The Arts & Humanities
Ceramics Studio

Ernest G. Welch School of Art & Design
College of the Arts
Georgia State University

Safety Handbook

All students, faculty and visitors are required to have read, be aware of, and abide by the rules and regulations contained herein.

CONTENTS

PURPSOE OF THIS GUIDE

This training guide provides basic information for working safely with chemicals and operations in Visual Arts. The guide is intended to supplement, but not replace, the safety orientation for faculty and students in Visual Arts.

EMERGENCY PROCEDURES

The **FIRST AID KIT** is available outside of the tool room.

EMERGENCY PROCEDURES:

FOR ANY LIFE THREATENING EMERGENCY (**) – SEEK TREATMENT IMMEDIATELY

(**)LIFE THREATENING*EMERGENCY* Could possibly include, but not limited to: portable damage to major blood vessels or nerves, profuse bleeding that cannot be stopped, amputated body part, broken bone, cut to bone, eye injury, head trauma and/or automobile accident.

NON-EMERGENCY PROCEDURES

Situations that do not require emergency or immediate attention should be reported to the Area Coordinator.

Students who are injured at Georgia State University:

Students should go directly to the Student Health Center locate in the University Commons at 141 Piedmont Avenue, Suite D. **TALK WITH THE HEALTH CENTER ABD SEE WHAT THEY RECOMMENT FOR STUDENTS AFTER HOURS**

Faculty & Staff who are injured while working for Georgia State University:

Injured employees, and their supervisors, must follow the current Workers' Compensation Protocols if they wish the Workers' Compensation Insurance to cover their medical expenses for their injury.

RESPONSIBILITY FOR SAFETY

FACULTY

Faculty are responsible for ensuring that students attend training and work safely and:

1. Ensure artists understand the potential health and physical hazards of the chemicals and equipment used;

2. Explain proper and safe procedures for handling, under all circumstances, the hazardous substances used;
3. Provide appropriate equipment to allow laboratory workers to work safely

ARTISTS

Each student, faculty and staff member is expected to attend training and:

1. Follow procedures and practices outlined in this training guide
2. Report all accidents, near misses, and potential chemical exposures to the Department Manager

SECURITY – GSU CAMPUS POLICE: 404-413-2100

CAMPUS POLICE

Call the police if there is any strange activity or disturbance. Call 404-413-2100 or 3-2100

Escort service is also available from the sculpture studio to the main campus, parked cars and public transportation.

Studio doors should be kept locked at all times.
After shutting, check to see if the doors are truly locked.

*****When working in the studio after hours, students are encouraged to notify the campus police and to utilize the escort service.**

AFTER HOURS

Students currently *enrolled in a Ceramics course* may work in the studio during their scheduled class time or during open studio hours

ACCESS TO THE CERAMICS DEPARTMENT

CARD ACCESS

All students who are registered for Ceramics classes are given clearance for 24 hr. Panther Card access to the front door of the Art and Humanities Building. If your card does not work two weeks after turning in your After Hours Pass to your course instructor, go to the **Art Office (AH 117)**, to activate the card. Have your After Hours Pass with signatures from your course instructor and School Director with you. Sometimes it is necessary to go back several times.

Do not allow anyone into the building from the outside who may not have access. If the building is locked and accessible only with a campus I.D., be careful not to let anyone follow you into the building.

HOURS
The Art and Humanities Building is normally open M-F from 7:30 AM to 7:30 PM during the regular school year.

STUDIO USE
Students are permitted and often required to work outside of class in the ceramics Studios. Note the posted schedule of ceramics classes. You may not work independently in a shop while another class is being held unless you ask the permission of the instructor conducting the class beforehand.

SAFETY IN NUMBERS
The Art and Humanities Building does not have a guard. It is recommended that you always work with a partner when working outside of scheduled class hours for both personal safety and in case of an accident.

CLASSROOM/STUDIO DOORS
The DOOR CODES may not be given to anyone, even fellow GSU students- If anyone has unauthorized access to the code, it will be changed immediately. The code is changed every semester and the area coordinator can change it whenever necessary and restrict access. Do not compromise the security of yourself and others in the Art and Humanities Building or the Ceramics Studios: Do not leave doors propped open at any time, either for friends, for a quick trip to the store, or because your card does not work!

COMBINATIONS
Push button combinations to the doors to the Ceramics studio are given out to students of the relevant classes by instructors. Do not give out these combinations to anyone except Ceramics classmates.

ACCESS FOR THOSE NOT ENROLLED IN CLASSES
Students currently not enrolled in classes who wish to use the ceramics facilities may do so only with the permission of the Ceramics Area Coordinator. Prior experience with a ceramics class is normally a prerequisite.

STUDIO ETIQUETTE

SMOKING
NO SMOKING AT ANY TIME. Smoking is NOT ALLOWED ANYWHERE IN THE STUDIO, OR WITHIN 25 FEET OF ANY GSU BUILDING.

FOOD AND BEVERAGES
No Food or beverages are allowed in the Ceramics studio

SHOWS & GRANTS
Students are encouraged to post and note shows, as well as, grant opportunities on the bulletin boards between the Arts & Humanities Elevators.

SPACE ALLOCATION

GRADUATE STUDENTS will be assigned space in the graduate room. These **spaces are determined by the faculty and are non-negotiable.** Graduate students will be offered space for **three** contiguous years only. After that time if the student is still in the program, he/she will be required to vacate that space and must provide their own workspace off campus.

The graduate space is reserved for graduate students only. No other students are permitted entry into this space.

SUPPLIES, MATERIALS & MAINTENANCE
Every Ceramics course has an associated fee that provides for purchase of common supplies and studio maintenance. Course fees are paid along with tuition and fee amounts are available in the course catalog. While these fees are sufficient to support most student work in the studio, certain projects may require the student to purchase additional supplies at their own expense. "Excessive use" of common studio supplies and resources is determined by the faculty.

MATERIALS FOR STUDENT PROJECTS
Aside from certain projects in beginning courses, students must supply their own materials for projects. In many cases the department has access to or can help find materials.
Do not use any materials found in the studio or classrooms without permission of the owner or an instructor.
If you did not pay for a particular material or bring it in yourself, then it belongs to Someone Else! **DO NOT USE IT.**

PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) is special gear used to protect the wearer from specific hazards of a hazardous substance. It is a last resort protection system, to be used when substitution or engineering controls are not feasible. It should be understood that PPE does not reduce or eliminate the hazard. It only protects the wearer and does nothing for anybody else in the area or for any equipment exposed to the chemical.

PPE includes gloves, respiratory protection, eye protection, and protective clothing. The need for PPE is dependent upon the type of operations and the nature and

quantity of the materials in use, and must be assessed on a case by case basis. Workers who rely on PPE must understand the function, proper use, and limitations of the PPE used.

GLOVE SELECTION AND USE

Gloves should be worn whenever the possibility of skin contact with hazardous chemicals exists. Every glove is permeable to a chemical. The permeability varies with the chemical being used, the length of time of the exposure and the thickness of the glove. General use gloves, such as the latex surgical gloves, are appropriate when using small amounts of most chemicals for short periods of time. These gloves should be changed whenever they become contaminated with the chemical. Otherwise, the glove that offers the best resistance to the chemical should be used. The following guidelines should be used to determine the appropriate glove.

1. Review the Material Safety Data Sheet (MSDS) for the chemical of interest.
2. Determine the potential consequences of skin contact by the chemical.
3. Determine the exposure period and characteristic of the potential contact. That is, are you choosing gloves to protect you from an occasional splash or spill or are you planning to wear the gloves while you immerse your entire hand and arm in a container of material.
4. Determine which gloves or glove materials offer the best resistance to the chemical. This information may be found in the Personal Protective Equipment section of the MSDS, glove vendor information or the Chemical Protective Clothing database available through Georgia State.
5. Establish the dexterity and sizing requirements.
6. Determine physical resistance properties required of the glove. That is, resistance to heat, cutting, punctures, etc.
7. Other considerations - color, cuffs, length of glove, use of liners.
8. Establish a decontamination procedure. Be sure to check for pinholes before use, wash or decontaminate gloves before removing, and wash hands after removing.

In addition to protecting hands and skin from chemical exposures, there are many gloves which offer protection from physical hazards, such as high or low temperatures, electrical shock, skin abrasions, vibration or sharp objects. Always match the glove to the hazard.

RESPIRATORY PROTECTION

A respirator may only be used when engineering controls, such as general ventilation or a fume hood, are not feasible or do not reduce the exposure of a

chemical to acceptable levels. The use of a respirator is subject to prior review by Georgia State Research and Health Safety Officer at 404- 413- 3510, according to university policy, since their use is regulated by the OSHA respiratory protection standard.

Any worker who believes that respiratory protection is needed must notify Georgia State for evaluation of the hazard and enrollment in the Respiratory Protection Program. This program involves procedures for respirator selection, medical assessment of employee health, employee training, proper fitting, respirator inspection, maintenance, and record keeping.

EYE PROTECTION

Safety glasses should be worn for protection from impact of particles. Standard eyeglasses fitted with side shields are generally not sufficient. Workers who are interested in prescription safety glasses should contact Georgia State Environmental Programs Advisory Committee at (404) 413-3500 Goggles should be worn when a potential splash from a hazardous material exists. They may be worn over prescription glasses. Face shields are in order when working with large volumes of hazardous materials, either for protection from splash to the eye or flying particles. Face shields may be used in conjunction with goggles for maximum protection from corrosives and hot chemicals. Contact lenses do not offer any protection from chemical contact.

PROTECTIVE CLOTHING

When the possibility of chemical contamination exists, protective clothing, which resists physical and chemical hazards, should be worn over street clothes. Smocks are appropriate for minor chemical splashes and spills, while plastic or rubber aprons are best for protection from corrosive or irritating liquids.

Loose clothing (such as overlarge smocks or ties), skimpy clothing (such as shorts), torn clothing and unrestrained hair may pose a hazard. Perforated shoes, sandals, or cloth sneakers should not be worn in chemical use areas or where mechanical work is being performed.

EXPLANATION OF MATRNAL SAFETY DATA SHEET

Per the OSHA Hazard Communication Standard, School of Art and Design is required to ensure that material safety data sheets are readily available for all chemicals used in the department. Material Safety Data Sheets (MSDSs) are available upon request. Individuals who bring in materials from outside must keep MSDSs on hand. New materials must be approved for use and storage by the Department Manager or Technical Manager and MSDSs must be included in the MSDS binder.

Following is an explanation which is provided to help you interpret the information found on manufacturers' MSDSs. While the format of these data sheets varies from manufacturer to manufacturer, certain components appear on each sheet.

PARTICULARLY HAZARDOUS SUBSTANCES

WHERE TO FIND TOXICIY INFORMATION

Toxicity information may be found in Material Safety Data Sheets, under the 'Health Hazard Data" section, on product labels, in the Registry of Toxic Effects of Chemical Substances (RTECS), or in many other sources listed in the Health and Safety Reference Guide on the next page.

CHEMICAL EXPOSURE

The following procedures should be followed in the event of chemical exposure. In all cases, the incident should be reported to the department manager, regardless of severity.

CHEMICALS ON SKIN

1. Immediately flush with water for no less than fifteen minutes. Remove any jewelry or clothing that have become contaminated to facilitate removal of any residual material. For pullover shirts and sweaters, it may be beneficial to cut garments off to prevent contamination of eyes.
2. If immediate medical attention is needed, call Public Safety at 404-413-3333 for an ambulance or transportation to Hospital.
3. Explain carefully what chemicals were involved.
4. Review the MSDS to determine if any delayed effects should be expected.

* MSDS are located on the desktop of the studio computer as well as the computers in Professor Arikoski-Johnson and Professor West's offices.

CHEMICALS IN EYES

1. Flush eye(s) with water for at least fifteen minutes. The eyes must be forcibly held open to wash, and the eyeballs must be rotated so all surface area is rinsed. The use of an eye wash fountain is desirable so hands are free to hold the eyes open.
2. Remove contact lenses while rinsing. Do not attempt to rinse and reinsert contact lenses.
3. Seek medical attention regardless of the severity or apparent lack of severity. Contact GSU Police at 404-413-3333. Explain carefully what chemicals were involved.
4. Review the MSDS to determine if any delayed effects are expected.

CHEMICAL INHALATION

1. Close containers, open windows or otherwise increase ventilation, and move to fresh air.
2. If symptoms, such as headaches, nose or throat irritation, dizziness, or drowsiness persist, seek medical attention by calling GSU Police at 404-413-3333. Explain carefully what chemicals were involved.
3. Review the MSDS to determine what health effects are expected, including delayed effects.

ACCIDENTAL INJECTION OF CHEMICAL

1. Immediately contact the Poison Control Center at 800-962-1253 for instructions.
2. Do not induce vomiting unless directed to do so by a health care provider. Explain carefully what chemicals were involved.
3. Review the MSDS to determine what health effects are expected, including delayed effects.

SPILL WORK PRACTICES

In the event of a chemical spill, the individual(s) who caused the spill is responsible for prompt and proper clean-up. It is also their responsibility to have spill control equipment appropriate for the chemicals being handled readily available. There should be a sufficient quantity of absorbents or other types of materials to control any spill that can be reasonably anticipated. Vermiculite, lined 5-gallon pails and limited spill control materials are available throughout the building.

WASTE DISPOSAL

HAZARDOUS CHEMICAL WASTE PICK-UP PROCEDURES
The following procedure refers to hazardous chemical waste only (not biological/medical waste).

Keep your hazardous waste containers clean, in good condition, and make sure they are securely closed at all times.

1. Store you hazardous waste containers in secondary containment such as trays to minimize opportunities for a spill.
2. Make sure your hazardous waste containers are labeled with a yellow hazardous waste sticker that details the contents using full chemical names (no abbreviations) and percentages, or using a GSU waste stream name.
3. When your hazardous waste containers are full, create a Pickup Worksheet at https://chematix.gsu.edu/Chematix/ and submit your request through

Chematix. You may also e-mail eprograms@gsu.edu
4. If you require replacement supplies indicate this on your online Environmental Work Request.
5. If you require supplies at any time, without a waste pick-up e-mail eprograms@gsu.edu
6. A list of supplies is available for review online at http:/ /www.gsu.edu/research/ lab_safety_supplies.html
7. Allow 72 hours for the waste pick-up or supply delivery.

For questions or concerns contact the Environmental Program Manager: 3-3551, or a Chemical Safety Specialist: 3-3535 or 3-3568

HANDELING HAZARDOUS WASTE

Materials that are to be disposed of as hazardous waste must be placed in sealable containers. Containers should be filled, leaving a headspace for expansion of the contents. Often the original container is perfectly acceptable. If you routinely generate significant quantities of compatible solvent s, bulking of waste in five- gallon carboys provided by GSU EPA may be practical.

Similar wastes may be mixed if they are compatible (e.g solvents, linseed oil and oil-based paint). Containers must be kept closed except during actual transfers. Do not leave a hazardous waste container with a funnel in it hazardous waste label.

Waste containers must be labeled as hazardous waste as soon as the material is first put into the container. Waste container labels are available on each flammable liquid storage cabinet and through the sculpture shop. Be sure to include the name and phone number of a person that can be reached on the day of the waste pickup.

Procedure:
1. Place the waste materials in an appropriate waste container.
2. Seal the container. Do no leave a funnel in an open container.
3. Ensure the container has a completed hazardous waste sticker on it. If there is no room for a sticker, or if a sticker is not immediately available, write the works “Hazardous Waste” on the container and ensure that the contents are clear.
4. Once the container is full, inform the ceramics area to ensure that it is included with the next scheduled waste pickup.

Chemical waste pickups are generally scheduled as needed. Please notify the Graduate Lab Assistant or your faculty member if you notice to fill a container.

CERAMIC SPECIFIC HAZARDS

Ceramic art and pottery has a wide variety of hazards. The specific hazards and

precautions can be divided into four area:

1. Working with clay
2. Glazing and coloring
3. Firing in a kiln
4. Potential leaching of finished ware

CLAY

Clays are minerals composed of hydrated aluminum silicates, often containing large amounts of crystalline silica. Other impurities may include organic matter or sulfur compounds. Sometimes, grog (ground firebrick), sand, talc, vermiculite, perlite, and small amounts of minerals such as barium carbonate and metal oxides, are added to modify clay properties. Clays can be worked by hand or on the potter's wheel, or cast in a clay slurry into molds.

Clay is made by mixing dry clay with water in clay mixer. Clay slip is made by adding talcs which themselves can be contaminated with fibrous asbestos or asbestos-like materials. Geographical sources of talcs are relevant, for example, New York State talcs are notoriously asbestos-contaminated, while Vermont talcs are not. Pfizer has some fiber-free talcs.

HAZARDS

1. There have been known cases of silicosis, or "potter's rot, from chronic inhalation of large amounts of free silica during clay mixing. Symptoms of silicosis include: shortness of breath, dry cough, emphysema, and high susceptibility to lung infections such as tuberculosis. The disease may take= years to develop. Silica dust exposure is not hazardous by skin contact or ingestion.
2. Chronic inhalation of kaolin is moderately hazardous, and can result in kaolinosis, a disease in which the lungs become mechanically clogged.
3. Asbestos is extremely toxic by inhalation and possibly by ingestion. Asbestos inhalation may cause asbestosis, lung cancer, mesothelioma, stomach cancer, and intestinal cancer.
4. Sand, perlite, grog, and vermiculite contain free silica and are, therefore, highly toxic by inhalation. Vermiculite is also frequently contaminated with asbestos.
5. There is a danger of accidents if clay or water can be added while the mixer is in operation.
6. Bags of clay and glaze materials can be very heavy, and lifting can cause back problems.
7. Hypersensitivity pneumonia, asthma, or other respiratory problems may occur with exposure to molds growing in wet clay that is being soured or aged in a damp place, in slips that stand for months, or with inhalation of dry aged clay. Molds can cause or exacerbate skin problems and change

the workability of clay.

8. Throwing on a potter's wheel for long periods of time can result in carpel tunnel syndrome because of the awkward position of the wrists. Pain, numbness and/or pins and needles in the thumb and first three fingers, are common symptoms. Back problems can occur from bending over the potter's wheel for long periods of time
9. Hand contact with wet clay can result in abrasion and dryness of fingertips and hands. Moving parts of kickwheels can cause cuts and abrasions.
10. Clay scraps on the floor, bench and other surfaces can dry and pulverize, producing an inhalation hazard due to the presence of free silica. Similarly, reconditioning clay by pulverization and sanding finished green ware, can create very high concentrations of hazardous silica dust.

PRECAUTIONS

1. Use premixed clay to avoid exposure to large quantities of clay dust
2. Clay storage and mixing should take place in a separate room. Bags of clay (and other pottery materials) should be stacked in palettes or grids off the floor for easier clean-up.
3. All clay mixers should be equipped with local exhaust ventilation to remove fine silica dust particles from the air.
4. Clay mixers should be equipped with proper machine guards so that they cannot be opened to add clay or water while the mixer blades are turning.
5. Wear separate work clothes while in the studio. Choose clothes of material and design that don't trap dust. Wash these clothes weekly, and separately from other laundry.
6. Avoid contact of clay with broken skin. Use a skin moisturizer.
7. To prevent back problems, always lift with knees bent. Also, use a standup wheel (Cranbrook style treadle wheel), or elevate electric wheels to a height that doesn't require bending over. Exercise and massage may relieve minor muscular pain.
8. Keep wrists in unflexed position as much as possible to prevent carpel tunnel syndrome. Take frequent work breaks.
9. Be careful of the moving parts on kickwheels.
10. Recondition clay by cutting still-wet clay into small pieces, letting them air-dry, and soak in water.
11. Finish green ware while still wet or damp with a fine sponge instead of sanding when dry. Do not sand greenware containing fibrous talc.
12. Wet mop floors and work surfaces daily to minimize dust levels and prevent dry scraps from becoming pulverized.

GLAZES

Glazes used to color or finish clay pieces are a mixture of silica, fluxes and colorants. Common fluxes include lead, barium, lithium, calcium and sodium, and are used to lower the melting point of silica. The actual colorants, which are an assortment of metal oxides usually account for less than 5% of the glaze by weight. Originally, soluble raw lead compounds including red lead, white lead, galena, and

litharge were used as fluxes in low-fire glazes. In fact, over 400 cases of lead poisoning were reported in British potters in 1897. Lead frits and good housekeeping greatly lowered the number of potters that had been poisoned by these highly toxic lead compounds. Frits are made of melted minerals and metal compounds that are sintered and ground into powder form. While lead frits are sometimes assumed to be insoluble and nontoxic, leaching tests with acids have shown that many frits are as soluble as raw lead compounds and, in fact, there have been cases of lead poisoning from both inhalation or ingestion of these.
High fire porcelain and stoneware techniques eliminate the need for lead as a flux. Also, alkali earth or alkaline earth fluxes can be used for low-fire conditions instead of lead. Silica may also be removed from leadless type glazes. The substitution can be based on boric oxide as the glass-former, instead of silica. Alkali earth fluxes include sodium, potassium, and lithium oxides; alkaline earth fluxes include calcium, magnesium, barium, and strontium oxides. Minerals containing these fluxes include certain feldspars, nepheline syenite, petalite, bone and plant ashes, whiting, and dolomite.
An assortment of metal oxides or other metal compounds produce particular colors when fired. These are added in such small amounts to the glaze, that they aren't usually a great hazard. Luster or metallic glazes are fired in a reduction atmosphere. These glazes can contain mercury, arsenic, highly toxic solvents such as aromatic and chlorinated hydrocarbons, and oils such as lavender oil. The common metals are often resonates of gold, platinum, silver, and copper. Some underglazes and over glazes use mineral spirits as the vehicle instead of water.
Glaze components are weighed, sorted and mixed with water. These materials are often in fine powdered form, and result in high dust exposures. Glazes can be dipped, brushed, poured, or sprayed on the ceramic piece.

HAZARDS

1. Lead compounds are highly toxic by inhalation or ingestion. Symptoms of lead poisoning include: damage to the peripheral nervous system, brain, kidney, or gastrointestinal system, as well as anemia, chromosomal damage, birth defects and miscarriages.
2. Lead-glazed food ware can leach lead if not fired properly, or if the glaze composition is not correctly adjusted. For example, the addition of copper to lead frits renders a higher solubility of lead in the final fired ware. Acidic drinks and foods such as tomato juice, citric juices, sodas, tea, or coffee, can increase this hazard.
3. A glaze label marked "lead-safe" means that the finished ware, if fired properly, will not release lead into food or drink. The actual glaze is still hazardous to handle and fire and may contain lead. Adequate control over firing conditions is very difficult in the craft studio.
4. Other fluxes such as barium and lithium are also highly toxic by inhalation, but less so than lead.
5. Certain colorant compounds of particular metals are known or probable human carcinogens, including: arsenic, beryllium, cadmium, chromium (VI), nickel, and uranium.

6. Antimony, barium, cobalt, lead, lithium, manganese, and vanadium colorant compounds are highly toxic by inhalation.
7. Antimony, arsenic, chromium, vanadium, and nickel compounds are moderately toxic by skin contact.
8. Free silica occur in many of the clays, plant ash, flint, quartz feldspars, talcs, etc. used in glazes. See the discussion above for the hazards of silica and the disease silicosis. Weighing and mixing glazes can result in the inhalation of these toxic materials.
9. Soda ash, potassium carbonate, alkaline feldspars, and fluorspar used in glazes are skin irritants.
10. Spray application of glazes is very hazardous because of the potential inhalation of glaze mists.
11. Dipping, pouring, and brushing certain glazes may cause skin irritation and accidental ingestion due to careless personal hygiene habits.
12. Glazes containing solvents are both flammable and hazardous.

PRECAUTIONS

1. Use lead-free glazes. If the glaze does not state "lead-free" or "leadless" on the label, assume it contains lead until proven otherwise.
2. Lead glazes should only be used on non-food ware items. Design lead-glazed pieces so that they won't be used for food or drink. Lead-glazed pottery should be labeled as lead-containing.
3. If possible, don't use colorants that are known human carcinogens and avoid probable human carcinogens. There is no known safe level of exposure to carcinogens.
4. Consider wearing a respiratory when weighing and mixing powdered. Wet glazes are not an inhalation hazard. Good housekeeping procedures and cleanup of spills reduce the risk of inhalation or ingestion of toxic dusts. Wet mop spilled powders.
5. Gloves should be worn while handling wet or dry glazes.
6. Good dilution ventilation or local exhaust ventilation should be available when applying solvent-containing glazes.
7. Basic personal hygiene rules should be followed including restricting eating, drinking, or smoking in the studio, and wearing personal protective equipment such as gloves, and separate work clothes or coveralls. Wash hands after work. Leftover glazes and glaze scrapings can be homogenized, combined, tested, and used as a glaze.

KILNS

Electric kilns and fuel-fired kilns are used to heat the pottery to the desired firing temperature. The most common type are the electric kilns. Heating elements heat the kiln as electric current passes through the coils. The temperature rises until the kiln is shut off.

Fuel- fired kilns are heated by burning gas {natural or propane), oil, wood, coke, charcoal or other materials. Propane gas or natural gas is used most often. These

kilns can be either located indoors or outdoors. The fuels produce carbon monoxide and other combustion gases. Fuel-fired kiln s are usually vented from the top through a chimney.
Firing temperatures can vary from as low as 1,382°F for raku and bisque wares, to as high as 2,372 °F for stoneware, and 2,642 °F for certain porcelains.
The early stages of bisque firing involves the oxidization of organic clay matter to carbon monoxide and other combustion gases. Sulfur breaks down later producing highly irritating sulfur oxides. Also, nitrates and nitrogen-containing organic matter break down to nitrogen oxides.
Galena, cornish stone, crude feldspars, low grade fire clays, fluorspar, gypsum, lepidolite and cryolite can release toxic gases and fumes during glaze firings. Carbonates, chlorides, and fluorides are broken down to releasing carbon dioxide, chlorine, and fluorine gases.
At or above stoneware firing temperature, lead, antimony, cadmium, selenium and precious metals vaporize and the metal fumes can either escape from the kiln, or settle inside the kiln or on ceramic ware in the kiln. Nitrogen oxides and ozone can be generated from oxygen and nitrogen in air.

HAZARDS

1. Chlorine, fluorine, sulfur dioxide, nitrogen dioxide, and ozone are highly toxic by inhalation. Bisque firings of high-sulfur clay have caused the production of great amounts of choking sulfur dioxide. Other large acute exposures to gases are not common. Inhalation of large amounts of these gases can result in severe acute or chronic lung problems. Long-term inhalation of low levels of these gases can cause chronic bronchitis and emphysema. Fluorine gas can also cause bone and teeth problems.
2. Many metal fumes generated at high temperatures are highly toxic by inhalation. Since lead vaporizes at a relatively low temperature, it is especially hazardous.
3. Carbon monoxide from fuel-fired kilns or the combustion of organic matter in clays is highly toxic by inhalation and can cause oxygen starvation. One symptom of carbon monoxide poisoning is an intense frontal headache, unbelievable by analgesics.
4. Hot kilns produce infrared radiation, which is hazardous to the eyes. There have been reports of cataracts, from years of looking inside the hot kilns.
5. Heat generated by the kiln can cause thermal burns. The Edward Orton Jr. Ceramic Foundation reported that when a kiln was operated at 2370 ° F, the surface temperature, was at and above 595 ° F, and the temperature one foot away from the peephole was 156 ° F.
6. Heat produced by even small electric kilns can cause fires in the presence of combustible materials or flammable liquids.
7. If an electric kiln fails to shut off, the heating elements melt which can cause fires. Gas kilns also generate a lot of heat, and room temperatures often exceed 100 ° F.

PRECAUTIONS

1. Infrared goggles approved by the American National Standards Institute (ANSI) or hand-held welding shields should be worn when looking into the operating kiln. Shade number from 1.7 to 3.0 is recommended, but a darker shade may be required if spots appear in front of one's eyes after looking away from the kiln.
2. Do not use lead compounds at stoneware temperatures since the lead will vaporize.
3. Lumber, paper, solvents, or other combustible and flammable materials should not be stored in kiln areas.
4. Always check that the kiln has shut off.
5. If gas leaks are suspected (e.g. gas odor): shut off gas at the source; shut off power to the kiln room at the circuit breaker; and call the gas company. Test for leaks with nonfat, soapy water or use approved leak-detection solutions.

SPECIAL PROCESSES

While most glaze firings refer to firing a glaze-coated pot in the kiln, special processes sometimes are used. Salt glazing and raku firing are two examples.

SALT GLAZING

This process involves throwing wet salt (sodium chloride) into the heated kiln while the bisque ware is being fired. Wet salt at high temperatures decomposed to sodium and chlorine. The sodium reacts with the bisque ware to form a glaze. Large amounts of hydrogen chloride gas and possibly chlorine are also formed.

Sodium carbonate (washing soda) can also be used. Carbon dioxide is generated instead of hydrogen chloride.

HAZARD

1. Hydrogen chloride gas is highly toxic by inhalation. Healt h effect s are both similar and more irritating compared with most other kiln gases. Often, local environmental protection laws ban salt kilns.
2. Hydrogen chloride and water vapor form hydrochloric acid, which can corrode metal fittings in the area.

PRECAUTIONS

1. Substitute safer sodium carbonate for sodium chloride.
2. Sodium chloride salt glazing should only be done outdoors. Kilns should be equipped with canopy hoods and chimney stacks that are tall enough to disperse the hydrogen chloride safely.
3. All gas piping, and metal fixtures should be rout inely checked for corrosion.

RAKU FIRING

Raku involves first firing ware at a low temperature in a regular gas kiln, and then removing the still hot pieces and placing in them in sawdust, leaves or other organic materials for a reduction phase.

HAZARDS

1. See above for the hazards and safety precautions used with gas kilns.
2. The reduction step produces large amounts of smoke and carbon monoxide
3. Treated wood or other materials can yield an exposure to highly toxic preservatives or pesticides, such as arsenic and chromium compounds.

PRECAUTIONS

1. Raku should only be done outdoors because of smoke. Be careful to not locate raku near air intakes or open windows of buildings.
2. Do not use materials that have been treated with preservatives or pesticides for the reduction phase.

LEACHING OF FINISHED CERAMIC WARE

LEAD LEECHING

There is a real concern about lead leaching into food and drink from pottery fired with lead glazes. Both the U.S. Food and Drug Administration (FDA) and the Canadian Consumer and Corporate Affairs have regulated how much lead can leach from foodware into food and drink. Acidic liquids are of particular concern. Similarly, continual microwave reheating, (e.g. a coffee mug at work) can yield greater leaching of lead glazes. Many cases of lead poisoning, and even some fatalities, have occurred from the leaching of lead from lead- glazed pottery.

While commercial ceramics companies routinely test their ware for lead leaching, craft potters do not have the same quality control as does the ceramics industry, and lead leaching is more of aproblem.

According to United States regulation, ceramic ware that does not pass the lead leaching tests must have a permanent fired decal stating:

"NOT FOR FOOD USE - MAY POISON FOOD. FOR DECORATIVE PURPOSES ONLY."

As mentioned earlier, you can also drill a hole in the pottery so it cannot be used for liquids or food.

Preferably, do not use lead glazes, especially for food and drink vessels. Any food ware finished with lead glazes should be tested regularly by certified laboratories.

Other Leachable Metals

Other metals can leach into food and drink. Cadmium is the single metal besides lead presently regulated in the United States and Canada. However, other possible toxic metals in glazes can leach. Barium has been seen in some tests to leach in hazardous amounts from certain glaze formulations. If a barium glaze, or other glaze, changes color from contact with food, do not use the vessel for food. Try and use only glazes with calcium, magnesium, potassium, and sodium fluxes and minimize the amounts of toxic metal colorants. Routine testing for other metal leaching should be done. More research needs to be done in this area.

SCULPTURE SPECIFIC HAZARDS

Many artists work with traditional sculptural materials including plaster, stone, lapidary, clay, wax, and modeling materials. See ceramics for information on some other sculpting media.

PLASTER AND PLASTER MOLDS

Plaster can be carved, modeled, and casted. Varieties of plaster include: Plaster of Paris, casting plaster, white art plaster, molding plaster, and Hydrocal. These are all varieties of calcined gypsum, composed of calcium sulfate. Mold releases used with plaster include vaseline, tincture of green soap, auto paste wax-benzene, silicone - grease- benzine, and mineral oil-petroleum jelly. In waste molding, the plaster mold is chipped away.

HAZARDS

1. Plaster dust (calcium sulfate) is slightly irritating to the eyes and respiratory system. In situations where there is heavy inhalation of the dust, more severe respiratory problems can result.
2. Potassium sulfate and potassium alum are slightly toxic by ingestion; potassium alum is slightly toxic by skin contact, and can cause mild irritation or allergies in some people.
3. Borax is moderately toxic by ingestion, by inhalation, and by absorption through burns or other skin injuries. It is also slightly toxic by skin contact, causing alkali burns.
4. Concentrated acetic acid is highly corrosive by ingestion, inhalation, and skin contact.
5. Burnt lime (calcium oxide) is moderat ely corrosive by skin contact (especially if the skin is wet), and highly toxic by inhalation or ingestion.
6. Careless use and storage of sharp tools can cause accidents. Chipping set plaster can result in eye injuries from flying chips.
7. Benzene used with many mold releases is moderately toxic by skin contact and inhalation, and is highly toxic by ingestion. It is also

flammable.

8. Making plaster casts of hands, legs, and other body parts can be very hazardous due to the heat released during the setting process.

PRECAUTIONS

1. Wear gloves and goggles when mixing acetic acid and burnt lime.
2. Always carve or cut in a direction away from you, and keep hands behind the tool. If the tool falls, don't try to catch it.
3. Wear safety goggles when chipping plaster.
4. Wear gloves and goggles when pouring benzene. Store in safety containers and do not use near open flames.
5. Do not use plaster for body part casts. Instead, use a plaster- impregnated bandage (such as Johnson and Johnson's Pariscraft), along with vaseline or similar mold release as protection.

MOLDMAKING MATERIALS

See Section 12 for information about clay compounds. Modeling clays of the plasticine type usually contain China clay in an oil and petrolatum base. Additives are often present, including dyes, sulfur dioxide, vegetable oils, aluminum silicate, preservatives, and turpentine. These are modeled and carved with simple tools. There are also a variety of polymer clays that are self- hardening, or oven-hardening (e.g. FIMO, Sculpey), which are not really clays at all. These are often based on polyvinyl chloride.

HAZARDS

1. Some of the additives in plasticine clays such as turpentine and preservatives might cause skin irritation or allergies, and sulfur dioxide might cause some respiratory problems in certain asthmatics. The amounts present are usually small.
2. The curing temperatures of different product are not the same, and in some cases, very close to the temperatures at which decomposition can occur.

PRECAUTIONS

1. Use gloves or apply a barrier cream to hands if skin irritation results from using plasticine modeling clays. Wash hands with soap and water after contact.
2. Obtain the Material Safety Data Sheet (MSDS) from the manufacturer or supplier, and make sure the temperature of decomposition is not reached.

WAX

Many different types of waxes are used for modeling, carving, and casting. These include beeswax, ceresin, carnauba, tallow, paraffin, and micro-crystalline wax. In addition there are the synthetic chlorinated waxes. Solvents used to dissolve

various waxes include alcohol, acetone, benzine, turpentine, ether, and carbon tetrachloride. Waxes are often softened for carving or modeling by heating in a double boiler or with a light bulb, by sculpting with tools warmed over an alcohol lamp, or by the use of soldering irons, alcohol lamps, and blowpipes. Wax can be melted for casting in a double boiler. Additives used with waxes include rosin, dyes, petroleum jelly, mineral oil, and many solvents.

HAZARDS

1. Overheating wax can result in the release of flammable wax vapors, as well as in the decomposition of the wax to release acrolein fumes and other decomposition products which are highly irritating by inhalation. Explosions have occurred from heating wax that contained water.
2. Alcohol and acetone are slightly toxic solvents by skin contact and inhalation; benzine and turpentine are moderately toxic by skin contact, inhalation, and ingestion. Carbon tetrachloride is extremely toxic, possibly causing liver cancer and severe liver damage, even from small exposures. Exposure to carbon tetrachloride can be fatal by skin absorption or inhalation.
3. Chlorinated synthetic waxes are highly toxic by skin contact and skin absorption, causing a severe form of acne (chloracne). Some may be contaminated with polychlorinated biphenyls (PCBs), which are highly toxic, causing chloracne, liver problems, and possibly cancer of the pancreas and melanoma (a fatal form of skin cancer).

PRECAUTIONS

1. Do not overheat waxes. Use a double boiler and a temperature-controlled hot plate, or a crock pot. Do not use an open flame to melt waxes.
2. Use the least hazardous solvent to dissolve your wax. Do not use carbon tetrachloride under any circumstances. Store solvents safely, do not smoke or have open flames near solvents. Dispose of solvent-soaked rags in an approved waste disposal container which is emptied daily.
3. Do not use chlorinated synthetic waxes.

DISCLAIMER

CLEAN UP – FOLLOW ALL OF THE RULES BELOW

Students must clean their work area and clean up communal areas after use.

MATERIALS SHOULD BE RETURNED TO THEIR PROPER CABINETS!

If you do not clean up, you will be emailed or addressed about this in person to come and correct the situation during school hours. If the student does not respond, a notice *will* be sent to the Associate Director.

If **three (3)** notices on an individual student are sent to the Associate Director over the course of a semester with no response from the student, a Disruptive Student Complaint will be filed with the Dean of Students' Office. Students who continually violate Ceramics area policies and procedures will be barred from taking classes in Ceramics and barred from use of Ceramics materials and facilities.

Unidentifiable objects and refuse left on the floor will be considered trash. The clean-up people will be directed to remove it.

General use worktables should be kept cleaned for other classes to use.
Finished work and clutter should be cleared off and tables swept immediately upon completion of each work session. Do not use tabletops for storage.

Trash containers should not be overloaded. Heavy materials must be taken directly to the dumpster.

Each studio has specific rules for clean-up which should be followed, students should familiarize themselves with these rules.

MANDATORY CLEAN UP DAY

A clean-up day is scheduled at the end of every semester. Attendance for a two-hour time slot on cleanup day is MANDATORY for ALL students enrolled in a Cereamics course and for students in other courses that make significant use of the ceramics studio. Any materials left in the studio after the pre-cleanup deadline will be considered the property of the studio and either discarded or stored for common use. Students who fail to attend cleanup will have a registration bar placed on their record that will be lifted only after they complete their cleanup responsibility.

BANNED SUBSTANCES

Illegal drugs are not allowed in the studio at any time. Use of illegal drugs in the studio will result in the student's dismissal.

Legally prescribed and over the counter drugs should be used with caution when working in the studio.

Alcohol use is not permitted in the studios without prior university consent and approval procedures being followed. If university permission has been granted, all university procedures must be followed, a police officer must be present.

Certain chemicals and materials may be prohibited from use in the studio if it is determined that adequate protection for the student, his/her associates, or the environment is not available or in use.

Possession or use of banned substances in the studio is grounds for dismissal from the Ceramics program.

STUDIO/UNIVERSITY POLICY

Studio policies are in conjunction with and do not supersede but include all Georgia State University policies covered in the current catalog.

When a student is determined by faculty or the shop technician to be in violation of studio policy, a notice will be sent to the Associate Director of the School of Art & Design. Such notice is considered an official warning under the University Disruptive Student Policy (https://deanofstudents.gsu.edu/files/2013/03/Disruptive-Student-Conduct-in-the-Classroom-or-Other-Learning-Environment-April-2006.pdf) If a student receives 3 notices in the course of a single semester procedures will be initiated to withdraw the student from the course in accordance with the policy. Students who continually violate Ceramics area policies and procedures will be barred from taking classes in Ceramics and barred from use of Ceramics equipment and facilities.

"In the event that a student is unable to follow the procedures and policies outlined herein, and absent any emergency situation, prior approval must be given by a Ceramics faculty before any activity takes place. If policies are ignored or disregarded, the Ceramics area will file "A Disruptive Student Complaint" will be filed with the Dean of Students' Office. Multiple violations will be cause for dismissal from the university.