

# Laboratory Safety Orientation FACT SHEET

**LENGTH: 21 MINUTES**

**Production Year: 2023**

## **PROGRAM SYNOPSIS:**

Due to the nature of laboratory work, laboratory workers have the potential to be exposed to hazardous and/or infectious materials, as well as many other potential hazards such as glassware, hot materials, compressed gases, electrical hazards, slip and fall hazards, fire hazards, and more.

In this program, we will discuss some common laboratory hazards and learn about the safe work practices and procedures that may be used to control hazards and prevent injuries to laboratory workers.

## **PROGRAM OBJECTIVES:**

After watching the program, the participant should be able to explain the following:

- How to identify hazards;
- The use of personal protective equipment;
- The proper use of lab fume hoods;
- How to avoid contamination;
- Safety equipment and emergency response in the lab;
- Proper waste disposal and housekeeping;
- The use of glassware and compressed gas cylinders;
- The importance of a safety mindset;
- The chemical hygiene plan.

## **PROGRAM OUTLINE:**

### **INTRODUCTION**

- A laboratory is a unique working environment and laboratory workers perform a wide variety of tasks, processes, and procedures.
- Due to the nature of laboratory work, laboratory workers have the potential to be exposed to hazardous and/or infectious materials, as well as many other potential hazards such as handling glassware, working with hot materials, working with and transporting compressed gases, electrical hazards, slip and fall hazards, fire hazards, and more.
- To prevent injuries and incidents, laboratory safety must be top of mind for all laboratory workers and their employers.
- In this program, we will discuss some common laboratory hazards and learn about the safe work practices and procedures that may be used to control hazards and prevent injuries to laboratory workers.

### **HAZARD IDENTIFICATION**

- One of the most common hazards faced by laboratory workers is being exposed to a hazardous chemical or substance.
- To properly protect themselves from harmful exposure, lab workers must be able to easily identify the chemicals they plan to work with and quickly determine the chemical's hazards and any necessary safety precautions.
- There are two primary sources for this information: the chemical's label, and its Safety Data Sheet or SDS.
- The label provided by a chemical's manufacturer will contain the name of the chemical, a signal word of either "warning" or "danger", pictograms that indicate the health hazards and/or physical hazards presented by the chemical, as well as precautionary statements and hazard statements related to the substance.
- Chemical labels must not be removed or defaced and must remain legible at all times.
- Laboratory workers should read and understand the information presented on chemical labels prior to use and seek assistance in interpreting this information when needed.
- Another valuable resource for lab workers is the chemical's Safety Data Sheet or "SDS."
- Every laboratory is required to maintain a Safety Data Sheet for each chemical in the lab, and these SDS's are always available for lab workers to review.

- Many laboratories utilize digital Safety Data Sheets, and each laboratory worker must understand how to access this important information.
- A Safety Data Sheet contains 16 sections of detailed information about a chemical, such as its health effects, exposure limits, the protective equipment required, spill response, first aid, and storage and disposal considerations.
- To locate a chemical's SDS, you will need to know the proper name of the chemical.
- This is just one reason why all secondary storage containers must also be labeled with the name of the chemical it contains. Never use any chemical from an unlabeled storage container.
- The only exception to this rule is when you have placed a small amount of a chemical into a container for immediate use and the unlabeled container remains under your direct control.

### **PERSONAL PROTECTIVE EQUIPMENT**

- For laboratory workers, personal protective equipment or "PPE" serves two main purposes: to protect the worker from injury and/or exposure to hazardous materials, and to help prevent contamination.
- The minimum PPE required for laboratory workers will vary depending on the work being performed and the types of hazards present. All required PPE will be supplied to you by your employer at no cost.
- A lab coat is usually the preferred outerwear to protect lab workers against minor spills and splashes and to prevent contamination of clothing.
- Safety glasses with side shields are used to protect eyes from flying debris and minor eye hazards, and splash goggles and face shields are used when there is a risk of being splashed with a harmful substance.
- Laboratory workers are on their feet for many hours each day and it's important to wear comfortable footwear. However, not just any footwear is allowed.
- Closed-toed footwear with slip-resistant soles are typically required, and some labs also require shoes with a reinforced toe box to protect toes from dropped objects.
- To protect their hands, laboratory workers must select the proper glove for the job.
- In many cases, latex or nitrile gloves will be sufficient to protect against incidental exposure to low-strength irritants or infectious materials.
- When working with higher concentrations of caustics, a more robust chemical-resistant glove should be used. When handling hot glassware or other hot materials, a heat-resistant glove will be required.
- Always make sure you are using the correct glove for the job and for any chemicals being handled.
- Other, more specialized PPE such as respirators, chemical resistant suits, or infection-control gowns, may be required for certain processes or procedures.
- Section 8 of a chemical's Safety Data Sheet contains PPE information. If you are ever unsure of the protective equipment required to perform your work safely, stop and seek assistance.

### **LABORATORY FUME HOODS**

- Laboratory fume hoods are used to reduce employee exposure to harmful fumes, vapors, or gases by using a blower to direct airflow away from the user.
- Some hoods also filter or capture contaminants to prevent their release into the environment.
- Hoods must be inspected and tested periodically by a qualified person or vendor.
- Prior to each use, ensure the hood's exhaust system is operational.
- When working inside a hood, lowering the sash will improve the airflow directed away from the user while also providing a protective barrier between the lab worker and the process being performed.
- The exhaust system should remain on at all times while the hood is in use.
- Cap or cover all chemical containers that are inside the hood while not in use.
- Perform all work at least 6 inches from the hood opening, and do not place your head inside the fume hood.
- Also, fume hoods should not be used as permanent storage areas for chemicals or equipment.
- Remove all reagents, chemicals, and equipment related to a prior process before setting up another.

### **PREVENTING CONTAMINATION**

- All laboratory workers must stay vigilant in their efforts to prevent spreading contamination. Not only is contamination harmful to the quality of laboratory operations and test results, but spreading contamination outside the laboratory also places others at risk of exposure to harmful substances.
- After completing a laboratory procedure, immediately discard any disposable PPE that may be contaminated.

- Don new gloves or PPE as required, then clean and decontaminate the work area and any equipment, glassware, PPE, or other items used.
- To prevent carrying contaminants outside the lab, remove all PPE, disposable coverings or outerwear, lab coats, and similar items before leaving the lab area.
- Be sure to place these items into the proper containers so they may be disposed of properly or laundered and reused.
- Never bring these potentially contaminated items home with you, and do not wear them into cafeterias, break rooms, or other areas where eating or drinking may take place. And of course, never eat, drink or apply cosmetics in the lab or in any area where chemicals or infectious materials may be used or stored.
- And finally, thoroughly wash your hands before leaving the lab area.

### **SAFETY EQUIPMENT AND EMERGENCY RESPONSE**

- All laboratory workers must be familiar with the location of safety and emergency equipment such as fire alarm stations, fire extinguishers, safety showers, and eye wash stations.
- All employees must also be made familiar with the lab's Emergency Action Plan, which includes learning the location of all exits, storm shelters, and rally points.
- Lab workers should know the location of at least two exits from their immediate work area. This is important in case the preferred exit is inaccessible during an emergency.
- One of the most important pieces of safety equipment in the lab is the safety shower or eye wash station. All laboratory workers should be able to locate the nearest ones, even with their eyes closed.
- A chemical splash to the eyes will often leave a person unable to see, and quickly locating and using an eye wash is critical to minimizing any potential eye damage.
- To properly use an eye wash, you will need to hold your eyes open with your fingers and keep them in constant contact with the flushing fluid.
- Similarly, if splashed on the body with a caustic substance or other hazardous material, it's critical to quickly remove all affected clothing and thoroughly rinse the exposed area under a safety shower or other high-volume water source.
- Responding to a harmful chemical exposure is no time to be bashful. All contaminated clothing and undergarments should be removed during the rinsing process to ensure no chemical remains in contact with the skin.
- When using an eye wash or safety shower, continue rinsing the affected area for a minimum of 15 minutes. Exposure to corrosives or strong alkalis requires rinsing for 30 minutes or longer.
- Make sure you understand the proper exposure response to the specific chemicals and materials in your work area.
- Another potential laboratory emergency is a fire.
- If you see any indication of a fire, immediately notify other workers in the surrounding area by shouting "Fire!" and initiate an evacuation.
- Then, activate the nearest fire alarm station to alert the fire department and other emergency responders.
- As you are evacuating, isolate the fire by closing the hood sash, lab doors, and corridor doors. These actions may prevent the fire from spreading.
- Some organizations train and authorize certain employees to use fire extinguishers. But even when this is the case, fire extinguishers are only effective on small, incipient-stage fires.
- Before using a fire extinguisher, make sure you have a clear exit path behind you and evacuate immediately if the fire grows larger.
- Do not attempt to use a fire extinguisher if you are not trained and authorized to do so. Evacuate the lab and leave the firefighting to the professionals.

### **WASTE DISPOSAL AND HOUSEKEEPING**

- Laboratory workers should make it a habit to follow good housekeeping practices. Housekeeping is important for safety, sanitation and hygiene, and fire prevention.
- To prevent tripping hazards, do not store any items in walkways or aisles. Also, do not run electric cords or hoses in areas where they create a tripping hazard.
- Clean up or mark any non-hazardous spills right away to prevent slips and falls.
- Clean up and sanitize your work area after each process, being sure to dispose of your cleaning materials in the proper waste container. Many labs have stringent disposal requirements for various waste streams.

- Wash used glassware promptly after use and be sure to use distilled water as the final rinse if required for your process.
- Hang glassware on a sturdy peg to dry or place it in a secure strainer.
- Once dry, always return glassware to its proper storage location. This minimizes the risk it will get broken and allows the next user to easily find what they need.
- Of course, some laboratory operations, processes, and spill clean-up will generate hazardous waste; lab workers must understand how to dispose of this waste properly.
- Hazardous waste must be stored in properly labeled, leak-proof containers.
- Hazardous waste containers must remain closed with an air-tight seal when not in immediate use.
- After cleaning up a spill of hazardous material, all absorbates and other contaminated items may also be considered hazardous waste and must be disposed of according to your lab's procedures.
- Infectious material must also be disposed of properly. Discard all items potentially contaminated with infectious material into a proper biohazard container and follow your laboratory's procedures for sanitizing this material and/or disposing of it properly.
- Be sure to clean and sanitize any reusable PPE as well as working surfaces that may have been contaminated with infectious material.
- And finally, be sure to return all chemical containers to their proper storage location after obtaining the amount needed for your process.
- Certain chemicals cannot be stored together, so it's important to understand the proper storage location for the chemicals in your lab. If you are unsure, ask.
- When working with flammable chemicals, immediately return the container to a flammable liquid storage cabinet after withdrawing only the small amount needed for your process.
- Never allow flammable materials or containers to accumulate on your work benches or inside hoods.

#### **HANDLING LABORATORY GLASSWARE**

- Laboratory glassware comes in many sizes and shapes and is used for a wide variety of purposes.
- Always inspect glassware before use. Damaged glassware can leak, break, or even shatter violently when placed under heat or pressure.
- Discard any glassware that is cracked, chipped, or otherwise damaged into a waste container designed for this purpose.
- Be aware that hot glassware can cause severe burns to an unprotected hand. Always wear heat-resistant gloves when you suspect glassware may be hot.
- Hold glassware under its bottom when carrying it, especially when it contains material. The delicate neck or pipettes on some glassware is not strong enough to use as a handle.
- When glassware does break, do not handle the broken glass directly. Use tongs and/or a broom and dustpan to avoid being cut or punctured by glass shards.

#### **COMPRESSED GAS CYLINDERS**

- Compressed gases are often used in laboratories, and compressed gas cylinders have special handling and storage requirements.
- First, gas cylinders should always be stored away from any source of flames or sparks. And the cylinder's safety caps must always remain in place when the cylinder is not in use.
- Also, while stored, gas cylinders must remain chained to the wall or other sturdy structure, so they won't fall.
- To move a gas cylinder a short distance, it may be tilted and carefully rolled on the edge of its base.
- Always use an approved cart or dolly to move a cylinder any significant distance. When doing so, the cylinder must be chained to the cart and the safety caps must be in place.

#### **SAFETY MINDSET**

- Laboratory workers should always have a safety mindset.
- Before starting a new process, experiment, or procedure, take a few moments to get organized.
- Gather all of the glassware, equipment, tools, PPE, and other items needed before beginning.
- Inspect all PPE, glassware, and equipment before use, and make sure all electrical cords are in good condition.

- Consider the chemicals or materials you plan to use and review their SDS and chemical labels if any of them are unfamiliar to you.
- Ensure you have the correct PPE for the job and make sure you understand how to respond should a spill or exposure take place.
- Every lab has standard operating procedures for the work to be performed. Make sure you are familiar with your lab's SOP for the work you intend to do, and do not hesitate to seek assistance if you are unsure.
- Always stay alert for hazards or unsafe conditions as you move about the lab. Correct or report any safety issues right away.

### **CHEMICAL HYGIENE PLAN**

- In this program, we have provided an overview of common laboratory hazards and safety procedures. Of course, every lab has its own unique processes, procedures, and hazards that its laboratory workers must be aware of.
- This is why many labs are required to develop a Chemical Hygiene Plan as well as Standard Operating Procedures.
- The purpose of a Chemical Hygiene Plan is to provide guidelines for prudent practices and procedures for the use of chemicals in the laboratory.
- The plan includes lab-specific procedures to ensure that workers are protected from the health hazards presented by the chemicals used in the laboratory.
- As a laboratory worker, you should become familiar with your lab's Chemical Hygiene Plan and Standard Operating Procedures.
- In addition, laboratory workers will be provided with information and training relevant to the hazards of the chemicals present in their laboratory.
- As a laboratory worker, you will receive additional training on the following: the location and availability of the Chemical Hygiene Plan, the exposure limits for the hazardous chemicals present in the laboratory, the signs and symptoms associated with exposure to hazardous chemicals in the laboratory, how to recognize a leak or spill of the specific chemicals in the lab, and the specific measures workers can take to protect themselves from lab-specific chemical hazards including PPE, appropriate work practices, and emergency procedures.

### **CONCLUSION**

- As a laboratory worker, you have been given a large amount of responsibility. You are tasked to work with and near a wide variety of hazards, including chemical hazards. Always make sure you fully understand the safety requirements of the work that you intend to perform. Stop and seek assistance if you are ever unsure.
- As we have discussed, you have a variety of resources at your disposal to ensure you remain safe while working with chemical hazards in the laboratory. Use these resources, as well as your training and commitment to safety, to ensure that you leave the laboratory at the end of each day safe, healthy and injury-free.

## **LABORATORY SAFETY ORIENTATION**

### **ANSWERS TO THE REVIEW QUIZ**

1. a
2. b
3. a
4. a
5. b
6. b
7. a
8. a
9. a
10. a

**LABORATORY SAFETY ORIENTATION**  
**REVIEW QUIZ**

Name \_\_\_\_\_ Date \_\_\_\_\_

*The following questions are provided to determine how well you understand the information presented in this program.*

1. There are two primary sources for a chemical's hazard information: the chemical's label, and its Safety Data Sheet or SDS.
  - a. True
  - b. False
  
2. Lab workers can use any footwear as long as it's comfortable.
  - a. True
  - b. False
  
3. The exhaust system should remain on at all times while the hood is in use.
  - a. True
  - b. False
  
4. After completing a laboratory procedure, immediately discard any disposable PPE that may be contaminated.
  - a. True
  - b. False
  
5. When using an eye wash or safety shower, continue rinsing the affected area for only 5 minutes.
  - a. True
  - b. False
  
6. Discard all items potentially contaminated with infectious material into the regular trash.
  - a. True
  - b. False
  
7. Hold glassware under its bottom when carrying it, especially when it contains material.
  - a. True
  - b. False
  
8. While stored, gas cylinders must remain chained to the wall or other sturdy structure, so they won't fall.
  - a. True
  - b. False
  
9. Always stay alert for hazards or unsafe conditions as you move about the lab.
  - a. True
  - b. False
  
10. The purpose of a Chemical Hygiene Plan is to provide guidelines for prudent practices and procedures for the use of chemicals in the laboratory.
  - a. True
  - b. False