



GOVERNMENT CHEMIST LABORATORY AUTHORITY



MANAGEMENT AND CONTROL OF CHEMICAL SUBSTANCES AND PRODUCTS (CSP) ANNUAL AWARENESS TRAINING



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Why Concern of chemicals/Chemical Safety

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Staying safe means that you...

- Read labels on containers of chemicals
- Read Material Safety Data Sheets (MSDS)
- Handle chemicals with care
- Use correct protective clothing and equipment
- Remember emergency procedures

Chemical Labels

- Every container of chemicals is labeled by the manufacturer.
- The label will tell you
 - Name of chemical
 - Name, address and emergency phone number of manufacturer
 - Physical and health hazards
 - Precautionary measures
 - First-aid instructions
 - Proper handling/storage instructions



Health Hazards may be posed by Chemicals

- Carcinogen
- Highly toxic agent
- Toxic agent
- Reproductive hazard
- Irritant
- Corrosive
- Sensitizer
- Hepatotoxin
- Nephrotoxin
- Neurotoxin

Typical Precautionary Measures when using chemicals

- Do not breathe vapors
- Use in well-ventilated areas
- Keep container closed when not in use
- Avoid contact with skin
- Wash thoroughly with soap and water after handling

- Keep away from sparks, heat, and flame
- Do not store near combustible materials
- Store in tightly closed container
- Remove and wash contaminated clothing promptly
- Keep from contact with clothing and other combustible materials

Common Signal Words on Labels

- **Danger** – Can cause immediate serious injury or death
- **Warning** – Can cause potentially serious injury or death
- **Caution** – Can cause potentially moderate injury

Special Symbols Used on Labels

Helps you recognize kind of hazard a chemical could present if you are not careful

- **Toxicity in contact**
- **Corrosivity** (acids and bases)
- **Ignitability** (flammable solvents and certain solids)
- **Reactivity** (sodium and various water-reactive reagents)

Material Safety Data Sheets (MSDS)

Provides more detailed information about a chemical, including

- **Composition**, information on ingredients (Section 2)
- **Hazards** identification (Section 3)
- **First aid** measures (Section 4)
- **Accidental Release** measures (Section 6)
- **Handling** and **Storage** (Section 7)
- Exposure controls, **personal protection** (Section 8)
- **Stability** and **reactivity** (Section 10)
- **Toxicological** information (Section 11)

MSDS (cont'd)

Potential Health Effects

- Eye irritation
- Nausea
- Dizziness
- Skin rashes
- Headache
- Existing medical conditions possibly aggravated by exposure

MSDS (cont'd)

- Emergency/first-aid procedures to follow
- Accidental Release Measures
 - ✓ What to do if substance spills and leaks
 - ✓ How to correctly dispose of substance
 - ✓ Equipment/procedures for cleaning up spills and leaks

MSDS (cont'd)

Handling and Storage

- How to handle and store substance safely
- Any other precautions (i.e., grounding containers during transfer of flammables)

MSDS (cont'd)

- Exposure Controls, Personal Protection
 - ✓ Respirator
 - ✓ Gloves
 - ✓ Eye protection
 - ✓ Protective clothing
 - ✓ Ventilation
- Special work and hygiene practices that should be followed

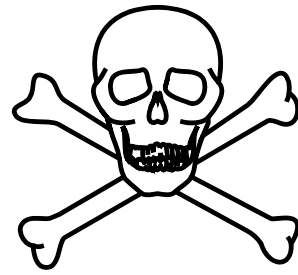
MSDS (cont'd)

- Exposure Limits
 - ✓ Threshold Limit Value (TLV)
 - ✓ Permissible Exposure Limit (PEL)
 - ✓ Recommended Exposure Limit (REL)

MSDS (cont'd)

- **Toxicological Information**
 - ✓ **LC50**: median lethal concentration by inhalation in a single exposure over a specified time period
 - ✓ **LCLO**: lowest reported LC50
 - ✓ **LD50**: median lethal concentration by a route other than inhalation

what is “highly toxic”?



- “Highly Toxic” is indicated by
 - $LD_{50} < 50$ mg/kg body wt by ingestion to albino rats each weighing between 200 to 300 gms
 - OR
 - $LD_{50} < 200$ mg/kg by continuous contact for 24 hrs with skin of albino rabbits each weighing between 2 and 3 kg
 - OR
 - $LC_{50} \leq 200$ ppm of gas or vapor inhalation (or 2 mg/L of mist, dust, or fumes) for one hour by albino rats each weighing between 200 to 300 gms

Handle Chemicals with Care

- **Dispose** of chemicals, and waste in approved containers
- **Clean up** spills immediately
- **Keep** the storage clean and neat
- **Store** incompatible chemicals in separate storage areas

Chemical Storage

- Establish separate storage areas for
 - ✓ Flammable and combustible organic liquids and solvents
 - ✓ Acids
 - ✓ Dry poisons, salts, and oxidizers
 - ✓ Bases

- Chemicals are stored in
 - ✓ Chemical storage cabinets
 - ✓ Flammable storage refrigerators (No food)
 - ✓ Chemical storage refrigerators/freezers (No food)
 - ✓ On shelves with retaining barriers

Storage Fundamentals

- Identify incompatible chemicals – check the Material Safety Data Sheet
- Isolate and separate incompatible materials
 - Isolate by storing in another area or room
 - Degree of isolation depends on quantities, chemical properties and packaging
 - Separate by storing in same area or room, but apart from each other

Use correct protective clothing and equipment

- Eye Protection
 - ✓ Safety glasses – flying particles, chemical splashes, dust
 - ✓ Splash goggles – corrosive liquids, solvents, powders
 - ✓ Face Shields – high pressure systems
- Respiratory Protection – normally not needed at LUC
- Skin and Body Protection
 - ✓ Gloves – see the MSDS
 - ✓ Aprons and lab coats – strong acids and bases
 - ✓ Shoes – always worn in lab, closed toe and closed heel



Do not

- Use unlabeled chemicals
- Store chemicals near heat, sunlight, or other substances with which they might react
- Store materials on floors or other places where people can pass
- Leave equipment unattended when its operating (unless it is designed to do so or you have an SOP)
- Put custodians and fellow workers in danger



If Overexposed to a Hazardous Substance

- Get medical help immediately!
- Inform your lab supervisor
- Check MSDS for first-aid instructions.
- Some general guidelines are
 - Eyes: Flush with water for 15 minutes
 - Ingestion: Follow label and MSDS instructions
 - Skin Contact: Stand under emergency shower and remove contaminated clothing immediately
 - Inhalation: Get to fresh air and get prompt medical attention



Other Emergency Procedures

Fire: call for assistance, activate building fire alarm; safely use fire extinguisher on small fires

Hazardous Chemical spill evacuate the room; close door; call for assistance; consider evacuation of building depending on the size.

Emergencies can happen, so

- Avoid working alone
- Know where emergency phone numbers are posted
- Review MSDS
- Know where to go and what to do in an emergency
- Know the location of the closest safety showers, eyewashes, and fire extinguishers

Chemical Hygiene Plan

Outlines specific work practices for all work involving hazardous substances in the lab

- Gives procedures to follow when working with hazardous chemicals
- Provides details on how your chemical exposure will be monitored and limited
- Assures that you have the right personal protective equipment (PPE)
- Specifies that some hazardous tasks to be approved in advance by the PI

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