

## Clay

Clay is the very common but unique material that makes ceramics and sculpture possible.

It should not be confused with soil- a combination of clay, sand, humus (partially decayed vegetable matter), and various other minerals.

**Clay:** A decomposed granite- type rock. To be classed as clay, the decomposed rock must have fine particles so that will be plastic.

**Note.** Clays should be free of vegetable matter but will often contain other impurities, which affect their colour and firing temperatures.

### Classified types of clays

**Ball clays:** extremely fine-grained, plastic, sedimentary clay. Although ball clay contains much organic matter, it fires white or near white in colour. It is usually added to white ware bodies to increase plasticity.

**Fire clays:** clay having a slightly higher percentage of fluxes than pure clay (kaolin).

It fires tan or gray in colour and is used in the manufacture of refractory materials, such as bricks and muffles for industrial glass.

It is often quite plastic and may be used by the studio potter as ingredient of stoneware.

**Slip clay-** naturally contain sufficient fluxes to function as a glaze with little or additions. They usually have a long firing range and few surface defects.

**Kaolin-** is a very pure form of clay, also known as china clay.

It is used in glaze.

It fires pure white in colour and only at very high temperatures.

**Stoneware-** are generally very plastic and fire in the middle range of temperatures. Depending upon the atmospheric conditions of the firing, the colour will vary from buff to gray.

**Earthenware-** characterized by their deep reddish brown colour and a high porosity that result from their lower firing range.

**Note:** these qualities make earthenware popular with sculptors and hand builders.

### Clay bodies

1. Clay bodies is completely satisfactory for the potter rarely occur in nature.
2. The clay may not be plastic enough, may have an unattractive colour or may not fire at

the desired temperature. Thus, it is usually necessary to mix clays in order to achieve a workable body.

### Types of clay bodies

A. **Earthenware bodies:** characterized by their deep reddish brown colour and a high porosity that results from their lower firing range.

B. **Stoneware bodies:** there is little difference between stoneware and a porcelain body:

Except for the presence of small quantities of iron and other impurities that color the stoneware and reduce its firing range.

Generally are much more plastic than porcelain.

Better suited for throwing and hand building techniques.

C. **Porcelain bodies:** the highest- firing category of ceramic wares.

Characterize by smooth texture, uniform white colour and ability to accept fine detail.

They are relatively non-plastic. For increase plasticity, some ball clay is generally added resulting in a higher shrinkage rate.

### Test for clay bodies

**Plasticity** is essential to any clay body.

A standard, simple test for plasticity is to loop a pencil-size roll of clay around your finger. If the coil cracks excessively, the clay is probably not very plastic.

Wedging, a process by which the clay is kneaded by hand to remove air pockets, has considerable effect in increasing plasticity.

Water of plasticity refers to the amount of water need to bring a dry, powdered clay into a plastic state.

**Porosity** of a fired clay body is directly related to hardness and verification of the clay.

#### To make a porosity test:

- i. Weigh an unglazed fired clay sample.
- ii. After an overnight soak in water, wipe the sample clean of surface water, and weigh it a second time.

The percentage gain in weight will be the porosity of the clay body.

A higher firing will reduce the porosity, but normally a specific firing temperature will have been

chosen.

**Shrinkage** of the clay body occurs first as the clay dries in the air and then again as the form is biscuit and glazed fired. The more plastic clays will always shrink the most.

**The test for shrinkage is quite simple:**

- a. First, roll out a plastic clay slab, and either cut or mark it to a measure.
- b. When the slab is totally dry, take a second measurement.
- c. Make a final measurement after firing.

### **Preparation of clay**

If a coil of moist clay crack excessively when wound around the finger, it probably is not suitable for forming.

Often sand will cause this cracking. It can be removed by adding water to the body to make a slip and allowing the sand to settle out. But the procedure may require more effect than it is worth as such sorting out impurities like glass, grass roots etc.

Wedging is important process in clay preparation. The clay is kneaded to force out air bubbles. The larger the clay mass, the greater the physical strength required.

The clay should be softer than desired for forming, because some moisture is lost in the wedging process.

Wedging the clay mass with firm pressure from the heel of your hand to compress the clay.

The rocking motion with a slight twist keeps the clay from flattening on the table.

This pressing, rocking and twisting will create a straight effect, bringing all portions of the clay into contact with the surface and bursting trapped air bubbles.

Use a wire strung will help to cut the mass of well wedged clay into smaller pieces. The wire also aids in mixing a stiff mass of clay with softer body.

Repeat this cutting and throwing operation several times, and then wedge the clay in the usual manner to obtain a uniform consistency.

Depending upon the type of work, it may be necessary to wedge grog into the clay body.

Grog (fired clay crushed to fine particles) helps plastic clay to "stand up," prevents sagging and lessens the chances of thick walls cracking.

Grog should be wedged into the body in small quantities. Dust thin layers of type needed onto the surface, and wedge until it is evenly distributed through the body.

## **Clay preparation methods:**

### **The plastic method**

It is used extensively in the brick industry and pottery.

It makes use of the moisture available in the clay as delivered.

If clay is too dry, water is added. The process is simple and cheap and requires no equipment.

The mixed clay can be used directly for forming products by coiling, slab construction and pinching.

This method is that clay with impurities, need a lot of time to sort.

Hard and dry lump do need a lot of time to soak up in the water, dissolve and become plastic.

### **The wet method**

Clay is dissolved in water to form slurry or slip.

A very homogeneous mixture can be prepared and is more suitable for casting

Slip can be used to join parts of clay together.

The dry method

Clay is dried, pounded and crushed into powder form and sieved.

Can only be used for dry pressing, such as the making of tiles.

### **The semi-dry method**

This method is basically a combination of the dry and the plastic method.

It consists of drying and crushing the clay until a powder is obtained.

Additives such as grog can be add and mixed with the clay powder.

Sieved in order to remove large particles

Water is added and mixed into the powder till a plastic mixture is obtained with consistency.

It suitable for processing such as hand throwing, coiling, slab construction

Produces a homogeneous mixture. After mixing with water, the resulting clay can be

used with many different methods suitable for pottery

### **Hand building Techniques:**

#### **Pinching**

Requires only properly conditioned, plastic clay and your fingers.

Small sculpture pieces can be pinched from one large mass of clay or built up from many units.

Expressive forms can be made with this hand building method, provided certain basic guidelines are kept in mind.

Small cracks that appear during pinching can be smoothed over, but larger cracks are likely to reappear during drying and firing.

If the clay becomes too dry and cracks excessively, it is best to moisten it, wedge and begin again.

Also important to pinching is gentle, even pressure to manipulate the clay.

#### **coiling**

Coiling is done by rolling out coils or ropes of clay.

Often these coils are joined to a flat or rounded base and gradually shaped to build up the desired form.

The coils should be pressed together firmly and the join marks smoothed on the inside with a vertical wiping motion.

Unless the piece is purely decorative, you should probably join the coils outside as well.

If a more refined form is desired, however, the surface can be finished with the wooden tool or metal scraper when the clay has begun to dry.

Coils can also be added to the rims of thrown forms, provided the clay has set up enough so that it will not sag

When joining coils to a leather-hard surface, be sure to score and slip the edge before adding the coils.

**Coil construction** is the basic technique for much sculpture, especially when used in combination with pinching and slabs.

Coils are use to create works on a very large scale.

Problem in coil construction can often be attributed to one or more of following:

Coil that are too thick or thin for the size of the piece

Clay that is either too soft and sticky or too stiff to join properly

Coils added so rapidly that the lower walls sag and thicken

A form that is too horizontal or has too flat a curve. The wet clay cannot support too wide a shape and may also sag during firing.

### **Slab construction**

Slabs are sheets or slices of clay that are rolled out, often with a rolling pin, to the desired thickness and wrapped, folded or cut and joined together. Made in the likely potential shapes.

If the slabs are draped over a mold, they should be plastic

If formed into a vertical shape, the pieces should be allowed to dry sufficiently so that they can support themselves.

Do not allow them to dry too much, however, for they may crack as they are folded.

As in other techniques, the edges that are joined should be scored and coated with slip to prevent them from coming apart during the drying process.

Shaped angles and joints should be reinforced with a coil of moist clay on the interior seam.

Horizontal spans may need to be reinforced with the interior clay partitions to support the slab prevent it from sagging.

Clay slabs can be smoothed and manipulated to create endless textures and sculptural effects.

### **Molds**

#### **Hump and Press Mold**

Many ancient pots were made with a mold of some sort.

The mold can be almost any rounded shape and the technique will produce a finished pot in practically a single step

For a hump mold, a slab of clay is draped over a form- a stone, gourd, kitchen bowl or a plaster form made for the purpose. The slab is pressed to conform to the mold and excess is trimmed away.

Strips of wet newspaper, paper toweling or plastic will prevent the clay from sticking to the form. After drying slightly-enough to maintain the shape without distorting-remove the mold.

If left on the form too long, the contracting clay will crack. A form can also be covered with coils of plastic clay. The coils should be smoothed together with a tool or the finger so they will not crack a part when drying.

**Press molding** consists of shaping slabs and coils plastic clay in concave form- the inside of a bowl mold

The procedure is the same as for hump mold, Except that the slabs or coils are pressed into a form than draped over it.

In this method the smoothing and joining of coils and slabs is done inside surface

The design will appear on the exterior.

### **Slip casting**

Another possibility for hand-building with molds is casting. Although casting is primarily a commercial production technique, some studio potters are interested in the clean line and smooth surfaces possible with this technique. Slip casting consists of pouring slip or clay liquid form into a plaster mold.

In order for the slip clay to dry and shrink away from the plaster mold. It is important that the form be of a smooth texture and surface even without crevices and undercuts.

When the plaster mold sections have dried, they are scraped clean and clamped together for the casting. Slip is poured into the mold

Plaster draws the moisture from the slip and causes the clay surface in contact with the plaster to harden or set up. The excess slip is poured or drained from the mold and the piece is allowed to dry further.

The mold is removed when the piece is leather hard and then the surface is scraped or sanded to remove the join marks of the mold section.

### **Wheel Techniques**

Throwing forming plastic clay on a potter's wheel. A potter's wheel has a turntable spins(by foot or electrical power), you shape the moist clay by gently pressing inward or outward against the clay.

### **Types of firing**

**The Bisque fire** ware must be hard enough to endure normal handling in the glazing operation, yet sufficiently absorbent to permit glaze sticking together.

**Note:** Raw ware must be completely dry before it is loaded in the bisque kiln. The accepted test for dryness is to hold the piece against your cheek. If it feels cold, there is still moisture in the

clay.

**The Glaze fire** differs in several respects from the bisque fire: the loading is different, the kiln atmosphere may be varied and the final temperature must be controlled carefully.

**Single fire:** A firing cycle in which the normal bisque and glaze firings are combined. The advantages are a great saving of fuel and labour and development of a stronger bond between the body and the glaze.

**Reduction fire:** A firing using insufficient oxygen; carbon monoxide thus formed unites with oxygen from the body and glaze to form carbon dioxide, producing colour change in colouring oxides

### Levels of firing

- Reheating the kiln before actual firing
- Firing the bone dry clay art work
- Cooling done in stages before actual opening of the kiln

### Definition the following terms

**Plasticity** The quality of clay that allows it to be manipulated and still maintain its shape without cracking.

**Shrinkage** Contraction of the clay in either drying or firing.

**Grog** Hard fired clay that has been crushed or ground to various particle sizes. It is used to reduce the shrinkage in ceramic products.

**Wedging** Kneading plastic clay with the fingers and heels of the hands in a rocking spiral motion which forces out trapped air pockets and develops a uniform texture. A process used to release air bubbles from clay by kneading it or cutting it in half with a wire, then slamming the pieces onto a hard surface.

**Green ware** Pottery that has not been bisque fired.

**Leather hard** The condition of the raw ware when most of the moisture has left the body but still plastic enough to be carved or joined.

**Glaze** A liquid suspension of finely ground minerals that is applied by brushing, pouring or spraying on the surface of bisque-fired ceramic ware.

**Bisque or biscuit** Unglazed ware fired to a temperature sufficient to harden but not mature the body.

**Terra cotta** An earthenware body, generally red in colour and containing grog. It is



common body type used for ceramic sculpture.

**Warping:** Distortion of pot in drying because of uneven wall thickness or in the firing when a kiln does not heat uniformly.

**Pottery** the craft of making objects from clay.

**Fired:** hardened by heating in a kiln

**Ware:** Pottery or porcelain in the raw, bisque glazed state.

**Casting (slip casting)** A reproductive process of forming clay objects by pouring a clay slip into a hollow plaster mold and allowing it to remain long enough for a layer of clay to thicken on the mold wall. After hardening, the clay object is moved.

**Mold** a form usually made of plaster of Paris, containing a hollow negative shape. The positive form is made by pouring either wet plaster or slip into this hollow.

### **Why do learners often experiment with clay first before other materials like cement in sculpture?**

Easily and available source to get clay

Clay is a cheap material

Flexible material to manipulate with hands

Can be recycled if not fired.

Can be permanent material when fired.

Can control moisture loss if still building

The plasticity does not allow to break easily during building

Clay is environmental friendly

Limitations

Dry powdered clay can cause health complication from silicon

### **The stages of clay**

**Slip:** Clay suspended on water. Can be poured into molds used to join clay together and can be used in decorating.

**Green ware :** Workable clay strong enough to bend without breaking

**Leather hard:** Drying clay that still has some flexibility with crack but not break when

bent. Is cold to touch. Best for carving into surface of the clay

**Bone dry:** Clay that has dried out and is ready to fire in the kiln. Has no flexibility and is very fragile.

**Bisque ware:** Clay that has been fired once. Lighter in colour and slightly shrunken. The clay is now rock hard and permanent, although it is still not waterproof yet.

**Glaze ware:** clay fired a second time in the kiln with a coat of glaze. Gives the surface a shiny smooth texture like glass, it is now waterproof.