

Clay Studio Safety

The following information is offered as suggestions in order to help maintain safety in every clay studio. The author of this document cares very much about your safety, but retains absolutely no responsibility for your safety or for any injury suffered whether or not you decide to follow these guidelines.

With reasonable precautions the clay studio is a very safe place to work, but in order to maintain a safe environment you must familiarize yourself with the key issues in ceramic studio safety. There are fundamental precautions that must become second nature to everyone working in a clay studio, as they affect not only your own personal safety, but everyone else's as well.

General Guidelines

There are a few general safety and cleanup considerations that must be implemented at all times in any clay studio:

- ***Avoid making dust!*** Don't leave clay scraps on the floor. Don't leave ware-boards where they might fall over and raise a cloud of dust. Confine all dust-producing processes to a spray booth with its exhaust fan turned or under appropriate exhaust nozzles with that exhaust fan turned on, or take the work outside and wear a proper respirator. ***Whenever you need to sweep or scrape up dry clay residue from the floor, use a spray bottle and very lightly mist water over it first – the slightest amount of moisture will keep down the dust.*** Always wear a proper twin-element respirator when any dust is present in the air. If you do not have a proper respirator, leave the area when there is any dust in the air and do not return until all dust has cleared. As a general practice, you should always avoid breathing dust of any kind. All of it is harmful.
- ***Heavy Lifting - Save Your Back*** - When moving bags of materials or moist clay, lift from the legs and hips and not from the spine, and don't attempt more than you are sure you can lift safely. Most dry materials come in 50-pound sacks, but that may be beyond your own safe lifting capability. If so, get help. When you need to move quantities of dry materials or mixed clay, always use a hand truck or a four-wheel platform cart.
- ***Clean up clay debris.*** You must realize that clay debris on the studio floor means that everyone else is breathing the dust produced when you move around.
- ***When cleaning the floors, always lightly mist the surface first,*** sweep up all dust and clay debris, and deposit in the trash cans. Mist the floors even if you are wearing your respirator, because without misting, dust is being raised into the air and is settling on all surfaces. Once you have swept or scraped up the dust and loose debris, lightly hose down the floor, and then squeegee the dirty water and gather with a mop and wringer-bucket. If there is an accumulation of debris in the bottom of the mop bucket, pour the water into the sink and then dump the debris into the trash.
- ***Avoid any accumulations of water on the floor,*** especially where clay residue is present (except when cleaning the floors, of course). The combination of water and clay residue

produces a very slick, slippery mud. It is your responsibility to clean up any clay, slurry, slip, or glaze that you deposit on the floor.

- **Always leave machinery/equipment in the correct "shut down" mode**, so that it cannot start abruptly and so that no parts are protruding that could cause physical injury. Turn pottery wheels to the "off" position when not in use. Never leave the clay extruders with the handle sticking out into the room. Always make sure that kilns are properly shut down when you finish using them, as per the instructions for the particular kiln.
- **Wash all clay and glazes off your hands before eating.** No food in the studio.

Clay-Mixing

During the clay mixing process there are three primary concerns: equipment operation, heavy lifting (discussed above), and toxic dusts.

Equipment Operation - Clay Mixers

- **The Soldner mixer** is the safest clay mixer on the market. Unlike some other mixers, the Soldner will not operate unless the lid is closed. Water and dry materials can be added through the grate opening in the lid while the machine is running. Recessed beneath the rotating concrete drum is a large chain sprocket with a roller chain driven by a small drive sprocket on the gearmotor under a metal cover at the back of the machine. There is no danger of becoming entangled in this chain when you are working around the front of the machine as long as the guard is in place over the rear sprocket. Keep in mind that the chain and sprocket are coated with a thick lubricant, so it is good to be aware of their presence and keep hands and feet away from the chain and sprocket.
- **Pugmills** are the main workhorses for blending and recycling claybodies. No one should ever be allowed to use a pugmill unless they are properly trained in their use. Pugmills are safe when properly used, and extremely dangerous when carelessly used. Consider that a pugmill is very similar to a giant meat-grinder. The comparison is appropriate. Pugmills are basically unstoppable, and do not know the difference between plastic clay and your arm. Never, ever allow your hand to enter the hopper opening on a pugmill unless the machine is completely disconnected from the power supply. Never attempt to clean a pugmill unless it is completely disconnected from the power supply. **Don't ever take any chances with a pugmill. They are almost unstoppable and have no conscience.**

Toxic Dust – Always Avoid Breathing Dust

Although there are some pieces of equipment that can cause immediate and possibly catastrophic injury, the greatest long-term hazard in the clay studio is dust. All ceramic materials that come in dry, powdered form present an inhalation risk, and you must always protect yourself from the dust. The primary concern is silica (quartz, flint) dust, which is composed of very fine sharp-edged particles. Fine particulate free silica (pure silica particles that are not chemically combined within other materials) is contained in some of the component materials we use in claybodies. Most secondary clays (those that have been transported by wind or water) contain very little free silica because silica particles are heavy in comparison to clay and tend to settle out. Primary clays like kaolins often contain small percentages of free silica as an impurity. The greatest danger is in mixing

high-fire stoneware or porcelain bodies where powdered flint (silica flour) is sometimes added as a major ingredient. Sand and grog often contain significant percentages of free silica dust.

While you should never breathe dust of any kind, a healthy non-smoker's lungs can expel clay dust and the coarser silica particles, but do not have the ability to expel the finest silica particles. Instead, they build nodules of scar tissue around each particle. The effect is cumulative, and long term inhalation of significant quantities of silica dust results in silicosis (potter's rot, black lung, etc.), which is ultimately fatal.

Smoking damages the cilia in the lungs. Cilia are small hair-like organs that line the interior surface of the lungs. They function by moving foreign substances up into the bronchial passages, where they are expelled by coughing. If you have ever been in a smoky environment and afterward coughed up dirty-looking mucous, it is because the cilia are doing their job. The function of the cilia is damaged by smoking, decreasing their ability to move foreign substances, especially insoluble dusts, which simply accumulate in the lungs, interfering with proper breathing, eventually causing emphysema and/or other lung diseases. ***Every serious clay studio artisan must be aware that smoking will drastically increase your risk of serious lung damage including emphysema and silicosis.***

Whenever working with dry ceramic materials anywhere (except in the spray-booth with the exhaust fan on or under the moveable suction nozzles in the glaze room with that exhaust fan turned on) always wear an approved twin element respirator with appropriate cartridges or filters for ultra-fine dust, and with a resilient rubber face piece that seals effectively against your face. Even when using the moveable vacuum nozzles in the glaze-mixing area it is a very good idea to wear a respirator. ***See the section below on respirators.***

NOTE: Disposable paper-element dust masks should never be used in the clay studio. Do not ever put yourself in any situation where there is dust in the air unless you are wearing an appropriate twin-element respirator.

Whenever adding dry materials to the clay mixer always make sure the exhaust fan is turned on ***and*** wear your respirator. Once all the dry materials are wet, you can turn off the fan, but keep your dust mask on as long as you are moving around in the clay mixing room or materials storage area, because you will inevitably be raising dust into the air.

Purchasing a Proper Respirator

Proper respirators are available at most good hardware stores and home improvement centers, but beware of the ones including organic chemical cartridges that you don't need. Also, those models generally come in one size that fits the average-size face. Always make sure that you get a twin-element ***half-mask*** or ***half-facepiece*** respirator with a resilient rubber face piece, equipped with ***P-100 HEPA*** (high-efficiency particulate air) dust filter designed to protect you from very fine dust. ***Half-mask*** means that it covers your mouth and nose, but not your eyes, as compared to a full-mask respirator with oxygen supply such as firefighters use.

A respirator appropriate for the ceramic studio does not need to have a cartridge for organic vapors from solvents, paints, etc., unless you specifically need that protection. As mentioned, many of the respirators sold in hardware stores and home improvement centers are equipped with such a cartridge, and those respirators are of no use to us unless the cartridges also have a P-100 HEPA rating or have additional P-100 dust filters attached. Also, be aware that all respirators equipped with organic vapor cartridges must be stored in a sealed plastic bag when not in use. If left out, the cartridges are constantly absorbing minute amounts of organic vapors from the atmosphere and will quickly exhaust their usefulness. This is a real problem, because people run the risk of assuming they are being protected from organic vapors when the organic cartridges are spent.

Got to amazon.com and enter “3M 6000 Series Half Facepiece Respirator” in the search box. This is a very good general-purpose dust mask with replaceable twin-element P-100 filters, and cost less than twenty bucks. Note that it comes in small, medium, and large, so get the size appropriate for your face. For more specialized respirators such as hypoallergenic silicone rubber, go to www.lss.com (Lab Safety Supply) for an extensive assortment of high-quality half-mask respirators. You’ll pay a lot more at Lab Safety Supply, especially since the mask and the cartridges or filters are sold separately.

Working with Wet Clay

- ***Again, Don’t Breathe Dust*** - Dust ceases to be a factor as long as clay is wet, but even with wet clay it is essential that you maintain good habits regarding studio cleanliness in order to avoid circumstances where dust is created. Whenever possible, minimize dust by cleaning up clay scraps or debris while they are still damp. As mentioned above, when cleaning up dry scraps or other clay debris, mist lightly with a spray bottle before scraping or sweeping to keep down the dust, and wear your respirator.
- ***Muscle and Joint Problems*** - A serious concern for everyone working in clay is the long-term effect on the muscles and joints. Of special concern is the wedging process, which contributes to the likelihood of Carpal Tunnel Syndrome, a condition resulting from constriction of nerves and blood vessels by the tendons that encircle the wrist. It is wise to avoid or minimize repetitive muscular movements. If you do all your wedging by hand, switch back and forth between cylinder wedging, right-hand cone wedging, and left-hand cone wedging. Better yet, get a vacuum de-airing pugmill to do the wedging for you.
- ***Skin Problems*** - When working with clay, especially when throwing, some degree of dry-skin issues are almost inevitable. Most routine dry skin problems can be addressed with frequent use of a good skin moisturizer, and there are usually bottles of moisturizer around the sinks in the studio. I also have a bottle of good moisturizer on my cart. For more serious dry skin, use a skin protectant (like Eucerin) before working with clay, and a good skin moisturizer immediately afterwards and frequently between sessions working with clay. If dry skin or rashes are more serious or persistent, consult your physician and suggest a referral to a dermatologist.
- ***Safety with Slab Roller and Potter’s Wheels*** - When using clay-working machinery such as the slab roller or potter’s wheel exercise appropriate caution. Keep fingers out of the way when operating the slab roller. After using and cleaning the extruder, always leave the handle off to the side against the wall where no one will run into it. When working on the wheel, remove any loose-hanging scarves, ribbons, strings, or ties, and fasten long hair to eliminate any chance of it

becoming entangled in the wheelhead. Never leave your cutoff wire or needle tool within the splash-pan. When the wheel is not in use always leave the electrical switch in the off position so that it will not suddenly start if someone accidentally steps on the pedal.

Glazing and Glaze-Mixing

- ***Once Again, Don't Breathe Dust.*** The greatest hazards in the glaze lab are encountered in mixing dry ingredients, and in spraying liquid glazes. All ceramic materials are toxic in inhalation to varying degrees, and silica, talc, barium carbonate, fluorspar, chrome, copper, manganese, and nickel compounds are especially toxic in inhalation. When mixing glazes or slips, always wear a proper respirator and if possible, do your mixing in a booth with proper exhaust fan.
- ***Skin Irritants*** include potassium dichromate, soda ash, potassium carbonate (pearl ash), fluorspar, and wood ash. When wood ash is mixed with water it becomes highly alkaline, capable of causing skin irritation and even chemical burns. If you experience skin dryness or irritation use a good skin protectant (like Eucerin) as mentioned above, and in the case of wood ash glazes, rubber gloves are recommended.
- ***Safety of Different Glaze Application Methods*** - In the glazing process, dipping, pouring, and brushing are all very safe methods, but reasonable precautions should to be taken to avoid prolonged contact with the skin. The most dangerous application method is spraying, which must always be done outdoors or in a spray-booth with the fan turned on, and in both cases you should also wear a respirator. Before attempting to spray glazes for the first time, always get proper instruction in the use of the particular spray equipment.
- ***No food or beverages in the glaze lab.*** After handling glazes or glaze materials, always wash your hands thoroughly before eating or drinking.
- ***Grinding Glaze Materials*** – Other than the ball mill, which involves no safety concerns, most potters and studios do not have equipment for grinding glaze materials. If you have access to equipment for grinding glaze materials, you must take adequate precautions to deal with the dust. Quantity grinding of minerals without adequate dust-reclamation equipment is usually illegal, and appropriate grinding and dust collection machinery is extremely expensive.

Kilns and Firing

This section is of concern to everyone who loads, unloads, and/or fires gas or electric kilns. The following guidelines or rules should always apply.

- Insulated leather or Kevlar gloves should be provided are available use with kilns. Always wear proper gloves whenever touching or handling hot surfaces or objects. Discard any gloves that are in poor condition. Never touch hot surfaces or objects with damp gloves – the dampness will instantly turn to steam and cause serious burns.
- Do not ever assume that a kiln is cold just because it is not on. Air convection over the surface may reduce radiated heat, and yet the surface may still be hot enough to burn you.
- Never place your unprotected hands or face close to any kiln opening. Positive pressure within the kiln may create a powerful stream of superheated gasses at any opening, capable of inflicting serious burns even if there is no visible flame.

- When you need to look into a kiln to check atmosphere or cones always wear appropriate tinted face shield, goggles, or safety glasses (shade #1.7 to 3.0) to protect your eyes from the extreme brightness and the possibility of heated gases or particles exiting the spyholes. Goggles for gas-welding are appropriate, while those for arc-welding are far too dark. If you see spots before your eyes after turning away from the spyhole, your eye protection is inadequate. Do not neglect proper eye protection. There are well-known older potters who have become partially or completely blind as a result of looking into kilns without proper eye protection.
- All firing processes produce toxic fumes that must be properly vented. Of course that is particularly true of any kiln located indoors. Proper vent systems for electric kilns are relatively inexpensive and easy to install, venting to the outside through a normal clothes-dryer-type wall vent. A vent system should be considered mandatory even if the kiln is in a separate room, because some of the fumes put off in ceramic firings are highly toxic. Vent systems for indoor gas kilns are extremely expensive and complicated, and should be designed by an engineer. A by-product of all bisque firings and (to a lesser degree) glaze firings is sulfur dioxide, which is toxic and corrosive and smells like rotten eggs. Some metals and metallic oxides release highly toxic fumes in midrange and high-temperature glaze firings. Fuel-burning kilns (oil, wood, gas) produce extreme heat and carbon monoxide in the flue gasses, and must be exhausted to the outside through appropriate high-temperature flues. The salt- and soda-firing processes produces acidic gases that are a respiratory irritants and are highly corrosive to metal surfaces.
- As a general rule, do not ever make adjustments on someone else's kiln unless there is a genuine danger of injury to yourself or others or of damage to the kiln or the studio. When in doubt always check with someone in charge.