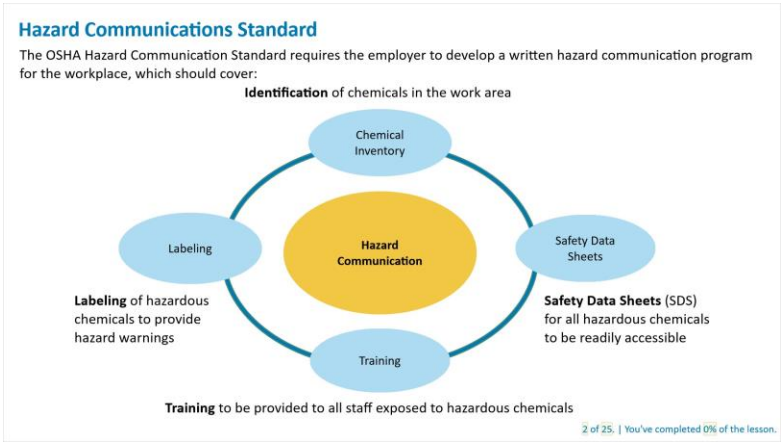
Chemical Safety

1. Chemical Safety

1.1 Chemical Safety

2. Hazard Communication

2.1 Hazard Communications Standard



2.2 Right to Know

Right to Know

Under the Hazard Communication Standard, you have the "Right To Know".....

- All of the operations in your work area where hazardous chemicals are present, and the proper protective measure to safely work with these chemicals including:
  - Appropriate personal protective equipment (PPE) needed when using each chemical
  - Where emergency equipment is located (safety showers, eyewash stations, alarm pulls, fire extinguishers, spill kits)
- How to access chemical inventories for your work location
- How to access the Safety Data Sheets (SDS) for these chemicals
- How to access a copy of your facility's written Hazard Communication Program

3 of 25. | You've completed 0% of the lesson.

2.3 CALIFORNIA ONLY: Employee Rights in California, Proposition 65

CALIFORNIA ONLY: Employee Rights in California, Proposition 65

California requires that employees are informed of their right:

- To receive information about hazardous substances in their work environment.
- For their physician or collective bargaining agent to receive that information.
- Against discharge or other discrimination due to the employee's exercise of these rights.
- To receive updated information on a timely basis when a new or revised safety data sheet is received. This must be within 30 days if the new information indicates significantly increased risks.

California voters approved proposition 65 which requires the state to publish a list of chemicals that are known to cause cancer, birth defects or other reproductive harm. That list is available on the California EPA web site.

Examples of listed chemicals in health care include cadmium, bis-phenol A (BPA) and some chemotherapy agents. Prop. 65 also requires that warnings appear on the label of listed products and that warning signs in the workplace be posted in conspicuous places where they're likely to be read and understood.

For questions regarding Prop. 65, contact your facility's EH&S department.

4 of 25. | You've completed 0% of the lesson.

2.4 Labeling System

Labeling System

One of the ways to find out about the hazards of the chemicals that you work with is by reviewing the container labels.

There are two types of container labels:

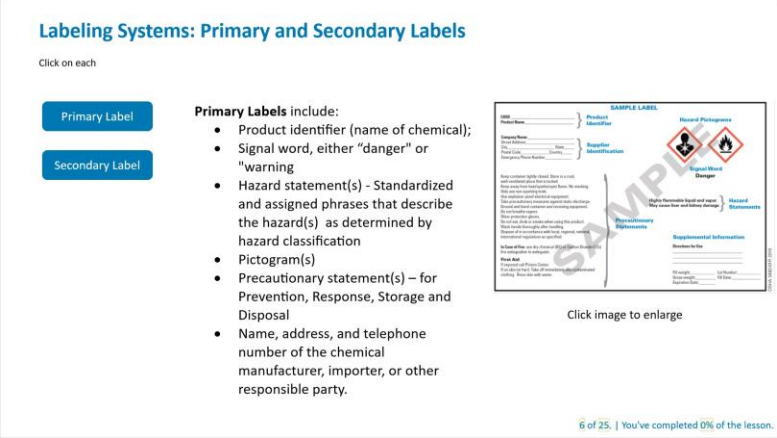
- **Primary Labels** are those which are attached to the product's original container and provided by the manufacturer/distributors.
- **Secondary Labels** are those that you or your department attaches to the smaller container after a hazardous chemicals is transferred from the original container.

It's important that all chemical containers are labeled.

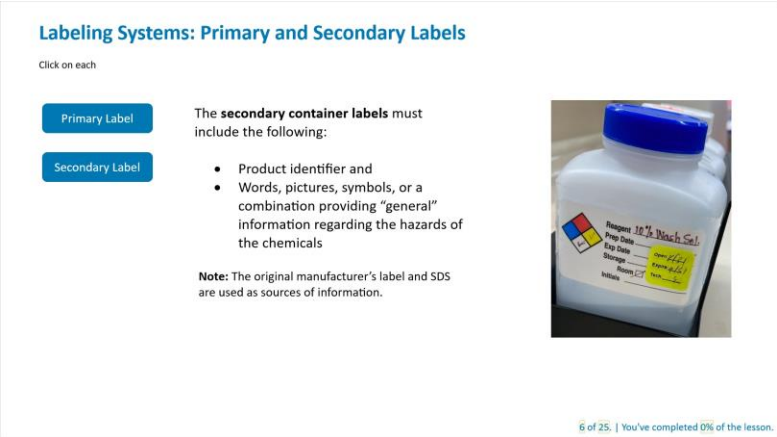
5 of 25. | You've completed 0% of the lesson.

2.5 Labeling Systems: Primary and Secondary Labels

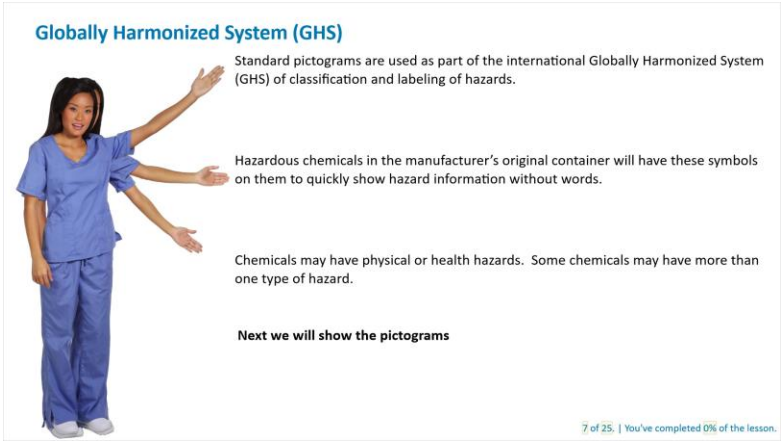
Primary Label (Slide Layer)



Secondary Label (Slide Layer)

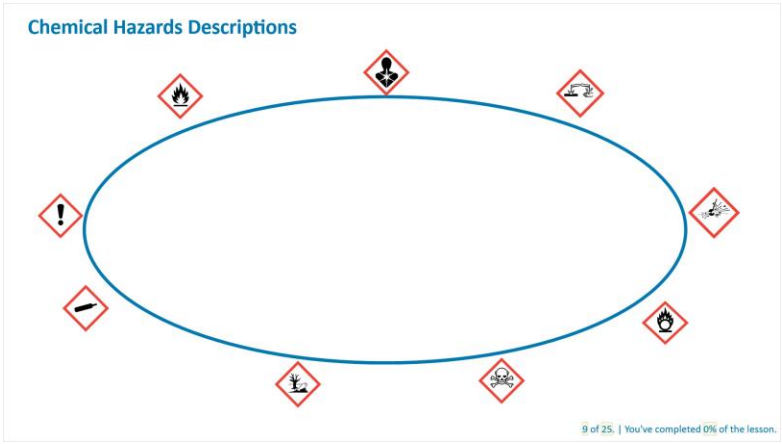


2.6 Globally Harmonized System (GHS)

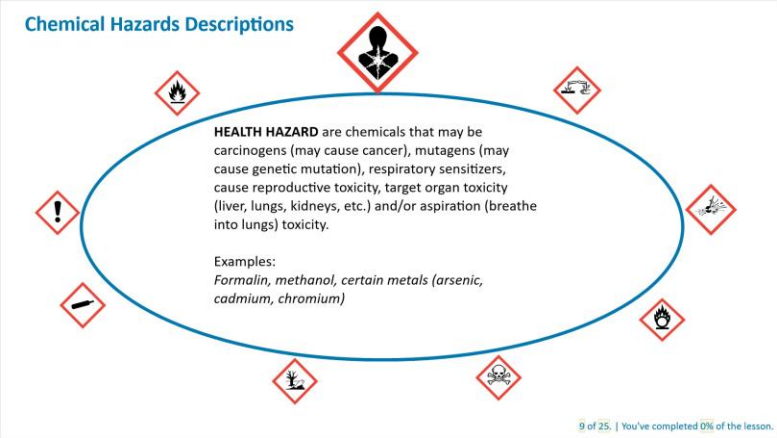


2.7 Pictograms and Hazards

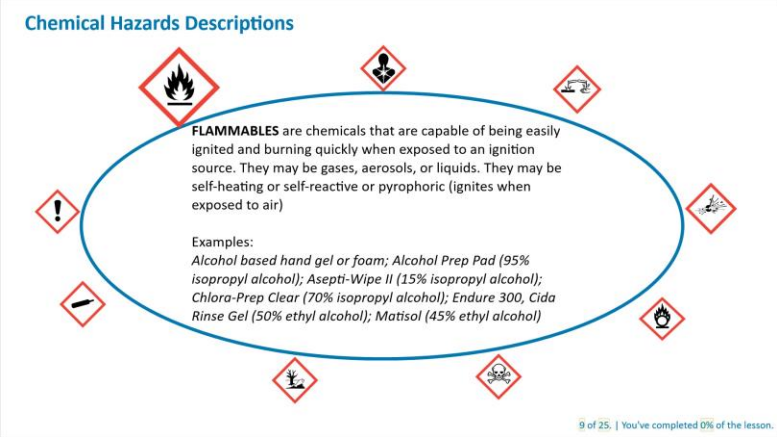
2.8 Chemical Hazards Descriptions



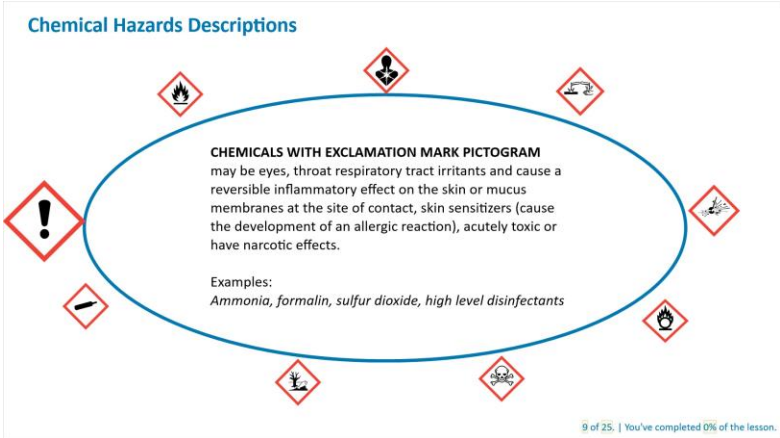
Health Hazard (Slide Layer)



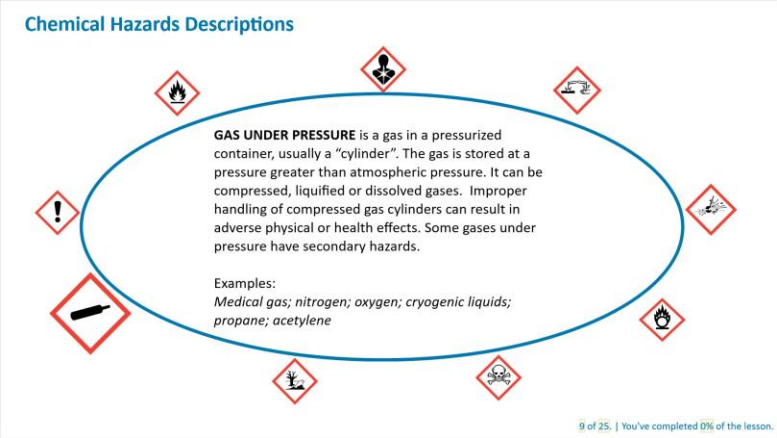
Flame - Flammables (Slide Layer)



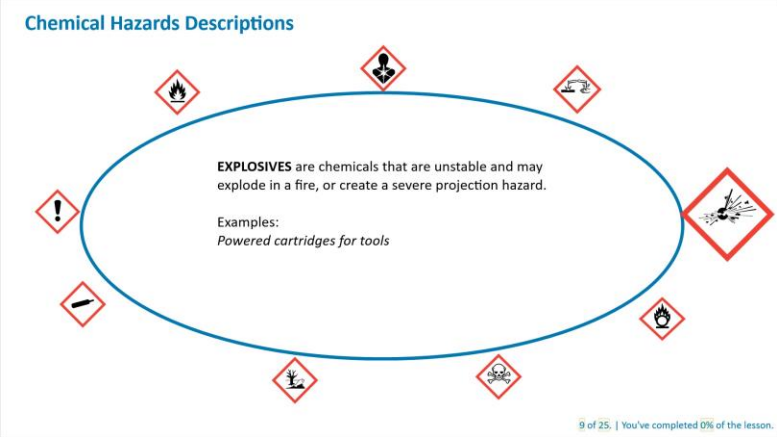
Exclamation Mark (Slide Layer)



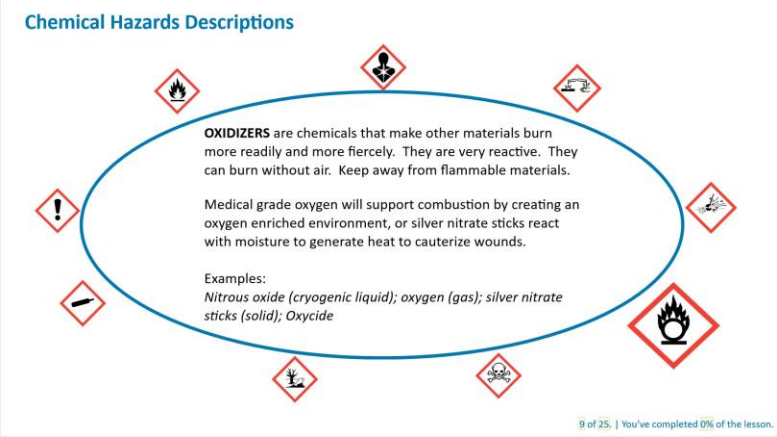
Gas Cylinder - Gas under pressure (Slide Layer)



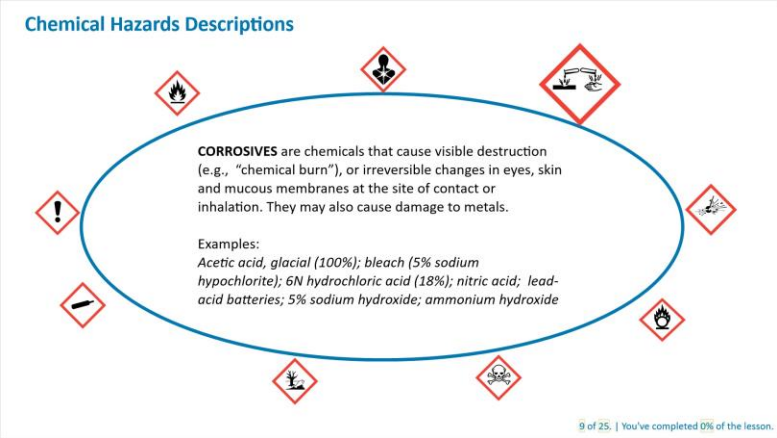
Exploding Bomb - Explosives (Slide Layer)



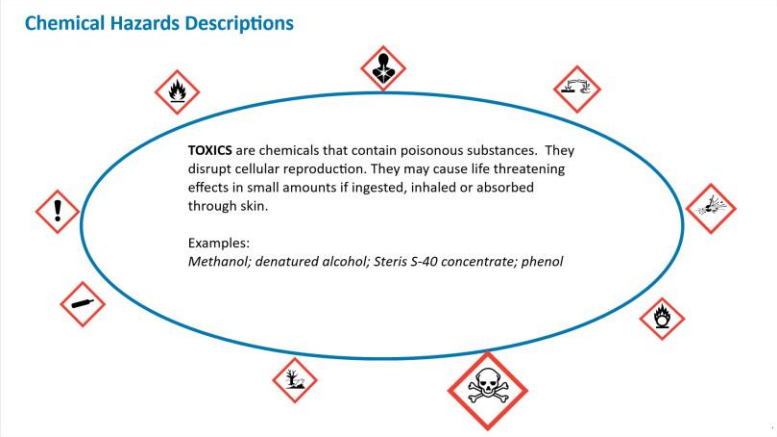
Flame over Circle - Oxidizers (Slide Layer)



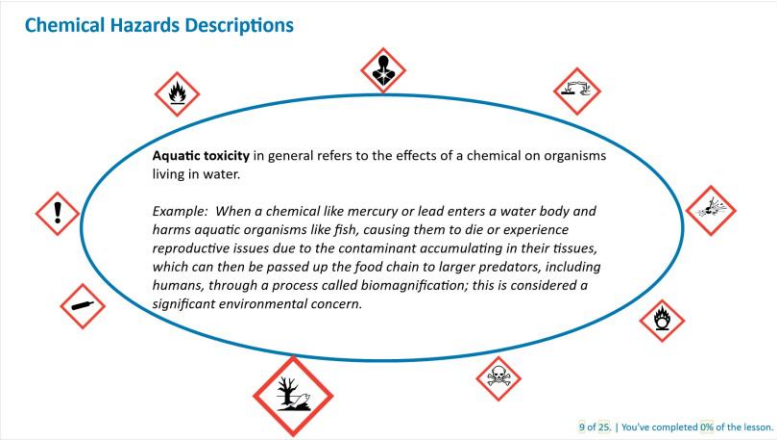
Corrosion - Corrosives (Slide Layer)



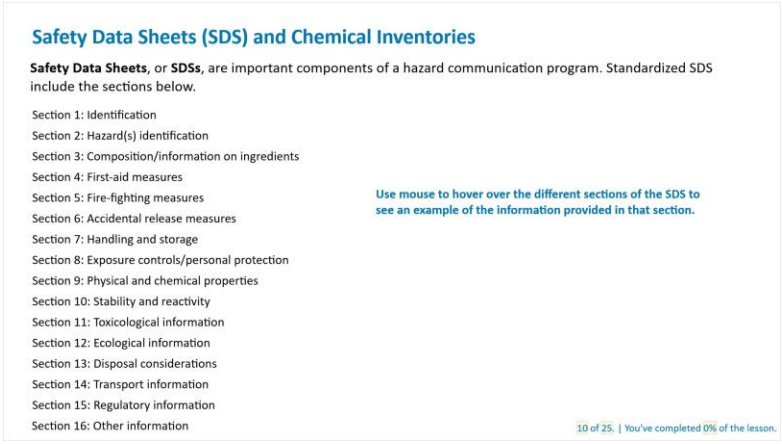
Skull Crossbones - Toxics (Slide Layer)



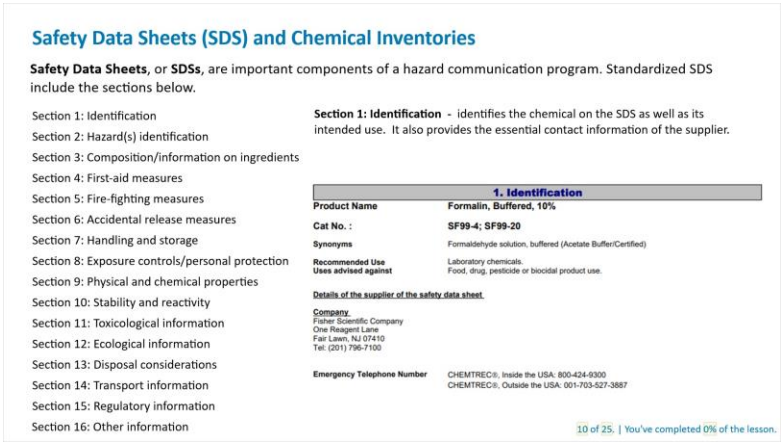
Environment (Slide Layer)



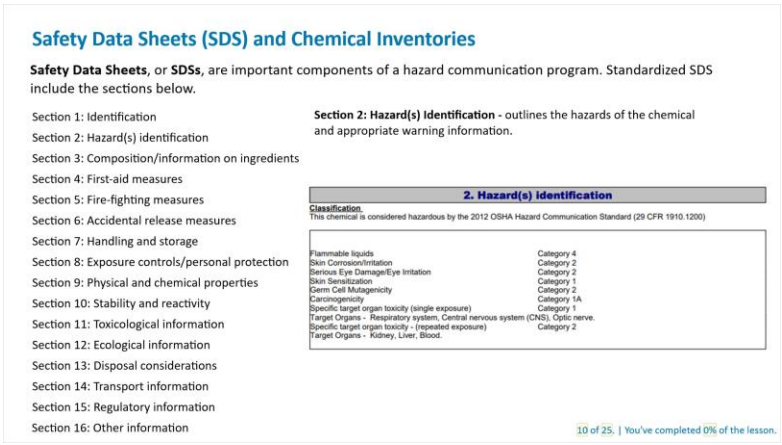
2.9 Safety Data Sheets (SDS) and Chemical Inventories



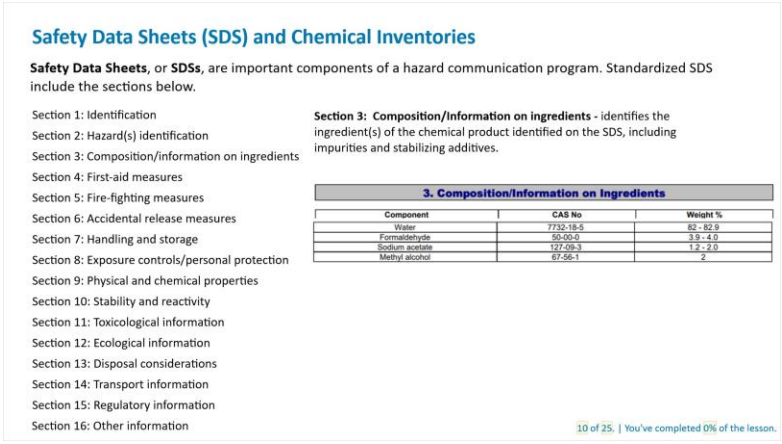
Section 1, Identification (Slide Layer)



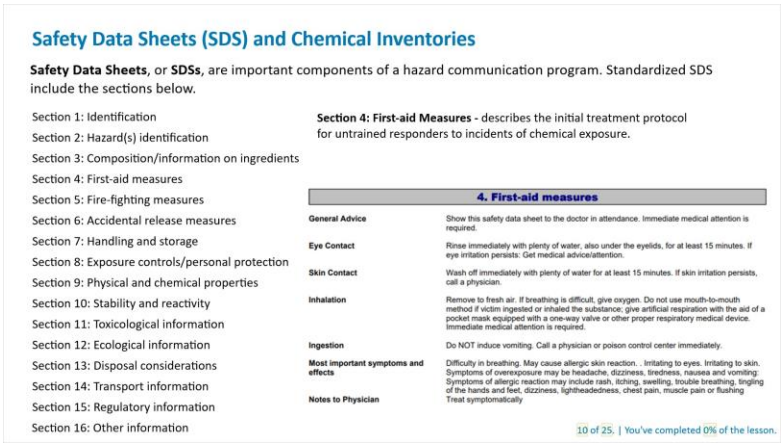
Section 2, Hazards identification (Slide Layer)



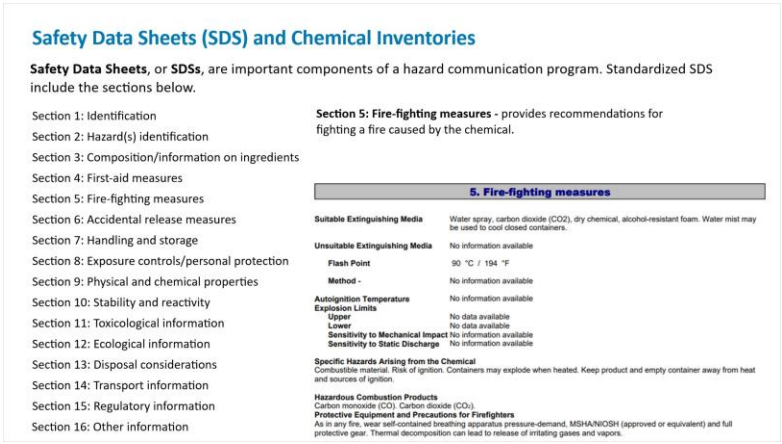
Section 3, Composition/informatioon on ingredients (Slide Layer)



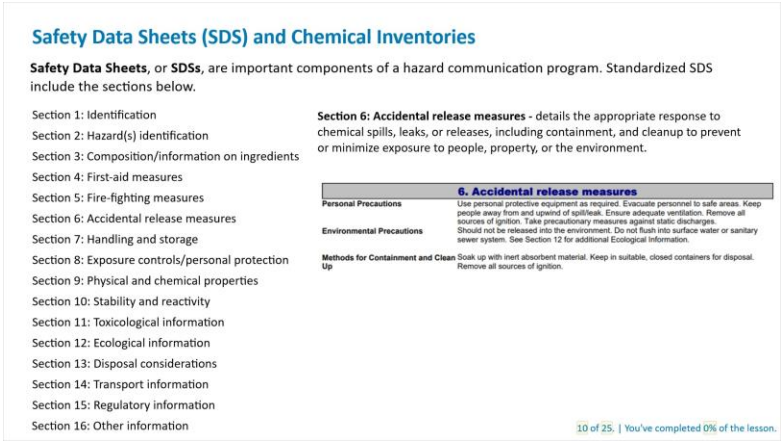
Section 4, First-aid measures (Slide Layer)



Section 5, Fire-fighting measures (Slide Layer)



Section 6, Accidential release measures (Slide Layer)



Safety Data Sheets (SDS) and Chemical Inventories

Safety Data Sheets, or **SDSs**, are important components of a hazard communication program. Standardized SDS include the sections below.

Section 1: Identification
Section 2: Hazard(s) identification
Section 3: Composition/information on ingredients
Section 4: First-aid measures
Section 5: Fire-fighting measures
Section 6: Accidental release measures
Section 7: Handling and storage
Section 8: Exposure controls/personal protection
Section 9: Physical and chemical properties
Section 10: Stability and reactivity
Section 11: Toxicological information
Section 12: Ecological information
Section 13: Disposal considerations
Section 14: Transport information
Section 15: Regulatory information
Section 16: Other information

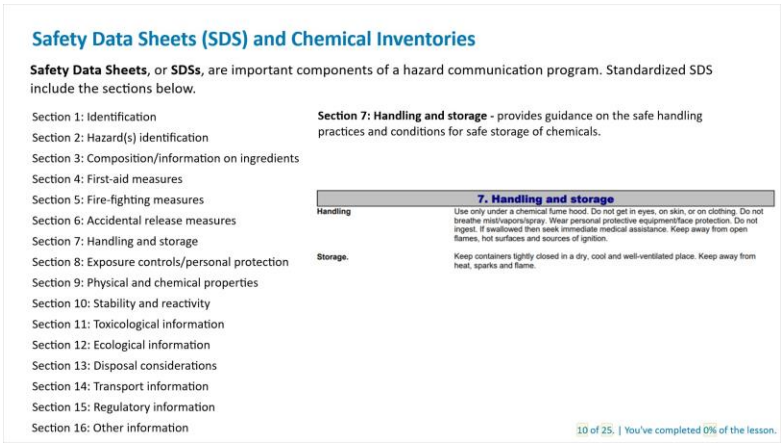
Section 6: Accidental release measures - details the appropriate response to chemical spills, leaks, or releases, including containment, and cleanup to prevent or minimize exposure to people, property, or the environment.

6. Accidental release measures

Personal Precautions	Use personal protective equipment as required. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Ensure adequate ventilation. Remove all sources of ignition. Take precautionary measures against static discharges.
Environmental Precautions	Should not be released into the environment. Do not flush into surface water or sanitary sewer system. See Section 12 for additional Ecological Information.
Methods for Containment and Clean Up	Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Remove all sources of ignition.

10 of 25. | You've completed 0% of the lesson.

Section 7, Handling and storage (Slide Layer)



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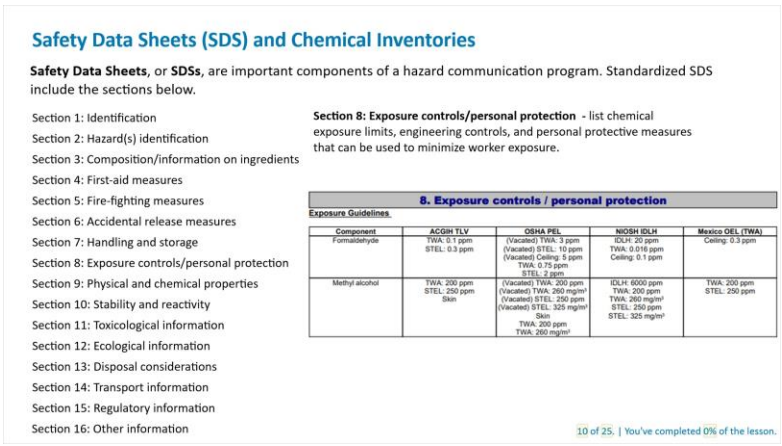
Section 7: Handling and storage - provides guidance on the safe handling practices and conditions for safe storage of chemicals.

7. Handling and storage

Handling	Use only under a chemical fume hood. Do not get in eyes, on skin, or on clothing. Do not breathe mist/vapors/spray. Wear personal protective equipment/face protection. Do not ingest. If swallowed then seek immediate medical assistance. Keep away from open flames, hot surfaces and sources of ignition.
Storage.	Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat, sparks and flame.

10 of 25. | You've completed 0% of the lesson.

Section 8, Exposure controls/personal protection (Slide Layer)



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Section 16: Other information

Section 8: Exposure controls/personal protection - list chemical exposure limits, engineering controls, and personal protective measures that can be used to minimize worker exposure.

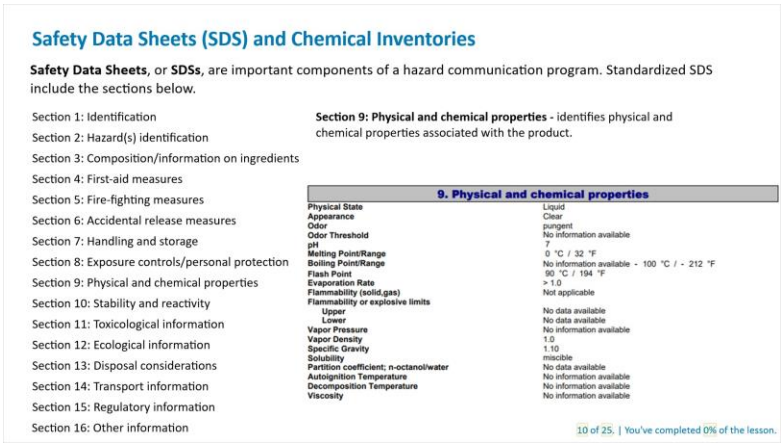
8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Formaldehyde	TWA: 0.1 ppm STEL: 0.3 ppm	(Vacated) TWA: 3 ppm (Vacated) STEL: 10 ppm (Vacated) Ceiling: 5 ppm TWA: 0.75 ppm STEL: 2 ppm	IDLH: 20 ppm TWA: 0.016 ppm Ceiling: 0.1 ppm	Ceiling: 0.3 ppm
Methyl alcohol	TWA: 200 ppm STEL: 250 ppm Skin	(Vacated) TWA: 200 ppm (Vacated) TWA: 260 mg/m³ (Vacated) STEL: 250 ppm (Vacated) STEL: 325 mg/m³ Skin TWA: 200 ppm TWA: 260 mg/m³	IDLH: 6000 ppm TWA: 200 ppm TWA: 260 mg/m³ STEL: 250 ppm STEL: 325 mg/m³	TWA: 200 ppm STEL: 250 ppm

10 of 25. | You've completed 0% of the lesson.

Section 9, Physical and chemical properties (Slide Layer)



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Section 16: Other information

Section 9: Physical and chemical properties - identifies physical and chemical properties associated with the product.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Clear
Odor	pungent
Odor Threshold	No information available
pH	7
Melting Point/Range	0 °C / 32 °F
Boiling Point/Range	No information available - 100 °C / - 212 °F
Flash Point	90 °C / 194 °F
Evaporation Rate	> 1.0
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	1.0
Specific Gravity	1.10
Solubility	miscible
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	No information available
Viscosity	No information available

10 of 25. | You've completed 0% of the lesson.

Section 10, Stability and reactivity (Slide Layer)

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Section 15: Regulatory information
Section 16: Other information

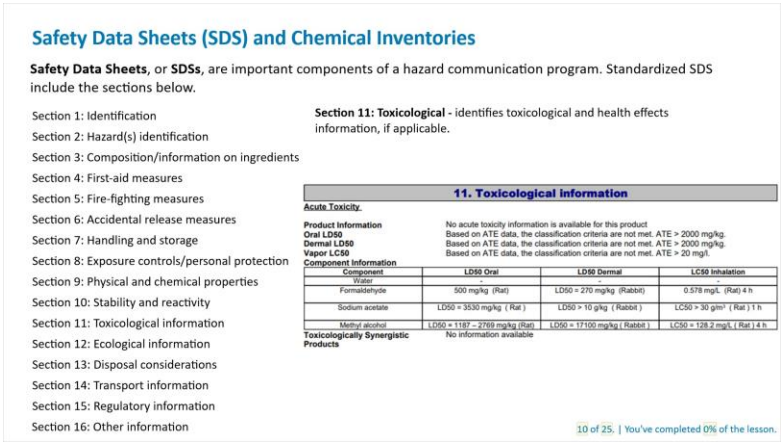
Section 10: Stability and reactivity - describes the reactivity hazards of the chemical and chemical stability information. This section is broken into three parts: reactivity, chemical stability, and other.

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Stable under normal conditions.
Conditions to Avoid	Incompatible products. Excess heat. Keep away from open flames, hot surfaces and sources of ignition.
Incompatible Materials	Strong oxidizing agents
Hazardous Decomposition Products	Carbon monoxide (CO), Carbon dioxide (CO_2)
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

10 of 25. | You've completed 0% of the lesson.

Section 11, Toxicological information (Slide Layer)



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Section 11: Toxicological - identifies toxicological and health effects information, if applicable.

11. Toxicological information

Acute Toxicity

Product Information	No acute toxicity information is available for this product
Oral LD50	Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.
Dermal LD50	Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg.
Vapor LC50	Based on ATE data, the classification criteria are not met. ATE > 20 mg/l.

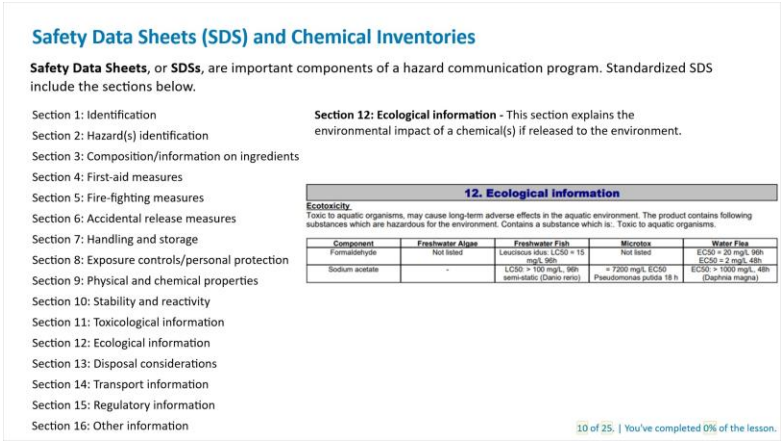
Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Water	-	-	-
Formaldehyde	500 mg/kg (Rat)	LD50 = 270 mg/kg (Rabbit)	0.578 mg/L (Rat) 4 h
Sodium acetate	LD50 = 3530 mg/kg (Rat)	LD50 > 10 g/kg (Rabbit)	LC50 > 30 g/m³ (Rat) 1 h
Methyl alcohol	LD50 = 1187 – 2769 mg/kg (Rat)	LD50 = 17100 mg/kg (Rabbit)	LC50 = 128.2 mg/L (Rat) 4 h

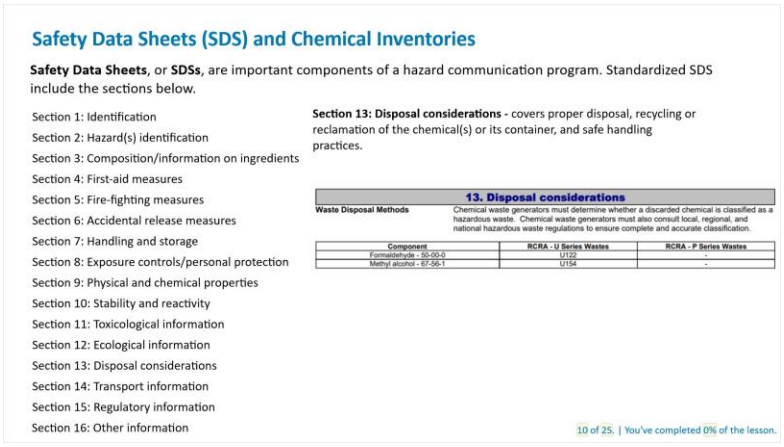
Toxicologically Synergistic Products No information available

10 of 25. | You've completed 0% of the lesson.

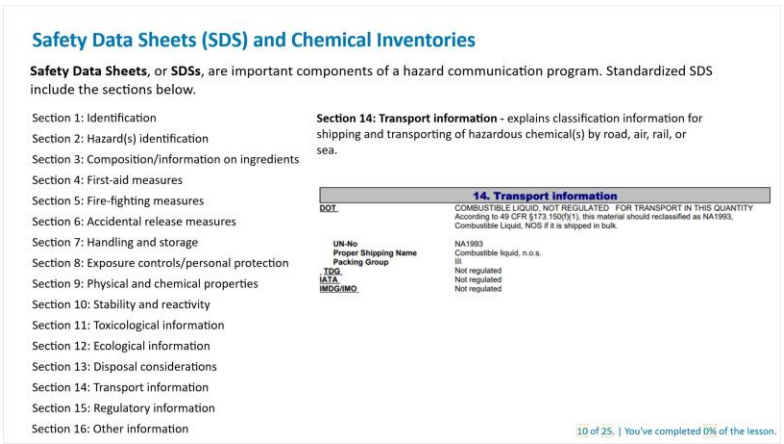
Section 12, Ecological information (Slide Layer)



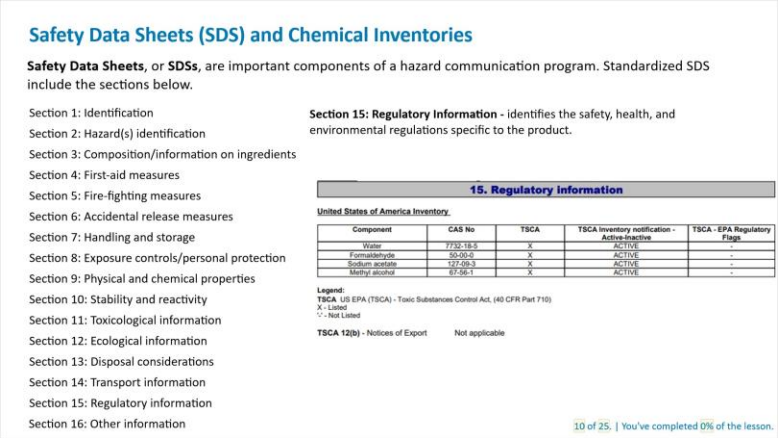
Section 13, Disposal considerations (Slide Layer)



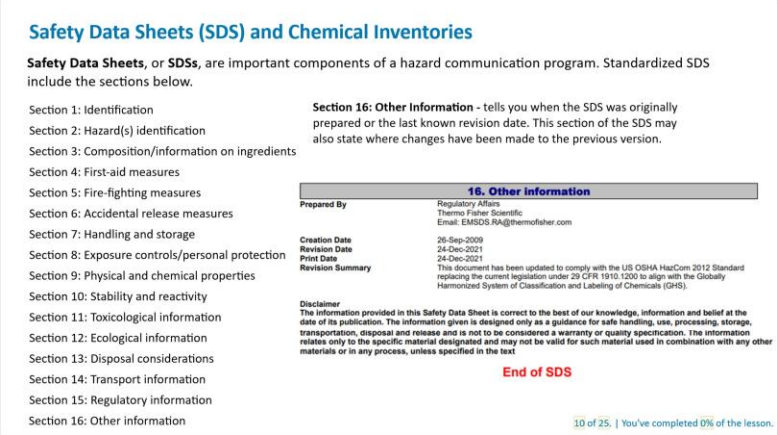
Section 14, Transpoprt information (Slide Layer)



Section 15, Regulatory information (Slide Layer)

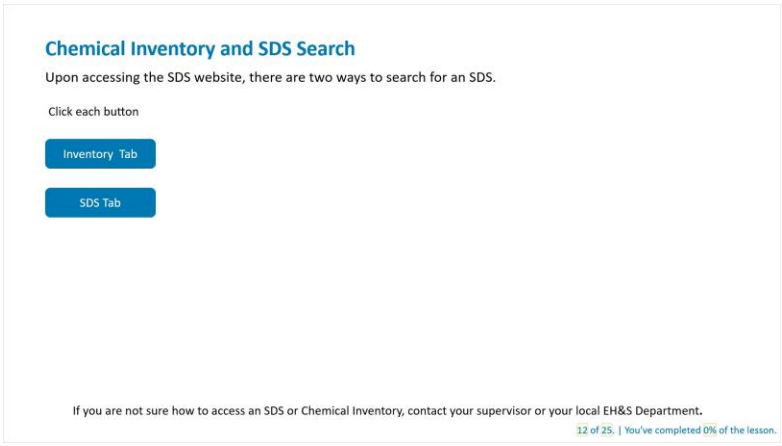


Section 16, Other information (Slide Layer)

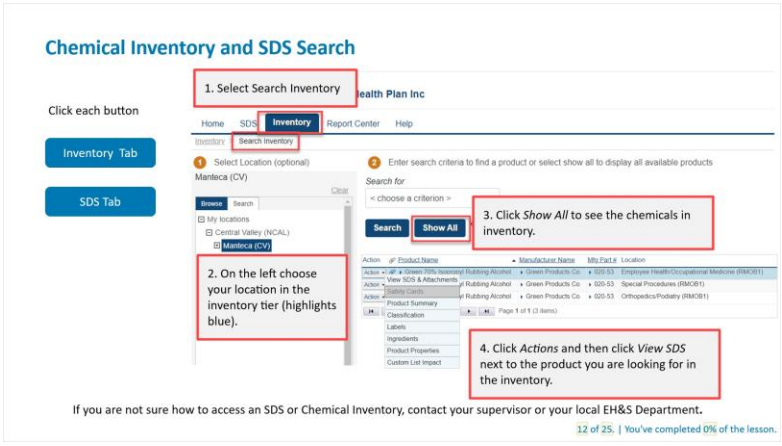


2.10 Safety Data Sheets (SDS) and Chemical Inventories

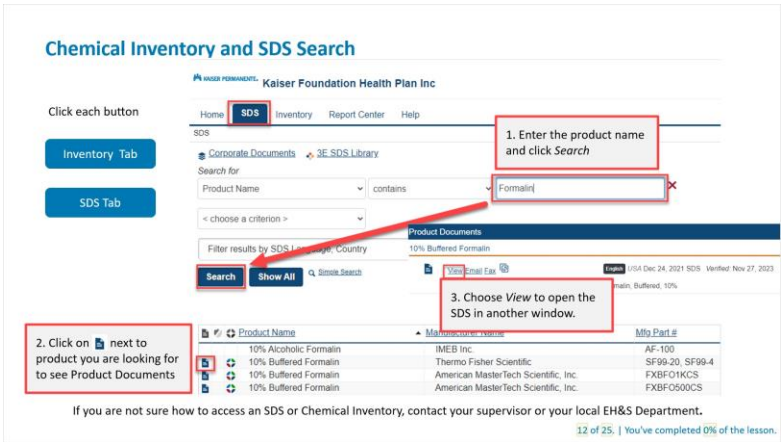
2.11 Chemical Inventory and SDS Search



Inventory Tab (Slide Layer)



SDS Tab (Slide Layer)

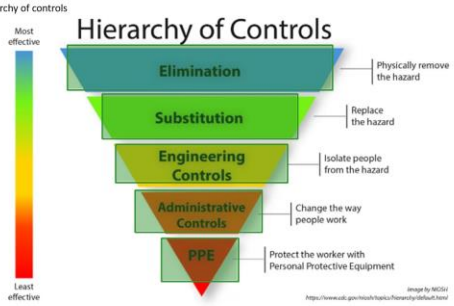


2.12 Hierarchy of Controls

Hierarchy of Controls

Let's look at some ways to protect you from exposure to hazardous chemicals using the hierarchy of controls.

Click each level of the Hierarchy of controls



13 of 25. | You've completed 0% of the lesson.

PPE (Slide Layer)

Personal Protective Equipment (PPE)

Personal Protective Equipment is **worn to minimize exposure** to chemical hazards by providing a barrier between you and the chemical.

Inspect PPE prior to use.

- Wear appropriate eye protection (goggles or face shield) if there is a potential for a chemical splash to eyes or face
- Wear appropriate gloves to avoid potential contact with hazardous materials
  - Nitrile gloves are typically worn for chemical use
  - Cryogenic gloves if handling chemicals like liquid nitrogen
  - Chemotherapy gloves if handling hazardous drugs
- Wear chemical resistant aprons/gowns if there is a potential for a chemical splash to the body
- When required, wear a respirator to reduce airborne exposure to chemicals *(NOTE: Typically chemical use at Kaiser Permanente does not require respiratory protection; however, if you are assigned a respirator for chemical use, you will receive additional training on how to use it properly)*

Follow your department's requirements for PPE use.

Close

Administrative (Slide Layer)

Administrative Controls

Administrative controls are work procedures/practices that reduce the duration, frequency, and severity of exposure to hazardous chemicals.

Safe work practices include:

- Know and follow department-specific procedures for chemical use
- Follow the precautionary statements printed in the SDS and labels
- Keep containers closed and workspaces clutter-free.
- Store chemicals properly
  - below eye level
  - with compatible chemicals
  - in storage cabinet when applicable
  - not on the floor

- Clean any spills promptly with the appropriate spill kit
- Wash your hands after handling chemicals
- Do not eat, drink, or chew gum near chemicals

Close

Engineering (Slide Layer)

Engineering Controls

Engineering controls (e.g. local exhaust ventilation and chemical management systems) reduce chemical exposure by removing it or enclosing it from the workspace.

Local Exhaust Ventilation (LEV)
LEV example include:

- laboratory fume hoods
- prefabricated grossing stations
- glove boxes
- slot exhaust
- snorkel exhaust

Chemical Management Systems
These systems reduce the need for handling/pouring chemicals. Some examples include auto-feed in SPD scope reprocessors or automated dilution systems (e.g. OxyCide dispenser and metered dose chemical dispensers for flammable liquids.).

If your department uses LEV, it is important that:

- it is inspected at least annually (there is a sticker showing most recent inspection date)
- you know how to properly use it
  - keep chemicals close to exhaust
  - keep exhaust area clutter free
  - keep sash within certified height
- if alarms are sounding, let your manager know so that it can be checked
- do not perform work within LEV if it is not functioning properly

Close

Substitution (Slide Layer)

Substitution

Look for ways to reduce exposures to hazardous chemicals by substituting them for a less hazardous alternative. This includes:

- Using green/environmentally friendly chemicals and cleaners
- Using a diluted version if clinically feasible (e.g. 10% formalin instead of concentrated 37% formalin)
- Using a less volatile form of the chemical (e.g. paste/ topical application instead of a liquid spray/aerosol)

For example: Replacing a chemical with steam for sterilization

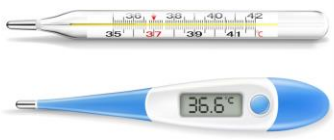
Close

Elimination (Slide Layer)

Elimination

Kaiser Permanente looks for ways to eliminate hazardous chemicals where we can. This may include changing the technology we use to accomplish the task.

For example, healthcare now uses digital technology to eliminate chemical use during X-ray processing and to remove mercury from thermometers.



Close

2.13 Methods of Detecting a Chemical Presence or Release

Methods of Detecting a Chemical Presence or Release

1. You may learn about the presence of a hazardous chemical in your area by:
   - Your manager informing you
   - Continuous monitoring devices (e.g. oxygen sensors where liquid nitrogen is stored, fume hood alarms)
   - Air sampling reports provided as a result of periodic monitoring for certain chemicals (e.g., formaldehyde survey in laboratories).

14 of 25. | You've completed 0% of the lesson.

2.14 Methods of Detecting a Chemical Presence or Release

Methods of Detecting a Chemical Presence or Release

2. Be familiar with the chemicals that are in your area (e.g. odor and the color) so that you know if conditions have possibly changed. It is important that you stay alert to the signs of a chemical spill or release, such as:
   - An unusual or strong smell
   - An unidentifiable substance in an area where chemicals are used
   - Leaks from chemical containers or equipment
   - Change in color of chemical that is not normal

Managers should provide department-specific information, as appropriate, for the chemicals in your work area on how to detect a spill or accidental chemical release.

15 of 25. | You've completed 0% of the lesson.

2.15 Spill Response

Spill Response

Click on each

Incidental Spill Response

Emergency Spill Response

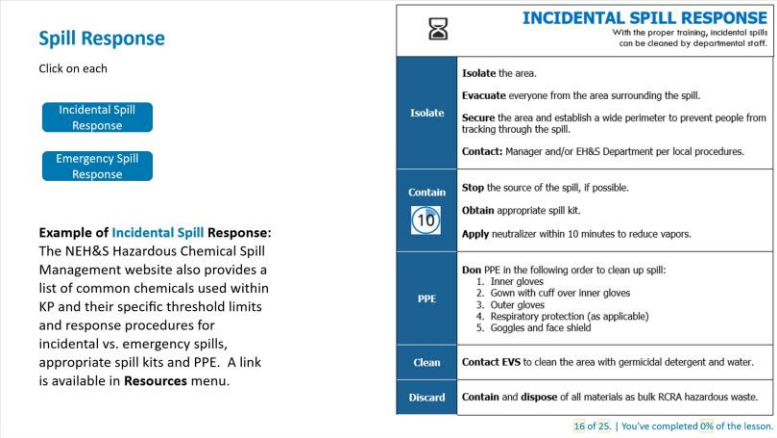
If a spill occurs, refer to the Rainbow Chart or other quick reference guide (such as Code Flip Chart) on emergency procedures. You can also refer to the SDS for accidental release measures.

The NEH&S Hazardous Chemical Spill Management website also provides a list of common chemicals used within KP and their specific threshold limits and response procedures for incidental vs. emergency spills, appropriate spill kits and PPE.

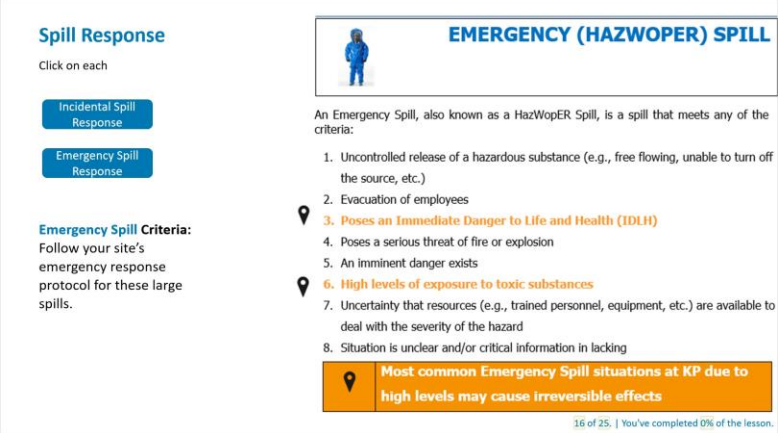
In general, you should follow these procedures for response to a spill.

16 of 25. | You've completed 0% of the lesson.

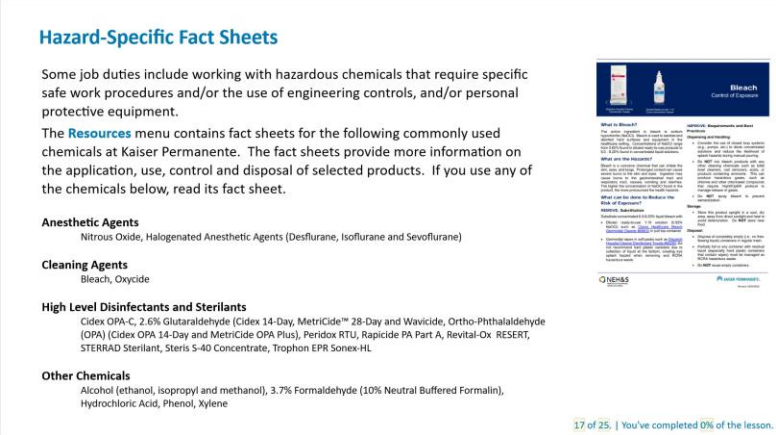
Incidental Spill Response (Slide Layer)



Emergency Spill Response (Slide Layer)



2.16 Hazard-Specific Fact Sheets



2.17 Hazard Communication Courses in KP Learn

Hazard Communication Courses in KP Learn

This concludes the General Hazard Communication course.

Additional chemical specific training is available on KP Learn and may be required by your department or site to inform you of the chemical hazards in your department.

Chemical Specific Courses
- Cadmium Exposure Prevention Training
- Formaldehyde Hazard Training
- High Level Disinfectant Hazard Training
- Phenol Hazard Training
- Respirable Crystalline Silica Training for Dental Operations
- Respirable Crystalline Silica Training for GI

Safe Handling of Hazardous Drugs
- Safe Handling of Hazardous Drugs for EVS
- Safe Handling of Hazardous Drugs for Non-Licensed Staff
- Safe Handling of Hazardous Drugs for Nursing

Waste Anesthetic Gases
- Waste Anesthetic Gas Hazard Training
- Waste Anesthetic Gases Management (Clinical Staff)

Other Courses
- Chemical Hygiene Training for Lab Employees
- Corrosives, Irritants, Sensitizers Training
- Dry Ice Management Guidelines
- Emergency Eyewash and Deluge Shower Training
- Flammables Training
- Gases Under Pressure Training
- Latex Allergy Awareness Training
- Toxics Training

18 of 25. | You've completed 0% of the lesson.

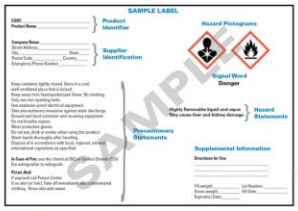
2.18 Summary

Summary

It's important that all chemical containers are labeled.

As a reminder, if you transfer a chemical to a new container, you need to add a secondary label.

Primary Label



Secondary Label

19 of 25. | You've completed 0% of the lesson.

3. Managing Hazardous Materials

3.1 Hazardous Material – Safe Chemical Storage

Hazardous Material – Safe Chemical Storage

It's important to store chemicals safely. Follow the manufacturer's recommendations. These are usually found on the chemical container, label, or safety data sheet (SDS).

Other things to remember...

- Store hazardous chemicals below eye level.
- Separate chemicals that could cause a hazardous reaction if they are mixed. For instance, acids and bases can be very reactive together.
- Consider whether your chemicals need to be stored in a special cabinet, such as a flammables or a caustics cabinet.
- Do not store chemicals in containers normally used for other purposes—for example, a cleaning detergent or water bottle.
- Chemical containers should not be stored on top of each other or on the floor where they could accidentally be knocked over.
- Chemicals should never be stored with food.

Do not dispose of hazardous materials in regular trash or down the drain.

20 of 25. | You've completed 0% of the lesson.

3.2 Compressed Gas Safety

Compressed Gas Safety

- A tank which is not secured may be knocked over. If the valve is knocked off or the tank ruptures, the cylinder would become a projectile causing severe injury or even death.
- A leaking oxygen cylinder can be a fire and explosion hazard.

Only store in approved areas.

- Cylinders containing compressed gases are a serious hazard when not handled or stored correctly.
- Leaks of compressed gases which displace oxygen,such as nitrogen, liquid nitrogen, nitrous oxide or carbon dioxide, can put people at risk for asphyxiation.

21 of 25. | You've completed 0% of the lesson.

3.3 Hazardous Material - Compressed Gas Cylinder Storage

Hazardous Material - Compressed Gas Cylinder Storage

- All compressed gas cylinders must be upright and secured to a fixed object or held in a portable transport cart/holder. Cylinders should be secured at both the top and the bottom.
- In patient areas, only 12 small "E-Cylinders" of oxygen or one "H-Cylinder" (a maximum of 300 cubic feet) can be stored in a smoke compartment without special enclosures. In use "E-Cylinders" of oxygen may be found on gurneys, wheelchairs or crash carts. These in use "E-Cylinders" are not to be included in the smoke compartment storage count limitation.

"E-Cylinders"

"H-Cylinder"

Store only in approved areas.

Information on safe handling and storage of compressed medical gas cylinders is available in the Resources of this Course.

22 of 25. | You've completed 0% of the lesson.

3.4 Activation of Emergency Eye/Face Wash

Using an Emergency Eyewash

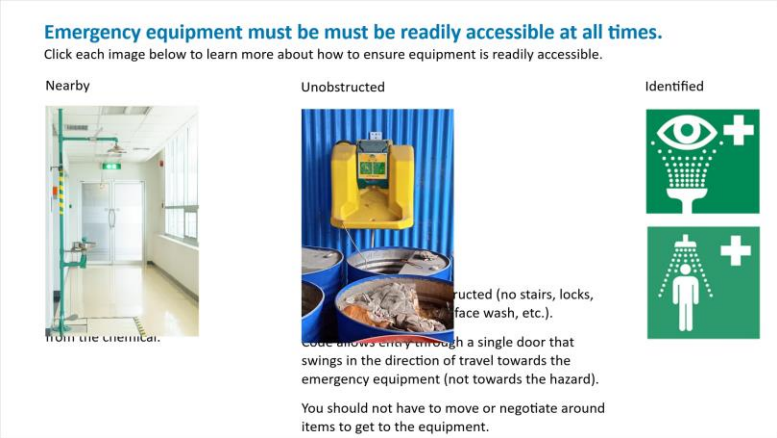
You need to know:

- **Chemicals you use** that can cause damage to your eyes or skin
- The **location** of the nearest eyewash *Can you get there with your eyes shut?*

Emergency eyewashes and/or showers must be in accessible locations that require **no more than 10 seconds for the injured person to reach**.

Next we will show the steps to activate an Emergency Eyewash.

3.5 Emergency Equipment



3.6 Activation Emergency Shower