Porcelain clays lack grog, and consequently have the highest shrinkage rate, making them extremely difficult for

inexperienced potters to use. Most of your work will crack in drying. I do not recommend beginning with porcelain for this reason.

DIFFERENCES IN CLAY BODIES AFTER FIRING

EARTHENWARE	STONEWARE/PORCELAIN
porous	**non-porous**
somewhat fragile	**less fragile**
often lead glazed, especially in the past	**never lead glazed****
brighter color range possible	**more muted colors possible**

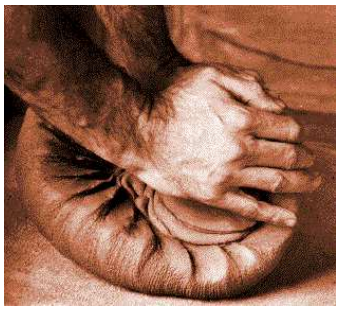
(commercial china sometimes has a low temperature lead glaze on a stoneware or porcelain bisque)**

POROSITY refers to the ability of a material to absorb water. Earthenware pieces, having been fired to a lower temperature, do not fully mature, or vitrify, and as such, allow water to slowly pass through the wall of the pot. The higher the firing temperature, the less water can pass through, so earthenware fired near the 2000 degree temperature will exhibit little porosity, especially if they are glazed. Conversely, pieces fired low, such as red clay planters, fired around 1200 degrees F. will exhibit pronounced porosity. At the extremely high temperatures that Stoneware and Porcelain are fired, little, if any porosity is noticed, even if the pot is unglazed.

Just as higher temperatures yield greater water retention, pots fired at stoneware/porcelain temperatures are much stronger and durable for everyday usage. Additionally, as temperatures increase, colors are driven from the glaze, so that fewer colors are possible at higher temperatures.

In this class, we will be using two clays, both stonewares:

B-MIX WITH SAND is a stoneware that is unusual in that it contains little iron oxide, yielding a stoneware that is uncharacteristically white in color. This clay does contain some grog, which is helpful in reducing the cracking common in light colored clays. B-Mix is a good clay for wheel throwing or hand-building.



LONG BEACH STONEWARE is a darker stoneware, containing iron oxide and grog. It is an excellent wheel and slab clay.
