Laboratory Safety, Chemical Hygiene, and Emergencies

Created with Presentations from the State Office of Risk Management’s Hazard Communication, OSHA’s GHS Guide, UH Downtown’s MSDS, and UHCL Lab Emergency & Fire Training

Lab Safety Overview

- Your Responsibility
- M/SDS Sheets
- Compound Identification
- Hazards, Effects, Routes of Exposure, Terms
- Chemical Hygiene/Hazard Communication
- Global Harmonization System (GHS) versus NFPA diamond
- Waste Disposal
- Personal Protection
- First Aid
- Chemical Emergencies
- Safety with Chemicals
- Glassware
- Eating, Drinking & Smoking
You and the University are both responsible for your personal safety. You are expected to work safely.

The university is responsible for providing you a safe laboratory environment, giving you instruction on proper procedures, training you on potential hazards in the laboratory, and giving you safe practices to follow.

You are responsible for following all safety instructions given by your teacher and teacher’s assistant, and any other materials given in lecture, textbook, experiment procedures, etc. You are responsible for reading product labels and Material Safety Data Sheets to be aware of material hazards, and adhering to the personal protective equipment requirements.

Immediately report any unsafe working condition to your instructor so it may be corrected as soon as possible.

An MSDS can be intimidating, but please be aware:

- It contains important information you may need to reference for safe handling precautions or in the event of a spill or accident.
- You should read and know how to access the MSDS for each chemical you work with, before beginning work.
- Your instructor will make every attempt to keep your exposure to hazardous chemicals low.
- The experiments have been designed with safe practices to eliminate as many hazards as is feasible.
- Some hazards are always present in a chemistry laboratory, but with appropriate facilities (measuring devices, transfer tools, fume hoods, etc.) and instruction you should be able to work safely.
### Material Safety Data Sheets

The M/SDS Contains the following information:

1. **Identification of Chemical** Product, Company and Emergency Contact Information
2. **Hazard(s) identification** (Toxicology information, route of entry, carcinogenicity, exposure limits etc.)
3. **Composition/information on ingredients**
4. **First-aid measures**
5. **Fire-fighting measures**
6. **Spill / Accidental release measures**
7. **Handling and storage**
8. **Exposure control/Personal Protective Equipment (PPE) Recommendations**
9. **Physical and chemical properties**
10. **Stability and reactivity**
11. **Toxicological information**
12. **Ecological information**
13. **Disposal considerations**
14. **Transport information**
15. **Regulatory information**
16. **Other information**
Often a chemical will have more than one appropriate name. For instance, all of the following are names given for acetone: acetone, dimethyl ketone, and 2-propanone. A chemical may also have different names in other languages (German, French, etc.)

To avoid confusion, the Chemical Abstracts Service (CAS) assigns a unique number, the CAS Number, to each compound. You will find this universal number in the MSDS along with the names.

This number allows an easy computer search for information about a compound, and will help you find the appropriate MSDS. Emergency personnel can readily access safety information with this number, and chemists can use it to find literature articles or to order it.

### Basic Chemical Hazards

- **Flammable** - chemicals that will ignite and burn easily, sometimes vaporizing to form flammable or explosive mixture with air. Caution must be taken with these materials to separate from flame and heat sources.
  - **Auto-ignition Temperature** - the lowest temperature upon which a material will ignite without an external source of ignition. Heating to this point may result in explosion.
  - **Oxidizers** - may cause a fire when they come in contact with other chemicals and are extremely reactive
    - **Volatile compounds** - readily evaporate (form a vapor) when left in an open container. The vapor could be flammable or toxic
  - **Corrosive** - chemicals that will damage (burn) your skin:
    - Corrosive: usually applies to acids
    - Caustic: usually applies to bases
Special Hazards
(may only be present in certain research labs)

- Peroxidizable - materials that can form peroxides during storage, generally after contact with the air. Special precautions must be taken to test for peroxides and routinely discard. Commonly used compounds can explode upon heating or distilling, but some may also be sensitive to shock or opening the container. Do not open or use any that do not have the date opened written on the container or any test data within a year of opening.

- Pyrophoric - a substance that reacts or ignites upon contact with air at temperatures below 45°C, or sometimes the moisture in air, or water itself.

- Spontaneously combustible - material that can ignite without an external source of heat, perhaps by reaction with oxygen in the air, by absorption of moisture, or from heat generated during processing.

TOXICITY

- Toxicity relates to the adverse effects of a chemical on a living system.

There are two timeframes to toxic effects:

- Acute Toxicity: the chemical’s adverse effects occur within a short time after exposure, sometimes after a single exposure. Acute effects may be severe.

- Chronic Toxicity: the chemical’s effects occur much later (days, months, years), and may be because of repeated exposure, possibly smaller doses. Chronic effects are often the hardest to diagnose because of the delay in response and lack of supporting evidence.

- The MSDS gives information about toxicity which should help guide you to the proper PPE and handling safeguards to prevent exposure.

- Manufacturer’s are required to study toxicity of new chemicals and report new adverse effects. However, toxicity of chemicals is not always known and chemicals should always be handled with caution.
Special SDS Toxicity Terms

Toxic compounds may list specific actions:

- **Carcinogen**: known to cause Cancer
- **Teratogen**: causes Birth Defects or Fetal Death
- **Hepatotoxic**: cause Liver damage
- **Nephrotoxic**: cause Kidney damage
- **Neurotoxic**: damages the Nervous system
- **Hematopoietic**: damages Blood cells and/or Bone marrow
- **Clastogen**: causes chromosomal breaks in cells, which causes mutated cells possibly leading to cancer. Example: Benzene, Arsenic

- **Systemic poison**: can cause severe poisoning or even death by remote exposure such as a small amount onto the skin. Phenol, hydrofluoric acid, and Methyl Mercury are examples of systemic poisons. Extreme care and special protective equipment and procedures are required for the use of these materials.

SDS: Effects that may be listed

- **Asphyxiant**: displaces air and/or reduces the level of oxygen in the body to dangerous levels. No pain is felt, the only indication may be light-headed or sleepiness.
- **Sensitizer**: causes reaction, often to the skin, possibly after repeated exposure
- **Irritant**: causes inflammation of the skin, mucous membranes, or lungs
- **Hygroscopic**: a material which attracts moisture. Some dry forms may create a solution upon contact with air, and some may dry out the skin
- **Vessicant**: causes severe, painful skin, eye and mucous membrane irritation often referred to as chemical burns or water blisters
- **Lachrymator**: causes tears and eye irritation
- **Sternutator**: irritates the nasal and respiratory passages and causes coughing, sneezing, lachrymation (tearing of the eyes), and possibly vomiting
SDS: Exposure Terms

- **LD50** - Lethal Dose to 50% of the population
  When this amount of chemical is taken (by contact or ingestion) 50% of the test subjects (usually mice) die. Reported in mg of substance per kg body weight. The smaller the number, the more lethal the substance is.

- **TLV** - Threshold Limit Value
  The maximum established amount a worker may be exposed to in the 8-hour day/40-hr week work environment without requiring additional controls or PPE to reduce exposure. Reported in mg/m³ or ppm as a volume of air space in the room.

- **PEL** - Permissible Exposure Limit
  A legal standard of exposure in the workplace for a typical 8-hr work day. This value may not be exceeded.

- **STEL** - Short Term Exposure Limit
  The maximum amount believed (not necessarily known to be) safe for a single short term exposure (<15 minutes), which should not be exceeded.

- **IDLH** — Immediately Dangerous to Life and Health
  An atmospheric concentration of any toxic, corrosive or asphyxiant substance that poses an immediate threat to life or would cause irreversible or delayed adverse health effects or would interfere with an individual's ability to escape from a dangerous atmosphere. [29 CFR* 1910.120]
### NFPA Diamond Special Hazards

#### Special Hazards

This section is used to denote special hazards. There are only three NFPA 704 approved symbols:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OX</td>
<td>This denotes an oxidizer, a chemical which can greatly increase the rate of combustion fire.</td>
</tr>
<tr>
<td>SA</td>
<td>This denotes gases which are simple asphyxiants. The only gases for which this symbol is permitted are nitrogen, helium, neon, argon, krypton, and xenon. The use of this hazard symbol is optional.</td>
</tr>
<tr>
<td>W</td>
<td>Unusual reactivity with water. This indicates a potential hazard using water to fight a fire involving this material. When a compound is both water-reactive and an oxidizer, the W indicator should go in this quadrant and the OX warning is placed immediately below the NFPA diamond.</td>
</tr>
</tbody>
</table>

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### NFPA Special Hazards (cont’d)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACID</td>
<td>This indicates that the material is an acid, a corrosive material that has a pH lower than 7.0</td>
</tr>
<tr>
<td>ALK</td>
<td>This denotes an alkaline material, also called a base. These caustic materials have a pH greater than 7.0</td>
</tr>
<tr>
<td>COR</td>
<td>This denotes a material that is corrosive (it could be either an acid or a base).</td>
</tr>
<tr>
<td></td>
<td>This is another symbol used for corrosive.</td>
</tr>
<tr>
<td></td>
<td>The skull and crossbones is used to denote a poison or highly toxic material. See also: CHIP Danger symbols.</td>
</tr>
<tr>
<td></td>
<td>The international symbol for radioactivity is used to denote radioactive hazards; radioactive materials are extremely hazardous when inhaled.</td>
</tr>
<tr>
<td></td>
<td>Indicates an explosive material. This symbol is somewhat redundant because explosives are easily recognized by their Instability Rating.</td>
</tr>
</tbody>
</table>
GHS vs NFPA Hazard Ratings

The Number system for GHS Hazards (on Safety Data Sheets or SDS) is Opposite of NFPA’s diamond hazard system.

<table>
<thead>
<tr>
<th></th>
<th>Most Severe</th>
<th>Least Harmful</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFPA</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>GHS</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

Since GHS is geared for chemical users, not emergency responders, think: **GHS is alerting me of what the #1, top hazard is.**

Common Routes of Exposure

Inhalation

This is the most common mode of exposure. Some chemicals have no odor (like Mercury); some odors you get used to after a while (attenuated) or your nose loses the ability to smell it. Strength of odor is not equal to how toxic it may be or how concentrated they are.

Skin and Eye Contact

You may think of skin as barrier, but chemicals can penetrate the skin. Chemical vapors, gases, aerosols, or mists can be absorbed through the mucous membranes of the eyes, mouth, nose, throat or skin. Contact may be indirect such as when you adjust your glasses while wearing dirty gloves and then later adjust your glasses with gloves off, or contact with items contaminated by others.

Eye exposure can be indirect through vapors, or direct via a splash (when not wearing goggles), or by touching your eye while your hand or glove is contaminated by a chemical.
**Common Routes of Exposure**

**Ingestion**

Ingestion is usually by accident. It is avoided by never eating or drinking in the laboratory, and by washing your hands after working with chemicals, not touching your face or mouth when working with chemicals, etc.

**Injection**

This can occur by skin puncture with a dirty piece of glassware or apparatus or accidental needle injury. Breaking a piece of glassware is a common route; chemicals can enter through a cut.

**Product Labels**

Most chemical products contain hazard information. Here is an example. Reputable companies may provide this information on the label, though warnings weren’t required before 1985, and no format is required until full effect of Global Harmonized System on 6/1/15.
When using a chemical from the manufacturer’s original container, note that the label on the container is required to specify known hazards, and the most important information from the MSDS sheet.

Chemicals distributed prior to 1985, however, may not include hazard warnings.

The label on a chemical includes:
- The name of the product,
- The name and address of the manufacturer
- The physical and health hazards,
- The NFPA diamond and/or GHS warning system
New GHS Product Labels

Identifier: NONEXUP7042012

DANGER:

Hazard Statements:
- Extremely Flammable Gas
- May Cause Cancer
- May Cause Respiratory Irritation
- In Contact with Water Releases Flammable Gas

Precautionary Statements:
- Keep away from heat/sparks/open flames/hot surfaces. No Smoking
- Obtain special instructions before use.
- Do not handle until all safety precautions have been read and understood.
- Avoid breathing vapors and mists.
- Wear protective gloves and eye protection.
- If swallowed: Remove person to fresh air and keep comfortable for breathing.
- Call poison center doctor if you feel unwell.
- Lesiang Gas Farr: Do not extinguish unless leak can be stopped safely.
- Eliminate all ignition sources if safe to do so.
- Store at safety data container in a well-ventilated place, locked up.
- Use combustible or use in a well-ventilated place.
- Dispose of contents in accordance with local/regional/national regulations.

XYZ Chemical Company 123 Main St. Anywhere, NY, USA 1-800-000-1111

New GHS Labeling & SDS

- The Globally Harmonized System (GHS) of Classification and Labeling of Chemicals is a worldwide initiative to promote standard criteria for classifying chemicals according to their health, physical and environmental hazards.
- GHS Labeling uses pictograms, hazard statements, and signal words “Danger” and “Warning” to communicate hazard information on product labels and Safety Data Sheets (SDS) logically and completely.
- The primary goal of GHS is better protection of human health and the environment by providing chemical users with enhanced and consistent information on chemical hazards. It now requires Acute and Chronic health hazards, with Precautionary statements about hazardous properties and health effects. Physical Hazards have broader list to include or more clearly indicate hazards.
- Manufacturers must comply by June 1, 2015 but may have already started updating labels and Safety Data Sheet (SDS).
New GHS System Pictograms Hazards
Used on SDS and Labels

Maintaining the Original Label

You can add information to the container but you cannot remove or deface the original label information.

The Hazard Communication Act Requires Re-labeling of primary containers if the label becomes illegible. If you must replace the original label, the replacement label must include:

- Identity of the chemical as listed on the MSDS;
- Appropriate hazard warnings (words, pictures, symbols, or combinations) for the chemical’s physical and health hazards;
- Manufacturer’s name and address.
Secondary Container Labels

When a chemical is transferred to another (secondary) container, the new container must be labeled with:

1) The name of the chemical as listed on the MSDS (chemical formula may be used, but no acronyms or abbreviations or structures) in English, and

2) Appropriate hazard warnings, words, pictures/symbols or combinations that provide general information on the hazards of the chemical.

This is required unless the container is for the immediate use of the individual who made the transfer. The contents must be written on the container before it is left unattended in the lab.

- Experiment solutions prepared for other people or for later, must also be labeled.

Alternative Container Labeling

To make labeling easier for multiple or small containers, there are some allowable alternatives to full labeling of containers.

- Associated with Label – smaller containers may have a unique id or acronym and a logbook or sign nearby which explains what it is.

- Outer container labeling for multiple smaller containers of an identical material. The outer container can have the full label.

- Equipment Process Logs- For containers with constant material changes, such as those inside equipment. Signs, process/log sheets, operating procedures, or other similar written materials may be used in lieu of affixing labels. The alternative method must identify the containers to which it is applicable and convey both the name and hazards required.
There are **Requirements for Treatment, Storage and Disposal** of Hazardous and Non-Hazardous wastes.

- **All chemical or biological wastes shall be collected in containers.** *They may not be put in the trash can.*
- All waste containers should be labeled with the contents and properties.
- After collection, wastes are treated and/or disposed of by a waste company in accordance with federal and state regulations.
- Clean up of experiments is YOUR responsibility, and must be done when class or grading is over. Do Not leave it for someone else to clean up.

### Hazardous Waste

This is our waste label, with the information the Environmental Health & Safety group needs to properly treat and dispose of waste.

**Hazardous Waste includes one or more of the following:**

- **Toxic Components**—40 listed chemicals (Benzene, Lead, Mercury...)
- **Reactive**—unstable, reacts violently with water or air, potential explosive
- **Ignitible**—liquid flash point <140°F, or non-liquid spontaneously combustible at STP
- **Corrosive**—liquid with pH <2 or >12.5 (highly acidic or basic)
- **Specifically listed as hazardous in regulations**

**Examples:** common solvents like toluene, xylene, acetone. Also Aniline, Carbon disulfide, Tetrahydrofuran
Other Waste

Trash (Non-Hazardous Solid Wastes)
- Paper, corks, and other uncontaminated, non-hazardous substances may be placed in the trash containers.
- Do not, however, place any glass (broken or not) in the trash containers.

Broken glass waste
- Any glass or broken glass waste must be placed in the special cardboard box containers provided.
- Glass must be clean of chemicals and biologicals
- Do not place paper or garbage in these containers.

Personal Safety with Chemicals
- Avoid direct contact with any chemical to your hands, face, or clothing (including shoes) by wearing proper PPE and washing hands after use.
- Never smell, inhale or taste laboratory chemicals. Use volatile or reactive chemicals in a fume hood, and be sure there is adequate ventilation.
- Breakthrough is the movement of a chemical through a protective material, such as a rubber glove. This may be a chemical's gradual permeation through or chemical degradation of the glove/material.
- Never engage in horseplay, pranks, or mischief in the lab.
**Protective Work Practices**

- Wash your hands frequently
  - After handling chemicals
  - After removing gloves
  - Before you leave the lab
- Use good housekeeping
  - Wash your benchtop before and after working
  - Return chemicals to their proper storage
  - Clean up any spills
  - Remove gloves, goggles and lab coat before you leave
- Be careful when carrying containers. Use a lab cart or bottle carrier to transport them, or support them from the bottom as well as side or top.
- Understand the hazards of your work
- Never work alone in the lab

**PPE: Personal Protection Equipment**

**Protect Yourself:**

- **Eyewear**
  - Goggles - for liquids, indirect vented so liquids don’t get in eyes
  - Glasses - for particulates
- **Gloves**
  - Check compatibility with the chemical in use
- **Foot protection**
  - Closed toe shoes, non-porous, and cotton socks
- **Clothing**
  - Lab Coat and long pants
**Laboratory Coats**

- You must purchase and wear a white lab coat to protect you from chemical spills.
- Not only is it required, it could save your life or health, with valuable seconds to reach a shower.
- Be sure the sleeves are not too long or they may get in the way of your work causing a hazard.
- Lab coats that get contaminated must be disposed of as chemical waste or disinfected and professionally laundered after contamination.

**Eye Wear**

- Safety Glasses or Goggles must be worn in the lab.
- Goggles with Indirect Vents used with liquids
- Prescription Eyewear
  - Glasses – some safety glasses and goggles will fit over them. Ordinary eye glasses do not provide adequate protection to your eyes. They must be rated Z87, have clip-on side shields, and adequate coverage.
  - Contact lenses – may be worn in the laboratory, but you must also wear approved safety goggles. Contacts may melt or trap chemicals against your eye, so must be removed in the event of a chemical splash.

Example of a chemical injury =>
Proper Attire

- You must wear closed-toe shoes in the laboratory. This is for both chemical spill prevention and dropping something.
  - Open-toed sandals are not permitted.
  - Bare feet are not permitted.
- **No shorts**: You may not wear shorts in the laboratory. Long pants or long skirt must be worn instead.

Safety with Chemicals

- Review procedure and MSDS carefully before starting, don’t read as you go. Don’t use a chemical you don’t know the hazards of.
- Use chemicals only as directed and for their intended purposes.
- Do NOT use any unlabeled chemicals. An unlabeled chemical could be hazardous, toxic, or react in an unexpected fashion when mixed with other chemicals.
- Never leave a running experiment unattended, especially while it is being heated or is rapidly reacting.
- Never remove chemicals from the lab without instructor authorization.
Glassware

- Always check your glassware for imperfections before use. If you come across any, do not use. Instead, ensure it is rinsed clean and place in broken glass container.
- Glassware that has imperfections or damage, may break or shatter when heated or evacuated.
- Star cracks form when two flasks bump against one another. Any of the lines in a star crack may extend.
- Joints which have chips that extend into the ground portion may leak when heated.
- Clean glass and put away when class is over.

Equipment & Supplies

- Never mouth pipette chemicals when transferring solutions. Instead, use a pipette bulb to transfer solutions.
- Always use a glass stopper tool and lubricate glass tubing, thermometers, or thistle tubes before inserting them into a stopper, and wrap toweling around them with your hands together while inserting into the stopper.
- Keep equipment away from the edge of the lab bench to prevent spillage.
- Support all beakers and flasks with clamps.
- Turn off your Bunsen burner or other heat source when you are finished using it. Never leave it on unattended.
Fume Hood Equipment

- **Use a fume hood** to perform chemical experiments when instructed to or when available, especially for volatile materials if there is a possibility of poisonous or irritating fumes being emitted from the chemicals utilized, or materials will be heated, or a strong reaction may be expected.

- **Lower the fume hood sash** while experiments are running to protect you and other users in the lab. The sash is designed to be operated at 18 inches (about halfway up) to allow you to see through the glass and your face and upper body is protected.

- There are visual lights or flow readings to indicate good flow, and low level alarms on hood meters.

Avoid Contamination of Chemicals

Do not put chemicals back into reagent bottles.

- Returning an unused chemical to a container risks contamination. Take only the amount you need. Extra material must be placed in the appropriate chemical waste container.

Take only as much as you need.

- Whenever possible, share excess material with a neighbor, but do not return it to the original container.
Laboratory Housekeeping

- The work area should be kept clean and uncluttered, with chemicals and equipment stored away when not in use. Chemicals should not be stored on the floor.
- Clean the work area upon completion of a task and at the end of the class.
- Waste materials should be poured into the appropriate waste container (not into the trash or down the sink) and glassware rinsed out and put away.
- Keep drawers and cabinet doors closed and electrical cords off the floor to avoid trip hazards.

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Laboratory Housekeeping

- Prevent slips and trips by cleaning up spilled liquids promptly and by keeping the floor free of loose items such as stirring rods, glass beads, stoppers, backpacks, etc... (Custodial staff are prohibited from cleaning up chemical spills, and are not expected to clean floors that have not been properly decontaminated after a spill)
- Never block or even partially block the pathway to an exit or to safety equipment, such as the safety shower or fire extinguisher. Keep aisles clear of obstacles such as boxes, chemical containers, and other storage items that might be put there (even temporarily).
No Eating, Drinking, or Smoking

- No eating, drinking, gum chewing, applying cosmetics or taking medicine in the laboratory.
- Do not bring any food or drink into the lab, there is always a risk of contamination or accidental ingestion of toxic chemicals.
- You may eat or drink in the hallway outside of the laboratory.
- Be sure you wash your hands well before eating or drinking. Your hands may be contaminated with chemicals.
- Lab chemicals should never be consumed or tasted, regardless of what they are or their perceived hazard.

No Drinking in the lab

- It is not considered safe to drink water from any Laboratory water sources (including deionized water).
- An experiment could back up and contaminate the water supply lines.
- Laboratory refrigerators, ice chests, cold rooms, ovens, glassware, and so forth may not be used for food storage or preparation.
- Smoking is not allowed in the laboratory or on campus, except in certain designated areas outside. Please also be aware that opened tobacco products can absorb chemical vapors.
Lab Emergencies

Every second counts!

- note where your exits are in the lab and where building stairwells are

Emergency Equipment – note where your eyewash(es), shower, & first aid kit are, and fire alarm pull

Buddy System – Don’t work alone in the lab if you can help it. Let someone know you are there.

Lab First Aid

Follow-up with a professional Medical evaluation, and ensure someone observes those injured for 24hrs.

- Acid or Base Burns – wash under water for at least 15 minutes. Bases have a slippery feel like soap. Acids have a “non-skid” feeling and may burn.

- Accidental Ingestion – Consult MSDS and call the local poison control center for advice. Do not drink anything unless instructed

- Inhalation: Move to fresh air
Tips for Lab Emergencies

Get follow-up medical attention!

Laceration – wash under water, let bleed a little to cleanse the wound, then compress and bandage and seek medical attention.

Needle stick – injection can lead to infection. Take care when handling needles, DON’T recap!

Burns – wash for 15 minutes with cold water, then apply burn gel if necessary for minor burns. Do not use fire blanket alone.

Emergencies - Eyes

ALWAYS WEAR YOUR EYE PROTECTION!
- Safety Glasses with particulates
- Goggles with Liquids

LIQUID SPLASHED ON THE FACE:
- Turn water on, then pull plug on eyewash (like a shower)
- Leave goggles on initially under the water
- Hold eyelids open with fingers and thumb and have someone keep you in the water
- Wash for 15 MINUTES
- Remove contacts and wash again
- Follow-up with a Doctor
ALWAYS WEAR YOUR LABCOAT!

Use Safety Shower for body burns or chemical spill onto the body

**LIQUID SPLASHED ON BODY:**

- Pull metal handle off wall clip and pull down
- Remove affected clothing and any clothing below affected area. Modesty vs. Health?

**Stand under shower for at least 15 minutes**

- Push up to stop if not on a timer
- Call FMC at extension 2240/2250 to notify of use, or if water won’t shut off
- Do not play with shower, this creates a huge mess

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**Fires**
Fire Safety

• Many solvents used in the lab are flammable and will burn.
• Hotplates are to be used for heating flammable materials (alcohols, benzene, acetone, etc...) instead of Bunsen burners.
• Vapors from Extremely Flammable Solvents can also ignite with electrical sources. Keep containers closed and work in a fume hood with these materials.
• Keep Water away from electrical, such as Water Baths & electrical outlets or equipment.
• Keep in mind Plexiglas and other plastics are combustible and can burn easily.

Rules for Fighting Fires

Just remember the three A's

Activate the building alarm system or notify the fire department by calling 911. Or, have someone else do this for you.

Assist any persons in immediate danger, or those incapable on their own, to exit the building, without risk to yourself.

Only after these two are completed, should you Attempt to extinguish the fire.

Remember that personal property is NEVER more important than ensuring your own safety and life.
TIME DURING A FIRE

• Allow yourself time to get out of the room and building when there is a fire. Smoke can fill a room within 30 seconds, and spreads fast.
• Only attempt to put out a small fire, IF you are comfortable doing so, AND if you have a clear route to an exit. Do NOT attempt to put out a fire that is between you and your only exit.
• Avoid flames, smoke, or fumes
• Most labs have two exits. Make sure the exits are not blocked, not even temporarily, but keep doors closed to contain fire.

Elements of a Fire

This is The Fire Triangle. Actually, it's a tetrahedron, because there are four elements that must be present for a fire to exist. There must be Oxygen to sustain combustion, Heat to raise the material to its ignition temperature, Fuel to support the combustion and a Chemical Reaction between the other three elements.

Remove any one of the four elements to extinguish the fire.

The concept of Fire Prevention is based upon keeping these four elements separate.
Types of Fires and Extinguishers

Not all fires are the same. Different fuels create different fires and require different types of fire extinguishing agents. Some fire extinguishing agents can be used on more than one class (type) of fire. Others have warnings where it is dangerous to use that extinguisher agent on certain types of fire.

Class A fires are fires in ordinary combustibles such as wood, paper, cloth, trash, and plastics.

Class B fires are fires in flammable liquids such as gasoline, petroleum oil and paint. Class B fires also include flammable gases such as propane and butane. Class B fires do not include fires involving cooking oils and grease.

Class C fires are fires involving energized electrical equipment such as motors, transformers, and appliances. Remove the power and the Class C fire becomes one of the other classes of fire.

Class D fires are fires in combustible metals such as potassium, sodium, aluminum and magnesium.

Class K fires are fires in cooking oils and greases such as animal fats and vegetable fats.
Fire Extinguisher Use

Pull the pin.

Aim the nozzle or hose at the base of the fire from the recommended safe distance.

Squeeze the operating lever to discharge the fire extinguishing agent.

Starting at the recommended distance, Sweep the nozzle or hose from side to side until the fire is out. Move forward or around the fire area as the fire diminishes. Watch the area in case of re-ignition.

Know how to use a fire extinguisher: FOLLOW THE *P*A*S*S WORD

*Pull *Aim *Squeeze *Sweep

It's just like squirting liquid cheese on nachos.
When you enter a public place or building, note where the exits are located.

And remember, in a fire, the best way out may not be the way you came in.