

# CHEMICAL LAB SAFETY RULES



## Unit Overview

This unit provides most of the safety rules that you should follow when working in a lab that contains chemicals and hazardous materials.

Many of these rules are common sense.

Applying these rules at all times, ensures that any environment you work in will be a safe environment.

## Objective

Given a real life situation, state the chemical lab safety rules that one would be required to follow in order to maintain a safe environment for employees and product.

# Why do we have rules?

*Would it be safe to drive a car without knowing the rules of the road?*

**Of course not!**

It's the people that don't apply these rules that cause accidents. Yes, accidents can still occur, but running red lights and stops signs increase the chance for accidents to happen.

The same situation applies in a laboratory or manufacturing facility. Those who apply the rules help to create and maintain a safe environment. Those who don't, create a hazard for everyone.

# What We Need to Know

Employers, employees, students, instructors – anyone working with or around chemicals

- ❖ must understand what they are working with,
- ❖ must know how to protect themselves and others, and
- ❖ must have access to and be able to interpret information about the chemicals in their work or educational environment.

# General Lab Safety Rules

- ❖ Always look for any dangers upon entering.
- ❖ Locate the Emergency Exits, study the evacuation plan.
- ❖ Locate safety showers, eye wash stations and First Aid kits.
- ❖ No horseplay.
- ❖ Develop an attitude of safety awareness! Safety First!



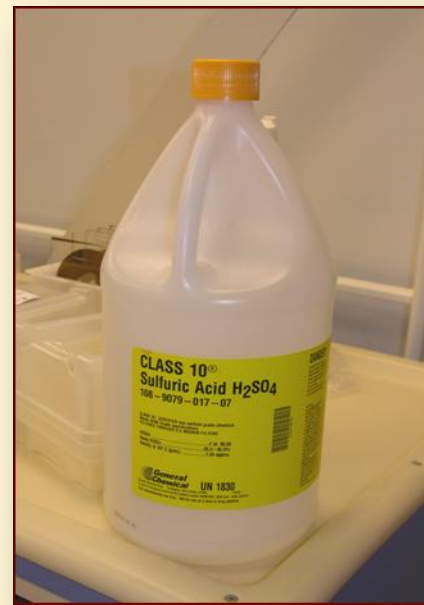
*Eye wash Station*

# General Chemical Safety

- ❖ Treat all chemicals and gases with the greatest respect.
- ❖ Avoid the use of contact lenses while working with chemicals - even under splash goggles.
- ❖ If you are pregnant, check to ensure that it is safe for you to be in the facility.
- ❖ **USE THE BUDDY SYSTEM.** Work within sight and hearing of at least one other person who is familiar with the kind of work you are doing.

# MSDS and Chemical Labels

- ❖ Study the MSDS for chemicals in your area.
- ❖ Read all labels carefully. Do NOT use a chemical if it has no label.
- ❖ Ensure all chemical containers have the proper label.
- ❖ Never obscure, deface, or remove any label.



*Chemical Label*



# Working Around Chemicals

- ❖ NEVER touch, smell, or taste an unknown liquid, gas, or solid.
- ❖ When working with chemicals, never touch your face or any exposed skin.
- ❖ Do not eat, drink, or smoke when working around chemicals.
- ❖ Do not store foodstuffs, cigarettes, gum, etc. where they could be contaminated.
- ❖ Do not touch anything with chemically contaminated safety equipment or tools.
- ❖ Never use sharp objects around chemical bottles.

# Working Around Gases

- ❖ ALL compressed gas cylinders are dangerous!
- ❖ Know the physical hazard of the gases / compressed gases that you are working around.
- ❖ Never use sharp objects around gas bottles.
- ❖ Do NOT change out a compressed gas cylinder unless properly trained and wearing the proper PPE.
- ❖ Never mix gases or any chemicals that are incompatible.

# Before Working with a Chemical

- ❖ Keep an ear on the ventilation system.
- ❖ Never adjust a ventilation sash.
- ❖ Wear the required PPE for the material you are handling.
- ❖ **In all cases**, wear safety glasses.



*Gloves for Working with Corrosives  
[Photo courtesy of Bob Willis]*

# Transferring Chemicals

- ❖ When carrying bottles of chemicals, support them from the bottom as well as from the neck.
- ❖ Never walk with open containers/ beakers.
- ❖ Do not take or store more of a chemical substance than is necessary for immediate need. Use small bottles with proper labeling.
- ❖ For chemicals that have been heated, cool to room temperature before pouring back into solvent bottle.

# Pouring Chemicals

- ❖ Pour a chemical at the bench designed for its properties.
- ❖ Check the surroundings for sources of ignition or obstructions.
- ❖ Twist the bottle cap off SLOWLY.
- ❖ Never pour excess chemicals back into stock bottle.
- ❖ Never mix corrosive chemicals with organics or solvents.



*Always pour chemicals at a ventilated workbench*

# Working with Flammables

- ❖ Use appropriate PPE for solvents
- ❖ Use Solvents / Flammables only in areas approved / designed for their use
- ❖ Never use a heat source near flammables / solvents.
- ❖ Know a chemical's flashpoint.
- ❖ Never fill a bottle with a flammable liquid more than 75% of total volume.
- ❖ Never mix solvents with corrosives.

# Working with Corrosives

- ❖ Always use proper PPE.
- ❖ Remember the AAA Rule:  
“Always Add Acid to water”  
never the reverse.
- ❖ When adding several acids/bases always add the weaker acids/bases first.
- ❖ Dispose of wipes into an appropriately labeled corrosive disposal container



*PPE for Working with Corrosives*

# Storing Chemicals

- ❖ Store solvents in the cabinets clearly marked “Solvents”.
- ❖ Store corrosives in the cabinets clearly marked “Corrosives” cabinet.
- ❖ Do NOT store food or drinks in the same cabinet or refrigerator that is used for chemical storage.
- ❖ When returning chemicals to storage, always store chemicals in their proper locations.



# Disposing of Chemicals

- ❖ Dispose of all chemicals in the designated locations.
- ❖ Never pour solvents down the Corrosives Chemicals drains!
- ❖ Only Corrosive Chemicals should be disposed of through the Corrosives Waste drain.
- ❖ If properly trained, collect flammables in appropriate containers (usually the bottle that it came in) and send out for disposal.

# Waste Disposal

- ❖ Dispose of waste in its proper container.
- ❖ Dispose of corrosive contaminated materials into the disposal container marked "Corrosives".
- ❖ Dispose of flammable contaminated materials into waste containers marked "Flammables."
- ❖ Dispose of regular non-contaminated waste into regular waste containers, NOT in the corrosives or flammables containers.
- ❖ Dispose of sharps in the container marked "Sharps Only."

# Spills of Leaks

- ❖ Treat all spills and leaks as hazardous.
- ❖ Never attempt to clean a spill.
- ❖ Rinse off safety equipment and wipe dry BEFORE removing.
- ❖ Clean tools that come in contact with the chemical.
- ❖ Clean the work station after use.



*Cleaning Tools after Use*

# Splashes

If an acid or caustic splashes on you, immediately go to the Safety Shower, pull the chain, and remain under the shower for 30 minutes or until help arrives.



*Shower Safety*

# CO<sub>2</sub> Fire Suppression Systems

- ❖ In case of a chemical fire, a suppression system floods the room as well as adjoining service chases with CO<sub>2</sub>. This removes all the oxygen from the environment.
- ❖ When a fire suppression system is activated, get out of the facility as safely and quickly as possible. Make sure your buddy is with you!
- ❖ Never enter the facility if the fire suppression system has been activated.
- ❖ Wait until the Fire Department and proper personnel have said that it is safe to re-enter.

# OSHA Compliance

- ❖ Never work in an unsafe area.
- ❖ Always know the evacuation routes.
- ❖ Always be aware of your surroundings.
- ❖ Always use appropriate PPE where required.
- ❖ Report any unsafe work conditions immediately.
- ❖ Report any unsafe work habits immediately.
- ❖ Report any life endangering issues immediately

# Putting It All Together

Your supervisor has instructed you to go into the lab and check all wet benches (solvent and acid benches) for splashes and cleanliness.

It's been a couple of weeks since you have been in the lab and you know that some things have been moved around.

List the safety rules that you would apply and the sequence that you would follow to complete this task.

## Summary

All labs, manufacturing facilities and research facilities require that anyone who enters the area apply appropriate safety rules.

Each facility has different chemicals but they all have the same basic rules.

**Know the rules! Apply the rules!**



## Disclaimer

*The information contained herein is considered to be true and accurate; however the Southwest Center for Microsystems Education (SCME) makes no guarantees concerning the authenticity of any statement. SCME accepts no liability for the content of this unit, or for the consequences of any actions taken on the basis of the information provided.*

# Acknowledgements

Made possible through grants from the National Science Foundation Department of Undergraduate Education #0830384, 0902411, and 1205138.

Any opinions, findings and conclusions or recommendations expressed in this material are those of the authors and creators, and do not necessarily reflect the views of the National Science Foundation.

Southwest Center for Microsystems Education (SCME) NSF ATE Center  
© 2009 Regents of the University of New Mexico

Content is protected by the CC Attribution Non-Commercial Share Alike license.

Website: [www.scme-nm.org](http://www.scme-nm.org)