TRAINING MODULE

LABS101: Hazard Communication for Laboratory Personnel
Chemicals are used in most clinical, research and teaching labs at Duke. Many are potentially hazardous and can affect your health if you don’t control your exposure.
Chemicals are used in most clinical, research and teaching labs at Duke. You should know the signs of overexposure, and what to do if you are exposed.

Understanding the information located on chemical labels and in safety data sheets will help you better protect yourself from chemical hazards in your workplace.
Chemicals can affect your health in many ways. They can be:
- toxic or “poisonous”
- cause cancer
- harm the unborn child
- burn your skin
- harm your lungs or other organs
- cause allergy or asthma symptoms
- cause drowsiness or dizziness
Chemicals can also present very serious physical hazards, such as:

- catching fire
- exploding
- reacting under certain condition
- causing or intensifying fires
- corroding of metals

Keep in mind that many chemicals will have multiple hazards, for instance they can be toxic as well as flammable.
TOXIC HAZARDS

Chemicals can enter the body through many ways. One of the most common ways is through **inhalation** of a chemical gas, vapor, mist, or dust. Another common way is **by contact** to the skin or eyes. The skin normally acts as a protective barrier to help keep out chemicals, but many can pass through into the bloodstream, causing systemic health effects.
TOXIC HAZARDS

A less common way to be exposed at work is **ingestion**. This is possible if you have food or drink with you when you are working with chemical products. **Injection** is another route for substances to enter the body. This can happen from being stuck by a syringe containing drugs or other chemicals, or getting cut from contaminated glass.
TOXIC HAZARDS

Acute vs Chronic

A hazardous chemical may cause acute health effects, chronic health effects, or both.

**Acute health** effects are those that affect you within a very short time following an exposure.

As an example, exposure to bleach can cause severe eye, nose, and throat irritation.
TOXIC HAZARDS
Acute vs Chronic

Chronic health effects result from prolonged or repeated exposures to a chemical over many days, weeks, months, or years.
Symptoms of exposure may not be immediately apparent so you may not know you have been harmed until much later.
Chronic health effects are often difficult to recover from. Examples of chronic health effects are liver damage or cancer.
TOXIC HAZARDS
Local vs Systemic

A health effect can also be **local or systemic**, depending on where it affects you after exposure.

A **local health effect** refers to an adverse health effect that takes place at the area of contact.

This may be the skin, eyes, respiratory tract, etc. Examples of chemicals that cause local health effects are strong corrosives such as nitric acid or sodium hydroxide.
TOXIC HAZARDS
Local vs Systemic

A health effect can also be local or systemic, depending on where it affects you after exposure.

A systemic health effect causes damages to “target organs”, which are specific tissues away from the location of exposure.

An example is kidney damage caused by exposure to phenol.
PHYSICAL HAZARDS

Physical hazards of chemicals do not directly affect your health. If chemicals with physical hazards are not handled and stored properly, you or others can be seriously injured or risk death.

Chemicals vary in how easily they catch fire or burn and must be kept away from sparks and flames.

Some chemicals may react in the presence of air, water, other chemicals, or under certain physical conditions.
PHYSICAL HAZARDS
Physical hazards of chemicals do not directly affect your health. If chemicals with physical hazards are not handled and stored properly, you or others can be seriously injured or risk death.

Reactions may result in toxic fumes, fires, and explosions, causing injuries, damage to property, and severe effects on the environment.
PHYSICAL HAZARDS

Corrosive chemicals, such as strong acids and bases, can potentially destroy and damage other substances that they contact.
PHYSICAL HAZARDS

Gases under pressure pose several different hazards.

When released suddenly, gas can expand quickly and displace oxygen in the air, expose users to toxic levels, or ignite in the presence of a spark or flame.

If a cylinder ruptures, it can accelerate to speeds great enough to penetrate concrete walls.
How do you know what chemical hazards exist in your work area?

The label and Safety Data Sheet are your first sources of information.

You can also ask the lab chemical hygiene officer, Principal Investigator, or lab safety coordinator or refer to the lab-specific Chemical Hygiene Plan and Standard Operating Procedures and the OESO safety guidelines for chemical hazard classes.
Be sure to ask about
- physical hazards
- health hazards
- simple asphyxiation hazards
- combustible dust hazards
- pyrophoric gas hazards
- hazards not otherwise classified
If you have questions or concerns, ask your supervisor, lab safety coordinator, lab chemical hygiene officer, or PI before working with the chemical.
HAZARD COMMUNICATION STANDARD

Published by the Occupational Safety and Health Administration (OSHA)
Updated in 2012 to align with the United Nations Globally Harmonized System (GHS) of Classification and Labelling of Chemicals

This standard requires that certain information be shown on chemical labels and requires “Safety Data Sheets” in a specific format.
HAZARD CLASSIFICATION

The Hazard Communication Standard has specific hazard classes for health and physical hazards, and different categories to indicate the level of hazard within the class.

Categories are usually numbers and are sometimes letters or a combination of numbers and letters.

Lower numbers and letters (like 1 or A) represent a greater hazard than higher numbers/letters in the same hazard class.

GHS BUILDING BLOCKS: HEALTH HAZARDS

<table>
<thead>
<tr>
<th>HAZARD CLASS</th>
<th>HAZARD CATEGORY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Toxicity (oral)</td>
<td>1</td>
</tr>
<tr>
<td>Acute Toxicity (dermal)</td>
<td>1</td>
</tr>
<tr>
<td>Acute Toxicity (inhalation)</td>
<td>1</td>
</tr>
<tr>
<td>Skin Corrosion/Irritation</td>
<td>1A, 1B, 1C</td>
</tr>
<tr>
<td>Serious Eye Damage/ Eye Irritation</td>
<td>1</td>
</tr>
<tr>
<td>Respiratory Sensitization</td>
<td>1A, 1B</td>
</tr>
<tr>
<td>Skin Sensitization</td>
<td>1A, 1B</td>
</tr>
<tr>
<td>Germ Cell Mutagenicity</td>
<td>1A, 1B</td>
</tr>
<tr>
<td>Carcinogenicity</td>
<td>1A, 1B</td>
</tr>
<tr>
<td>Reproductive Toxicity</td>
<td>1A, 1B</td>
</tr>
<tr>
<td>Specific Target Organ Toxicity(s)</td>
<td>1</td>
</tr>
<tr>
<td>Specific Target Organ Toxicity(r)</td>
<td>1</td>
</tr>
<tr>
<td>Aspiration Hazard</td>
<td>1</td>
</tr>
</tbody>
</table>
HAZARD CLASSIFICATION

Each hazard category is associated with specific Signal Words, Hazard Statements, Precautionary Statements and Pictograms.

These will be explained in the following labels section.

It is important to note that both NFPA and HMIS consider 1 to be the lowest hazard, opposite GHS, and still found in older MSDSs or labels.
70% Ethanol

Danger

Hazard Statements:
Highly flammable liquid and vapor. Causes serious eye irritation.

Precautionary Statements:
Keep away from heat/sparks/open flames/hot surfaces. No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Wash skin thoroughly after handling. Wear protective gloves/eye protection/face protection. Store in a well-ventilated place. Keep cool. Dispose of contents/container to an approved waste disposal plant. IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. IF eye irritation persists: Get medical advice/attention. In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.

Supplier Identification and Emergency Phone:
Sigma-Aldrich 3050 Spruce St. St. Louis, MO 63103 Emergency Phone #: (314) 776-6555

LABELS

Read the information on the label before handling any chemical.
70% Ethanol

Danger

Hazard Statements:
Highly flammable liquid and vapor. Causes serious eye irritation.

Precautionary Statements:
Keep away from heat/sparks/open flames/hot surfaces. No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Wash skin thoroughly after handling. Wear protective gloves/eye protection/face protection. Store in a well-ventilated place. Keep cool. Dispose of contents/container to an approved waste disposal plant. If ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. If IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.

Supplier Identification and Emergency Phone:
Sigma-Aldrich 3050 Spruce St. St. Louis, MO 63103 Emergency Phone #: (314) 776-6555

LABELS

Labels must have the chemical name or identifier. In this case it is 70% Ethanol.
70% Ethanol

Danger

Hazard Statements:
Highly flammable liquid and vapor.
Causes serious eye irritation.

Precautionary Statements:
Keep away from heat/sparks/open flames/hot surfaces. No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Wash skin thoroughly after handling. Wear protective gloves/eye protection/face protection. Store in a well-ventilated place. Keep cool. Dispose of contents/container to an approved waste disposal plant. IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/shower. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinguishment.

Supplier Identification and Emergency Phone:
Sigma-Aldrich 3050 Spruce St. St. Louis, MO 63103 Emergency Phone #: (314) 776-6555

Labels

Most hazardous chemicals will have a **signal word** on the label to alert users to the severity of the hazard.

The signal word will be either **Danger** or **Warning**, with Danger indicating the more severe hazard.
70% Ethanol

Danger

Hazard Statements:
Highly flammable liquid and vapor. Causes serious eye irritation.

Precautionary Statements:
Keep away from heat/sparks/open flames/hot surfaces. No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Wash skin thoroughly after handling. Wear protective gloves/eye protection/face protection. Store in a well-ventilated place. Keep cool. Dispose of contents/container to an approved waste disposal plant. IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.

Supplier Identification and Emergency Phone:
Sigma-Aldrich 3050 Spruce St. St. Louis, MO 63103 Emergency Phone #: (314) 776-6555

LABELS

If there are pictograms associated with the chemical, they will all be present on the label. Pictograms will be further covered in the next section.
70% Ethanol

Danger

Hazard Statements:
Highly flammable liquid and vapor.
Causes serious eye irritation.

Precautionary Statements:
Keep away from heat/sparks/open flames/hot surfaces. No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Wash skin thoroughly after handling. Wear protective gloves/eye protection/face protection. Store in a well-ventilated place. Keep cool. Dispose of contents/container to an approved waste disposal plant. IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.

Supplier Identification and Emergency Phone:
Sigma-Aldrich 3050 Spruce St. St. Louis, MO 63103 Emergency Phone #: (314) 776-6555

Labels

Hazard Statements are standardized phrases that provide specific hazard information. You should always see the same statement for the same hazards, no matter what the chemical is or who produces it.
**Chemical Hazards**

**70% Ethanol**

**Danger**

**Hazard Statements:**
Highly flammable liquid and vapor. Causes serious eye irritation.

**Precautionary Statements:**
Keep away from heat/sparks/open flames/hot surfaces. No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Wash skin thoroughly after handling. Wear protective gloves/eye protection/face protection. Store in a well-ventilated place. Keep cool. Dispose of contents/container to an approved waste disposal plant. IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/shower. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.

**Supplier Identification and Emergency Phone:**
Sigma-Aldrich 3050 Spruce St. St. Louis, MO 63103 Emergency Phone #: (314) 776-6555

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**Labels**

**Precautionary Statements** are standardized phrases that provide measures for users to follow to prevent exposure or what to do in case of an emergency.

They include statements on:
- prevention
- response
- storage
- disposal
70% Ethanol

Danger

Hazard Statements:
Highly flammable liquid and vapor. Causes serious eye irritation.

Precautionary Statements:
Keep away from heat/sparks/open flames/hot surfaces. No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Wash skin thoroughly after handling. Wear protective gloves/eye protection/face protection. Store in a well-ventilated place. Keep cool. Dispose of contents/container to an approved waste disposal plant. IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/shower. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.

Supplier Identification and Emergency Phone:
Sigma-Aldrich 3050 Spruce St. St. Louis, MO 63103 Emergency Phone #: (314) 776-6555

You should always see the same statement for the same hazards, no matter what the chemical is or who produces it.
70% Ethanol

Danger

Hazard Statements:
Highly flammable liquid and vapor. Causes serious eye irritation.

Precautionary Statements:

IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/shower.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

If eye irritation persists: Get medical advice/attention.

In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.

Supplier Identification and Emergency Phone:
Sigma-Aldrich 3050 Spruce St. St. Louis, MO 63103 Emergency Phone #: (314) 776-6555

Labels
The label will also contain the manufacturer identification including a number to call in case of an emergency.
WORKPLACE CONTAINERS

All containers of hazardous chemicals must be properly labeled in order to identify the contents and their hazards to others.

If a chemical is transferred to a different container, the new workplace container must be labeled with at least the name of the chemical and any applicable hazard warnings.
WORKPLACE CONTAINERS

You must have full hazard information available to you in your immediate work area; for example, the original container label or Safety Data Sheet.

One way to provide all of the hazard information is to use OESO premade chemical labels for common chemicals, or to fill out the label template found in the course page.

Click here to enter chemical name and concentration

Click here to enter pictogram(s) X

Click here to select Signal Word

HAZARD STATEMENTS:

PRECAUTIONARY STATEMENTS:

Supplier Identification & Emergency Phone#
Click here to enter supplier information & emergency phone
See the Safety Data Sheet for more information.
Exception:
Transferring a chemical into a container for immediate use.
Employees should have a working knowledge of the GHS pictograms.

For more information on each pictogram, please visit the course description page.
Safety Data Sheets or SDSs must be readily available to you in your work area, whether in a book or on a computer. These sheets will provide more detailed technical information on the chemical product than is provided on the label.

Duke Occupational & Environmental Safety Office
Safety Data Sheets contain 16 sections of information that are standardized and will be consistent across all suppliers. Each section contains specific subheadings.
16-Section Safety Data Sheet

1. Identification of the substance or mixture and of the supplier
2. Hazards identification
3. Composition/Information on ingredients Substance/Mixture
4. First aid measures
5. Firefighting measures
6. Accidental release measures
7. Handling and storage
8. Exposure controls/personal protection
9. Physical and chemical properties
10. Stability and reactivity
11. Toxicological
12. Ecological information (non-mandatory)
13. Disposal considerations (non-mandatory)
14. Transport information (non-mandatory)
15. Regulatory information (non-mandatory)
16. Other information including information on preparation and revision of the SDS

We will take a brief look at a few sections. For detailed information on all the sections, visit the course description page.
### Product Identification

1.3 Details of the supplier of the safety data sheet

<table>
<thead>
<tr>
<th>Company</th>
<th>Sigma-Aldrich</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td>3050 Spruce Street, SAINT LOUIS MO 63103 USA</td>
</tr>
<tr>
<td>Telephone</td>
<td>+1 800-325-5832</td>
</tr>
<tr>
<td>Fax</td>
<td>+1 800-325-5052</td>
</tr>
</tbody>
</table>

1.4 Emergency telephone number

| Emergency Phone # | +1-703-527-3887 (CHEMTREC) |

Section 1 provides **contact information** for the manufacturer in case you need to contact them with further questions about the chemical including an emergency phone number.

*Duke Occupational & Environmental Safety Office*
Section 2 provides much of the same information as the label including GHS classifications, pictograms and hazards.
1. Product Identification

2. Hazard Identification

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS
May form explosive peroxides.

Precautionary statement(s)
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ventilating/lighting/equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.

Be sure to check the SDS for Hazards Not Otherwise Classified. This subsection may include important hazard statements such as;
“reacts violently with water”, “contact with water liberates toxic gas” or, as shown here “may form explosive peroxides”. These and other hazard classifications are not part of the GHS classification system but some manufacturers will include them on their SDSs.
Employees should check multiple chemical information sources to ensure that they are aware of all of the hazards of a particular chemical before beginning work.
Section 7 lists precautions for **safe handling**, including recommendations for handling incompatible chemicals. It also provides recommendations for safe storage and specific storage requirements, such as ventilation requirements.
Section 8 lists any accepted **occupational exposure limits** such as the OSHA Permissible Exposure Limits (PELs). Other recommended exposure limits may also be shown.
8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 480 min
Material tested:Camatri® (KCL 730 / Aldrich Z677442, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.2 mm
Break through time: 60 min
Material tested:Dermatrill® P (KCL 743 / Aldrich Z677388, Size M)

It also provides methods to prevent exposures, such as appropriate eye protection and gloves. Some SDSs may indicate use of a respirator. When determining if a respirator is needed or appropriate, consult with OESO for clarification.
Section 9 lists the **physical and chemical properties** of the chemical or mixture. It will describe how the product looks and smells. It will indicate the products’ physical state, the boiling point, pH, water solubility and vapor pressure.
k) Vapour pressure
- 43.2 hPa (32.4 mmHg) at 20.0 °C (68.0 °F)
- 58.7 hPa (44.0 mmHg) at 25.0 °C (77.0 °F)

Keep in mind that the physical state and vapor pressure can affect the potential for exposure. Chemicals in powder form can easily aerosolize when handled. Chemicals with higher vapor pressures are more likely to present an inhalation hazard than those with low vapor pressures.
<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>g) Flash point</td>
<td>12.0 °C (53.6 °F) - closed cup</td>
</tr>
<tr>
<td>h) Evaporation rate</td>
<td>3.0</td>
</tr>
<tr>
<td>i) Flammability (solid, gas)</td>
<td>No data available</td>
</tr>
</tbody>
</table>
| j) Upper/lower flammability or explosive limits | Upper explosion limit: 12.7 % (V)  
                             | Lower explosion limit: 2 % (V)                            |

For powders and liquids with high vapor pressures, use of a chemical fume hood or other control is especially important. Information on the flash point and upper and lower explosion limits will give you an idea of how easily the chemical may catch fire.
FINDING SDSs
Click the appropriate choice for your workplace.

I work in a clinical lab

I work in a research or teaching lab
Finding SDSs
Clinical Lab

Go to the OESO website.
Navigate to Occupational Hygiene & Safety, and SDSs. There you will find a wealth of links and resources.
FINDING SDSs
Click the appropriate choice for your workplace.

I work in a clinical lab

I work in a research or teaching lab
Finding SDSs
Research/Teaching Lab
You can usually find Safety Data Sheets through the manufacturer’s website.
There will often be an SDS link on the product page.
Some manufacturers may have a separate search page for SDSs.
Developing SDSs

If your lab produces a new chemical or drug that will be used by another lab group at Duke or sent to any other user outside the lab, you must develop an SDS covering the hazards and provide appropriate labeling. Contact OESO Lab Safety for a blank SDS template and guidance.
Detecting Chemicals

There are several ways to detect the presence or release of hazardous chemicals in the work area. Being familiar with the properties of the product will help you detect anything unusual like strong odors or color changes.
Detecting Chemicals

In some situations OESO conducts active air monitoring to determine exposure levels of certain chemicals.

We do this routinely where formalin is used. The results of active sampling are used to develop control measures if warranted.
Detecting Chemicals

In areas where large amounts of liquid nitrogen are used, the oxygen concentration may be monitored continuously; an alarm will sound if the oxygen concentration is too low.
Controlling Hazards

There are a number of techniques to control hazard exposure in the workplace. Some of these methods are more effective than others.

To control exposures to chemicals we always try to apply the most effective control first.
Controlling Hazards

There is a “hierarchy of controls” for preventing exposure.

All these techniques should be considered to mitigate exposure.

Source: NIOSH
https://www.cdc.gov/niosh/topics/hierarchy/images/hierarchycontrols.jpg
Controlling Hazards

The best option is to eliminate the hazard if the process allows it.

One example is to eliminate mercury in the work environment by using non-mercury substitutes.
**Controlling Hazards**

If this is not possible, the next best option is to substitute with a less hazardous substance. For example, there are a number of alternatives to ethidium bromide for DNA staining, such as the product shown here. Another example is to purchase pre-cast polyacrylamide gels instead of powdered acrylamide.
If you must work with a hazardous substance, use engineering controls to prevent their release into the air.

Examples of engineering controls are fume hoods and exhausted biosafety cabinets.
Controlling Hazards

If you must work with a hazardous substance, use engineering controls to prevent their release into the air.

When maintained and used properly, these are very effective at removing airborne chemicals away from you.
Controlling Hazards

Elimination

Substitution

Engineering Controls

Admin Controls

Administrative controls can reduce chemical exposure.
Controlling Hazards

These include:
- Reducing the amount of time exposed
- Keeping chemical containers closed and stored properly when not in use
- Good housekeeping practices and
- Following standard operating procedures
Controlling Hazards

You are ultimately responsible for your safety and those around you by following proper procedures.

Poor housekeeping and chemicals don’t mix and can ultimately lead to an exposure.
Controlling Hazards

Personal protective equipment (PPE) is typically used together with other methods of chemical exposure controls. PPE alone as a means of exposure control is not ideal.
The available PPE should be appropriate for protection against the chemical. Don’t assume that the gloves you use for one product are effective for another. Check the SDS or a glove penetration guide to make sure your gloves will protect you.
When respirator use is required it is critical to wear the correct respirator and cartridges for the airborne hazard. Because of this, it is important to contact OESO if you use, or plan to use respirators.
Responding to Emergencies

Be familiar with any emergency response procedures specific for your worksite.

In the event of an emergency, refer to the Emergency Response and Incident Reporting guide, which should be located in your immediate area.
Responding to Emergencies

There is a great deal of information within this guide including:

- chemical spill procedures
- emergency contact numbers
- numbers for the different safety divisions within OESO.

This guide is your first resource for an emergency.
Responding to Emergencies

Chemical spills in your immediate area can, in many cases, be cleaned up by area personnel.

If the spills are large or particularly hazardous, the Duke Chemical Spill Response Team can be activated by calling 911 from a Duke phone or 919-684-2444 from a cell phone. In some cases, outside professionals may be required for cleanup.
You have completed the module. For further questions you can review or contact Laboratory Safety at 919-684-8822. If finished, acknowledge completion.