Lab Safety Rules

MANY HAZARDS exist in a lab. Safety must be your main priority. Basic lab rules and personal safety concerns have been established to ensure your health and limit any potential harm. There are chemical and fire concerns and equipment safety and handling rules that require specific guidelines to prevent any personal injury. These safety rules and guidelines must be followed to ensure everyone's safety in the lab.

Objectives:

1. Describe basic and personal safety concerns and rules.
2. Describe chemical and fire safety rules.
3. Describe equipment safety and handling rules.

Key Terms:

amp
ampere
flame retardant
fume hoods
inert chemical
lab
lab coat
Material Safety Data Sheets
safety
safety goggles

Basic and Personal Safety Concerns and Rules

Basic safety concerns are the primary responsibility of all students and instructors. All measures must be taken prior to any activity to ensure the safety of everyone in the lap. Authorization is required before any use of machines or equipment; there are no exceptions. Ensure the completion of all safety training before beginning any lab work.

A **lab** is a place equipped for experimental study in a science or for testing and analysis. A research laboratory broadly is a place providing opportunity for experimentation, observation, or practice in a field of study. **Safety** is the condition of being safe from undergoing or causing hurt, injury, or loss. It is required to learn how to use all the safety equipment and know where it is located.

FIGURE 1. Proper safety equipment must be worn at all times in the lab.

BASIC SAFETY CONCERNS AND RULES

All activity that is being performed must be approved by an instructor. Never work alone in the lab. No food or drink is allowed in the lap for safety reasons. Ensure the work area is completely clean before any activity begins. Always completely clean up after working and know the proper procedures to clean up after any accidents or spills.

Read all directions for the machine being used. The directions must be followed exactly as stated. Clarify any unclear directions with you instructor before any work is done. Ensure knowledge of the exact activity being performed and the proper steps are known before any work starts. Read through all the directions of an assignment several times. Write down in order all the steps that are required for a project and review them.

The only activity allowed in the lab is specifically what has been given and instructed to perform. Always act in a responsible manner. Do not walk around the lab and distract other students. Never interfere with someone else's work. Always be aware of others working and the surroundings. Report immediately any unsafe activity.

Know the exact procedures for a fire drill or if the room needs to be evacuated. Know what specific equipment needs to be turned off or shut down in the case of an emergency. Know what materials or chemicals must be contained if the room needs to be evacuated. Know all emergency procedures and the location of eye washes, showers, exits, and any emergency call box.

Always use the fume hood when using any material or process that causes fumes. **Fume hoods** capture, contain and remove through exhaust systems hazardous chemicals. Ensure you know how to operate the fume hood. Know how to use the power supply and the distance to the work must be located near the hood to ensure chemicals are exhausted.

FURTHER EXPLORATION...

ONLINE CONNECTION: How to Use Fume Hoods

Fume hoods are essential part of any lab and must always be used when required. The fume hood acts as an air vacuum chamber that safely removes any dangerous vapors created by certain chemicals or processes. Many of these vapors can be very harmful to breath. The proper use of the hood is essential for your safety.

To learn more about the use of fume hoods visit the web link below:

https://www.youtube.com/watch?v=NM9kj1_UdxM

PERSONAL SAFETY CONCERNS AND RULES

Personal protection and dress code rules are mandatory to follow; they ensure a safe working environment.

Always wear a lab coat or apron when performing any lab work. A **lab coat** is a lightweight, usually white coat, worn to protect clothing when working in a laboratory. Wear appropriate safety goggles or glasses at all times as required. **Safety goggles** are forms of protective eyewear that usually enclose or protect the area surrounding the eye in order to prevent particulates, water or chemicals from striking the eyes.

FIGURE 2. There are many harmful elements in a lab that could cause damage. You must always wear approved personal protection equipment.

Secure all loose items and personal accessories. Always tie back hair to prevent contact with equipment or chemicals. Do not wear loose clothing; long sleeves should be tight and located within the lab coat. Remove or tie back any jewelry. Open shoes are not allowed in the lab; shoes must cover feet completely. Shorts or skirts are not allowed in the lap.

Always wear appropriate gloves relative to the activity. Glove selection is noted on machine instructions and on Material Safety Data Sheets (MSDSs.) **Material Safety Data Sheets** are product guides that give safety information and precautions about a material. Safety gloves include: latex, rubber, neoprene, insulated and fire retardant gloves. **Flame retardant** is a substance that is applied to fabric, wood, or other material in order to make it resistant to catching fire. Ensure that there are no holes or tears in gloves and all clothing.

Chemical and Fire Safety Rules

Chemical, fire safety and heat prevention policies must be followed at all time. You must ensure the entire work area is completely clear when using any chemicals, equipment or material that creates heat or requires a fire.

FIRE SAFETY RULES

Do not heat or apply flame to any material or chemical unless you have been specifically instructed. Do not use a heat or a flame source without being instructed how to ignite it and extinguish it in an emergency. Never leave any heat source or fire unattended. Keep clothing and skin a clear distance from any flames or heat sources. Never allow a liquid that is in a closed container to be exposed to heat; it can expand and explode. Always be aware of any ignition sources in the lab including electrical equipment.

Always wear flame retardant gloves and fabric when working with flames. Use the appropriate gloves or clamps if you are using equipment and materials that have been heated. Always were goggles when using a heat source.

Check all electrical cords and gas supplies to make sure they are in good working condition. Immediately report any irregularities, do not try to fix the problem without consulting an instructor. Know exactly where all fire suppression devices and fire extinguisher are located.

FIGURE 3. You must always know exactly where all the fire suppression devices and extinguishers are located.

CHEMICAL SAFETY RULES

Chemical and material safety rules must be memorized and followed at all times. Properly dispose any item used that produces hazardous waste according to its waste disposal guidelines. Read all the material and chemical guidelines provided by the manufacture. Consult the instructor if the guidelines are not clear or present. Never let a chemical come in contact with your skin. Ensure you know where the fire extinguisher is and have direct access to it if the materials or chemicals are flammable.

Never mix chemicals unless specifically instructed to do so. Some materials and chemicals are poisonous and give off toxic fumes. Always read the manufactures precautions and warning

FURTHER EXPLORATION...

ONLINE CONNECTION: Lab Safety Rules

Your safety in the lab should be your primary concern. There are many hazards and dangerous materials and equipment that can cause harm to you and others. It is important that you always take the time to review all safety precautions and procedures and know where the equipment is located.

To learn more about lab safety rules visit the web links below:

https://blog.sliceproducts.com/lab-safety-rules

provided on the label. Never attempt to inhale fumes. Do not touch or taste any materials or chemicals. Materials and chemicals can potentially be very harmful.

Consult the instructor about the dangers off all materials and chemicals being used including inert chemicals. An **inert chemical** is one that is stable and un-reactive under specified conditions. Inert materials and chemicals have little or no ability to react with other materials and chemicals.

Read the label of all chemical containers several times before opening or removing its contents to ensure safe handling. Keep combustible materials away from open flames. Do not pour any material or chemical down the drains. Sinks and drains in the lab are only for clean water. Never allow chemicals to mix in a sink or drain or waste bin. Ensure proper waste disposal of all materials and chemicals.

Equipment Safety and Handling Rules

ELECTRICAL EQUIPMENT

Electrical equipment safety rules are followed at all times. Know the type and all precautions of any batteries being used. A shorted battery can cause burns and even explosions in some types of battery cells. You must properly dispose of all batteries.

Always check the equipment for heat; even if it has been turned off for awhile it can still be hot enough to cause a burn. Ensure all power is turned off on all equipment and the source disconnected before any repairs are to be made.

Do not operate electrical equipment if clothes or skin are wet. This includes when you are connecting or disconnecting the equipment. Do not engage any electrical equipment if there is water on the floor or a leak.

Always be aware of the electric cord. Do not pull on the cord. Ensure the cord is not a tripping hazard. Ensure the correct cord, power source and allowable amps or ampere are being used for the equipment. An **amp** or **ampere** is the base unit of electric current in the International System of Units. It is a measurement of the electromagnetic force between electrical conductors carrying electric current.

Ensure there are no metal articles, including watches, or metal rulers when using electrical equipment. Never use the electrical equipment to shock someone.

SAFE EQUIPMENT HANDLING

Safe equipment handling must be practiced in all labs. Read the manufacture's safety guidelines before the use of any equipment. The equipment should only be used according to the manufactures instructions. Proper training is required before for the setup of any equipment. Memorize and follow the proper clean up and shut down of the equipment before beginning any work.

Ensure the proper hand and eye protection is being worn according to the manufactures instructions if the equipment requires chemicals or abrasive materials. Thoroughly inspect the equipment before use. Ensure there are no unnecessary items, chemicals, or materials on the equipment.

LASER SAFETY

Lasers can potentially by harmful; one must always follow safety precautions and lab rules. Certified training must be completed before the operation of any laser device, including laser cutters.

Never look into the laser beam. You must always were approved goggles. Laser light can scatter in the room. A shiny surface can cause the light to reflect and accidently shine in your eyes.

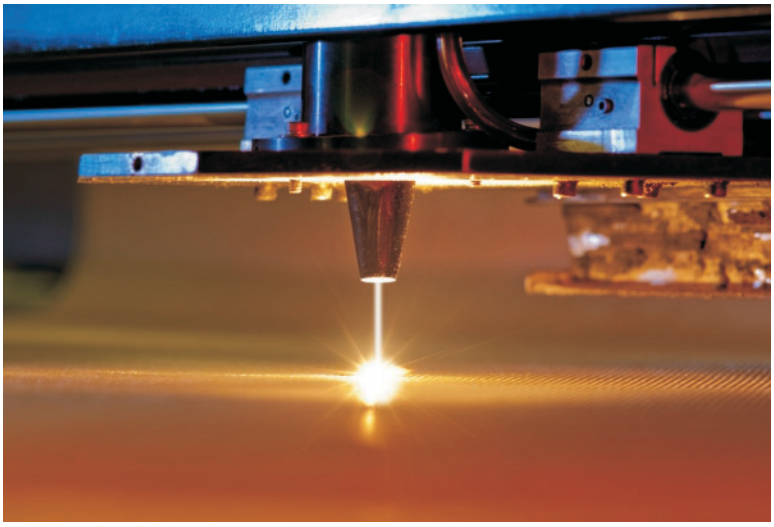

FIGURE 4. You must always review the safety guidelines and standard procedures when using a laser cutter.

Appropriate stops and guards should be used to keep the light from spreading out into the room. You must inform everyone in the room when the laser is in operation. Always stand the designated area when operating the laser. You must always keep the laser below chest level. Ensure your head is not near or at the same level as the light source. You must shut down and turn off the laser equipment before any contact is made with it.

Summary:

Basic safety concerns are the primary responsibility of all students and instructors. All measures must be taken prior to any activity to ensure the safety of everyone in the lap. All activity must be approved by an instructor. Never work alone. Read all

directions and follow them exactly. Personal protection and dress code rules are mandatory.

Chemical, fire safety and heat prevention policies must be followed at all time. Do not heat or apply flame to any material or chemical unless specifically instructed. Always wear flame retardant gloves and fabric.

Chemical and material safety rules must be memorized and followed at all times. Properly dispose all hazardous waste according to its guidelines. Read all the material and chemical guidelines provided by the manufacture.

Electrical equipment safety rules are followed at all times. Check the equipment for heat and be aware of the electric cord. Read the manufacture's safety guidelines; only use it according to the manufactures instructions.

Lasers can potentially by harmful; always follow safety precautions and lab rules. Certified training must be completed before operation. Never look into the laser beam and always wear approved goggles.

Checking Your Knowledge:

1. What are Material Safety Data Sheets?
2. What is a flame retardant substance?
3. When should you wear safety goggles?
4. What is your primary concern in a lab?
5. What is an inert chemical?

Expanding Your Knowledge:

Laboratory safety is your number one priority. Each piece of equipment, machine and material all have their own safety precautions and guide lines. It is good practice to read through all their guidelines, take notes and then review them on a regular basis to ensure your knowledge is always up to date.

Web Links:

The 10 Most Important Laboratory Safety Rules
https://www.thoughtco.com/important-lab-safety-rules-608156

Laboratory Safety Manual
https://ehs.ucsc.edu/lab-safety-manual/

OSHA Laboratory Safety Guidelines
https://www.osha.gov/Publications/laboratory/OSHA3404laboratory-safety-guidance.pdf