How do I work safely with chemicals in MIT laboratories?

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OSHA Laboratory Standard (29 CFR 1910.450)

- Mandates training and safe work practices
- Chemical Hygiene Plan developed by lab based on hazards in lab
- We have 35 Chemical Hygiene Plans (one for each department at MIT)
- Updated annually; reviewed by EHS Office

Introduction to Chemical Safety

- Right to know hazards of chemicals you work with.
- Right to know measures established to protect you from those hazards.
- Responsible for:
  - Knowing the hazards of your research.
  - Following established procedures.
  - Wearing appropriate protection/using protective equipment

What happens when I go into the lab?

- Meet people who will orient you about research and safe work practices (PI, dept EHS Coordinator, Lab EHS Representative)
- Take Training Needs Assessment (EHS Web Site)
- General Chemical Hygiene Training, Hazardous Waste Training, read Chemical Hygiene Plan
- Lab Specific Training by your EHS Representative (annual)

How can you be exposed to chemicals?

- By inhalation.
- By contact with skin or eyes.
- By ingestion.
- By injection.

Exposed by all four methods!

Specific Chemical Information: Review SDS

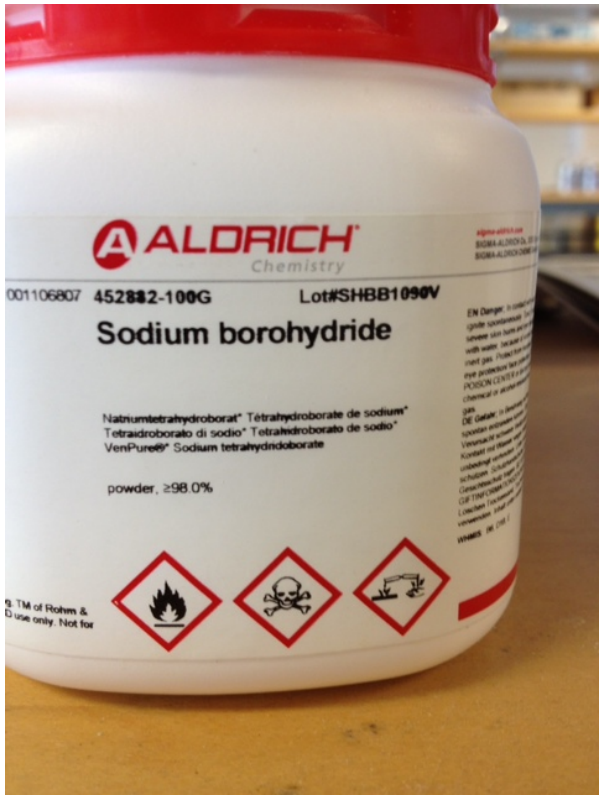
- When you first use
- When you use in a new way
- Read Label
- Look at SDS – May be notebook in lab, saved on computer
- Can Google or go to manufacturers' sites

(Material) Safety Data Sheet sections

- Section 1- Identification
- Section 2- Hazards Identification
- Section 3 – Composition
- Section 4-First Aid
- Section 5-Fire-fighting measures
- Section 6-Accidental Release measures
- Section 7-Handling and Storage
- Section 8-Exposure controls, TLVs, PPE
- Section 9-Physical and chemical properties
- Section 10-Stability and reactivity
- Section 11-Toxigological information
- Section 12 Ecological information
- Section 13 Disposal considerations
- Section 14 Transport information
- Section 15 Regulatory information
- Section 16-Other information

Label Information

- Chemical or product name
- Supplier information
- Signal word (Warning or Danger)
- Pictogram(s)
- Hazard statements
- Precautionary statements



Globally Harmonized Pictograms and Hazard Classes

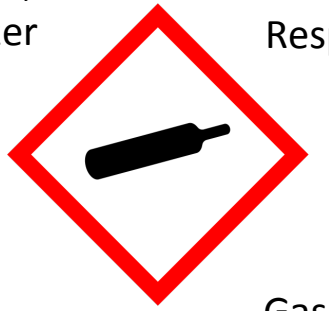
Acute Toxicity
(severe)

Acute toxicity
(harmful)
Irritant, Narcosis,
Dermal Sensitizer

Chronic Toxicity
Carcinogen
Reproductive Toxin
Mutagen
Respiratory Sensitizer

Corrosive

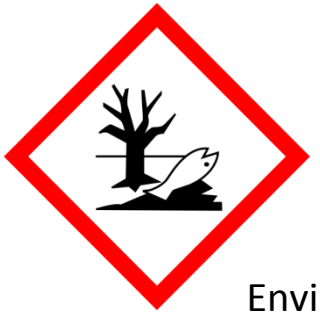
Explosive
Self-Reactive
Organic
Peroxides



Gases Under Pressure

Flammable
Pyrophoric
Self-Heating

Oxidizer



Environmental
Toxicity

SAMPLE LABEL

CODE _____
Product Name _____

Product Identifier

Company Name _____
Street Address _____
City _____ State _____
Postal Code _____ Country _____
Emergency Phone Number _____

Supplier Identification

Hazard Pictograms

Signal Word
Danger

Keep container tightly closed. Store in a cool, well-ventilated place that is locked.
Keep away from heat/sparks/open flame. No smoking.
Only use non-sparking tools.
Use explosion-proof electrical equipment.
Take precautionary measures against static discharge.
Ground and bond container and receiving equipment.
Do not breathe vapors.
Wear protective gloves.
Do not eat, drink or smoke when using this product.
Wash hands thoroughly after handling.
Dispose of in accordance with local, regional, national, international regulations as specified.

In Case of Fire: use dry chemical (BC) or Carbon Dioxide (CO_2) fire extinguisher to extinguish.

First Aid
If exposed call Poison Center.
If on skin (or hair): Take off immediately any contaminated clothing. Rinse skin with water.

Precautionary Statements

Highly flammable liquid and vapor.
May cause liver and kidney damage.

Hazard Statements

Supplemental Information

Directions for Use

_____
_____
_____

Fill weight: _____ Lot Number: _____
Gross weight: _____ Fill Date: _____
Expiration Date: _____

Labeling - NFPA Fire Diamond

- Summary of the health and physical hazards under conditions of a fire.
- Rated for severity on a 0 to 4 scale, (0: no hazard, 4: high hazard).
- The NFPA Diamond is pictured on many chemical containers.
- Example of Diamond for Acetonitrile.
  - Blue: Health Hazard (0=None - 4=Deadly)
  - Red: Flammability (0=None - 4=Burns readily)
  - Yellow: Instability (0=Stable - 4=May Detonate)
  - White: Special Hazards such as Acid, Alkali, Corrosive, Oxidizer, Use No Water, Radioactive

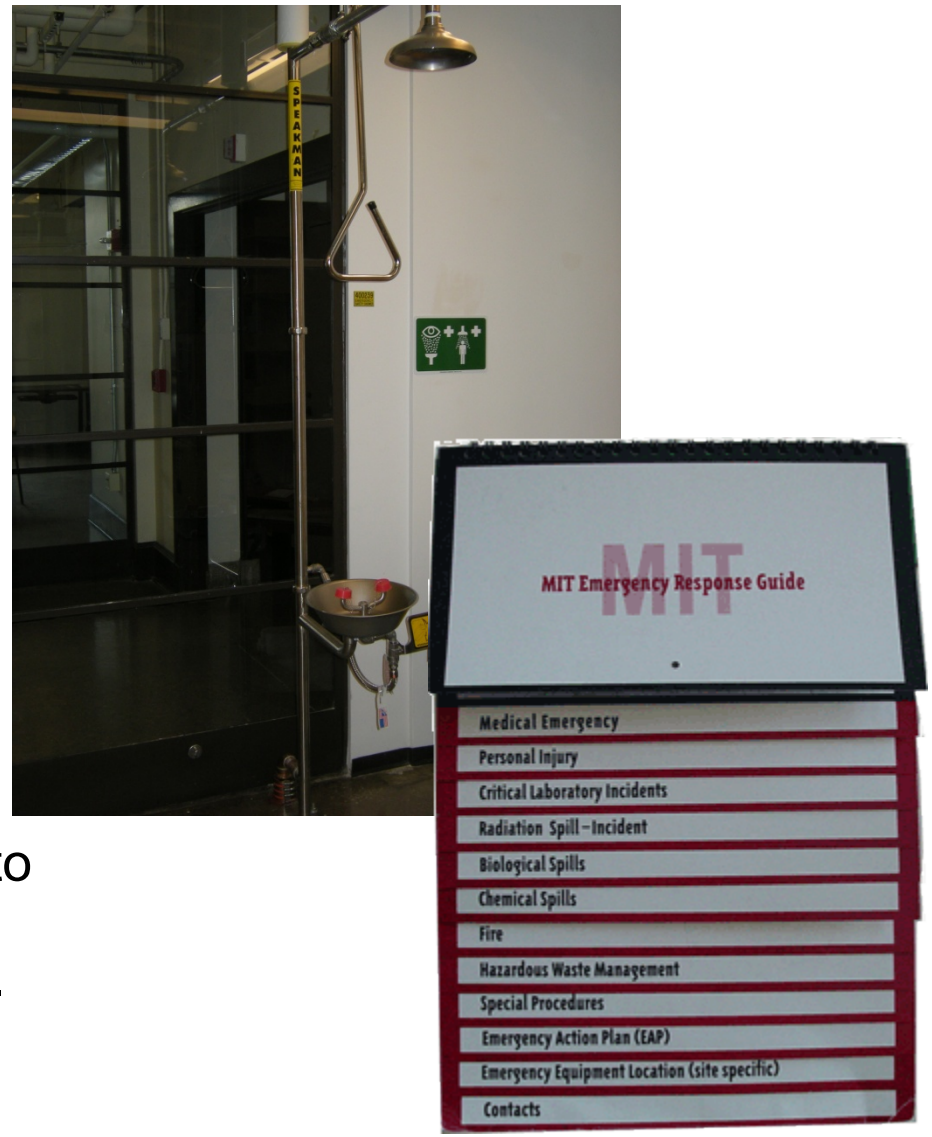
Types of PPE

Fume Hoods and Biosafety Cabinets

- A laboratory fume hood must be used when working with all hazardous substances where there is a risk of inhalation exposure
- The laboratory chemical fume hood is the most common local exhaust ventilation system used in laboratories.

Emergency Information

- Before beginning research with potentially hazardous materials learn location and operation of:
  - Alarm systems.
  - Eyewash.
  - Safety shower.
  - Spill kits.
- Carefully review the guidelines for handling medical emergencies, personal injury, chemical spills and fire in the laboratory.
- Remember that you may need to use this information to help a coworker in addition to yourself.



MIT Working Alone Policy for Undergraduates

- Anyone at MIT who works with potential hazardous conditions that can results in immediate injury or serious harm must discuss this activity with their PI or supervisor
- **Undergraduates shall not work alone with hazardous materials that can result in immediate injury or death without prior <u>written</u> approval from PI or supervisor**