



# Personal Protective Equipment (PPE)

WISE Safety Meeting

October 15, 2025

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# Outline

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- Hierarchy of controls
- PPE definition
- Roles and responsibilities
- Hazard assessment and awareness
- Overview of PPE
- Common mistakes
- Common scenarios

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# Hierarchy of Controls

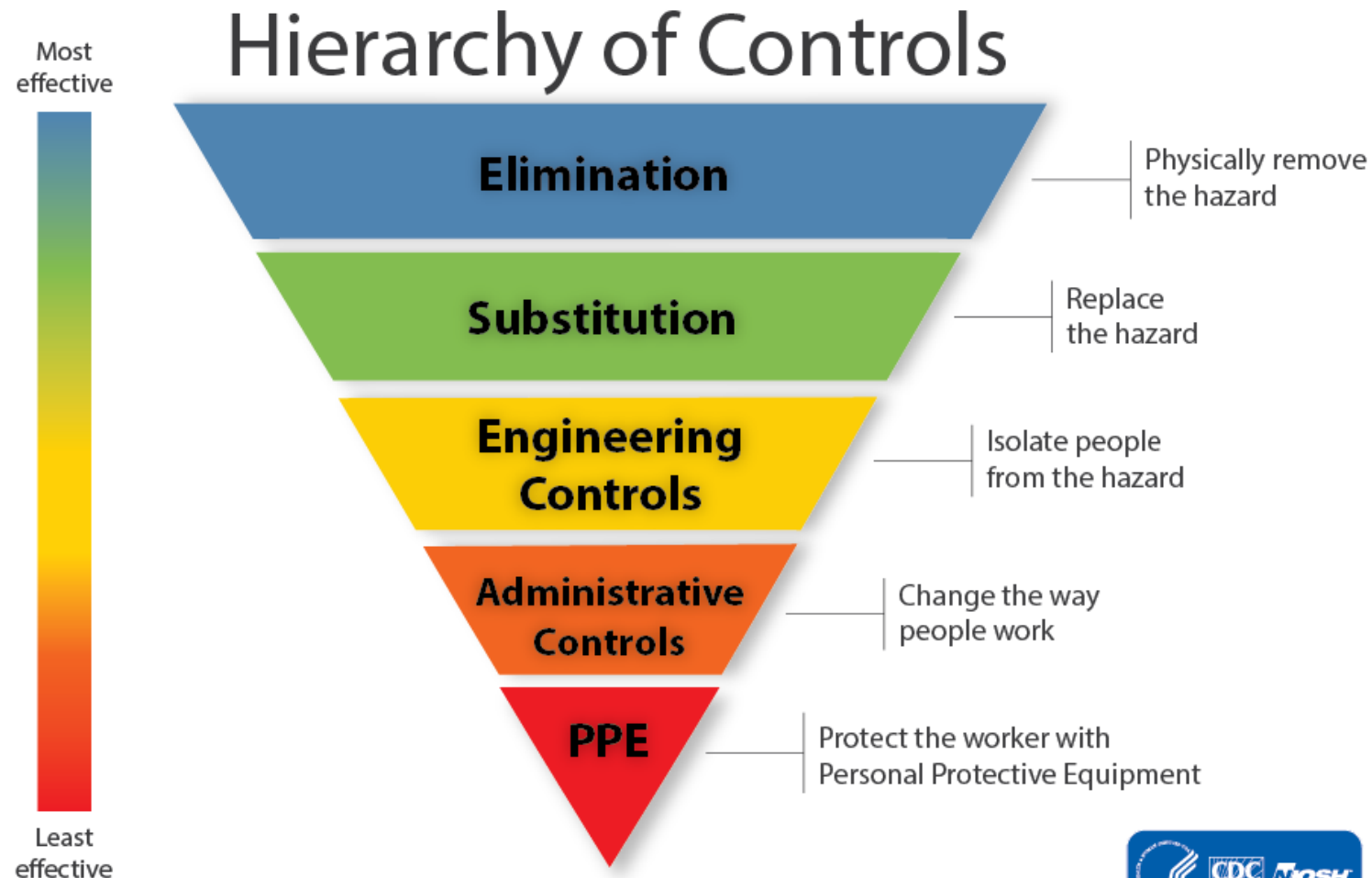


Image by NIOSH



# What is PPE?

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- Equipment used to minimize exposure to hazards that can cause serious workplace injuries and illnesses
- Includes items such as:



Gloves



Safety glasses



Lab coats



Earplugs



Hard hats

# Roles and Responsibilities

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## EHS:

- Assist in selection of PPE
- Assist in development of training
- Provide periodic audits of machine safeguards

## Department:

- Ensure machines and tools have the appropriate safeguards
- Provide PPE to employees when necessary
- Provide proper training to employees

## Supervisor:

- Analyze work to determine the safest and most efficient procedure along with physical protection needed
- Only assign tasks to qualified and trained individuals

## Employee/Student:

- Work safely
- Operate machinery with safeguards in place
- Wear, care for, and store PPE properly
- Inform supervisor if PPE needs replacement

# Hazard Assessment

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- Injuries or illnesses can result from physical, chemical, thermal, electrical, radiological, mechanical, and other hazards
- Hazards and risks depend on environment and equipment
- [Laboratory Registration & Hazard Identification Form](#)
  - Used to identify and assess laboratory hazards and potentially harmful materials
  - Includes lab safety equipment, physical hazards, chemical hazards, biological hazards, etc.
- Hazard assessments are important to evaluate potential hazards and develop appropriate protective measures

# Hazard Assessment

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- Be familiar with workplace facilities that may harbor hazards
- Look for warning signs and postings outside of hazardous areas
- Always consult the safety data sheet (SDS) for any chemical you are using

# SDS Example: Benzene



## SECTION 2. HAZARDS IDENTIFICATION

**GHS classification in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)**

**Hazards for the product as supplied**

Flammable liquids	: Category 2
Skin irritation	: Category 2
Eye irritation	: Category 2A
Germ cell mutagenicity	: Category 1B
Carcinogenicity	: Category 1A
Specific target organ toxicity - repeated exposure	: Category 1 (Blood)
Aspiration hazard	: Category 1
Long-term (chronic) aquatic hazard	: Category 3

## Benzene SDS

**Hand protection**

Material	: Fluorinated rubber
Break through time	: 480 min
Glove thickness	: 0.7 mm
Protective index	: Full contact
Manufacturer	: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Material	: Fluorinated rubber
Break through time	: 480 min
Glove thickness	: 0.7 mm
Protective index	: Splash contact
Manufacturer	: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Manufacturer	: data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
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Remarks	: 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. If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be
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Based on the SDS and listed hazards, you can make an informed decision on what PPE to wear



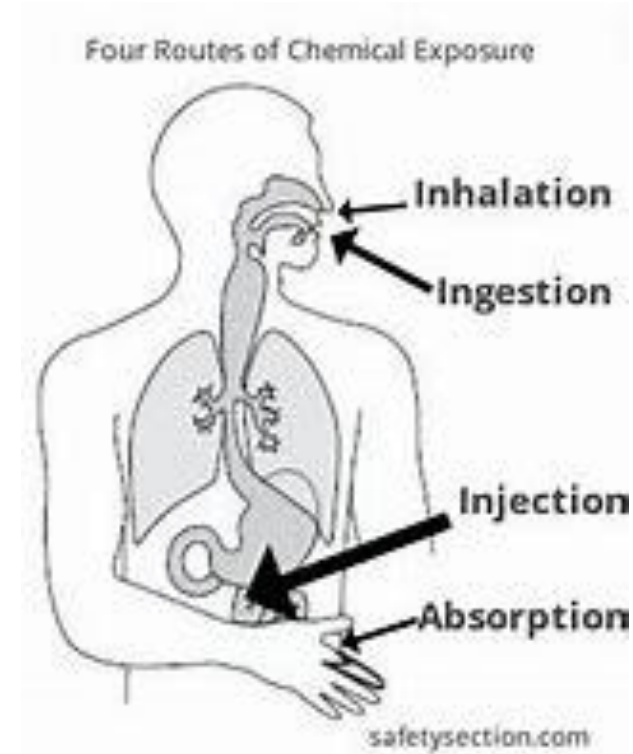
# Preventing Exposure

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Exposure routes:

- Inhalation → Lungs
- Ingestion → Swallowing
- Absorption → Skin or eyes
- Injection → Via needle



# Overview of Required PPE

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## Minimum Level Laboratory Safety Attire



Resources: KU EHS  
Training Courses available  
on Canvas

<https://ehs.ku.edu/canvas>

# Eye and Face Protection

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- Determined by a hazard assessment of relevant material
- Examples include:



Safety glasses w/ side shield protection  
- Stronger than glasses



Safety goggles  
- surround the entire eye area



Face shield  
- cover the entire face

**Safety eyewear should meet ANSI Z87 standards**

NOTE: normal prescription glasses are not safety glasses

# Chemical Eye Burns

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Alkali = most dangerous; penetrate more rapidly than acids

- Higher pH causes more damage
- Cause severe injury to cornea and lens
- Examples: ammonia, lye, magnesium
- Everyday products: fertilizers, cleaning products

Acids = Usually only damage the front of the eye but can cause blindness

- Examples: sulfuric acid, hydrochloric acid, acetic acid
- Everyday products: glass polish, nail polish remover, battery acid

Irritants = have a neutral pH; cause more discomfort than damage

- Examples: household detergents, pepper spray

# Hand Protection



Material	Effective for:	Not effective for:
Butyl	Aldehydes, ketones, esters, gases and water vapors, acids, bases	Aliphatic/aromatic hydrocarbons, halogenated solvents
Nitrile	Aliphatic solvents, some acids and bases, many alcohols	Ketones, strong oxidizers, chlorinated solvents
Neoprene	Acids, some alcohols and organic acids	Aromatic hydrocarbons and many chlorinated solvents
PVC	Acids, bases, salts, some alcohols	Organic solvents, aldehydes and esters
Viton	Chlorinated and aromatic solvents, gas and water vapors, benzene	Ketones and esters



# Other PPE

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PPE should protect wrists, ankles, face, and neck

Standard protection:

- Full-length pants or skirts below the knee
- Closed-toe shoes



**Lab coats:** additional protective layer, should be cotton and fall below knees



**Steel toes:** protect from impact of a falling heavy object

# Common Mistakes

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1. Poor assessment
  - a. PPE is unsuitable for presented hazards
2. Lack of training
  - a. Incorrect use
  - b. Incorrect disposal
  - c. Failure to maintain
3. Lack of accountability
  - a. Enforce among your peers
4. Comfort over safety
  - a. Must still use PPE even if it's uncomfortable
5. Failure to update or adapt
  - a. Failure to update or adapt
  - b. New equipment/procedures/chemicals used means revisiting PPE

# Scenario 1: Gas Cylinders



- Can pose several hazards
  1. High pressure—compressed gases are under pressure
  2. Chemical hazards—gases may be flammable (hydrogen), toxic (carbon monoxide), oxidizing (oxygen), corrosive (hydrogen chloride), inert (nitrogen)
  3. Physical hazards—heavy and often awkward to move
- Example: Size 1A Nitrogen cylinder
  - 2,490 psig at 70°F
  - 151 lbs

Cylinder Specifications

Cylinder Size	Valve Outlet CGA No.	Pressure psig @ 70°F	Pressure kPa @ 21.1°C	Approximate Ship Weight	
				lb	kg
1U	677	6,000	41,369	359	163
1H	680	3,500	24,132	233	106
1L	580	2,640	18,202	170	77
1A	580	2,490	17,167	151	68



# Scenario 1: Gas Cylinders

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- When moving cylinders:
  - Wear steel toes
  - Use a cylinder cart with a chain to transport
  - Keep cylinder caps on (no regulator on)
- When connecting or using:
  - Wear safety goggles
  - Wear gloves



# Scenario 2: Dichloromethane (DCM)



- Consult SDS to determine hazards

**Sigma-Aldrich** [www.sigmaaldrich.com](http://www.sigmaaldrich.com)

**SAFETY DATA SHEET**

Version 6.24  
Revision Date 06/24/2025  
Print Date 06/25/2025

**SECTION 1. IDENTIFICATION**

**1.1 Product identifiers**

Product name	: Dichloromethane
Product Number	: 270997
Brand	: Sigma-Aldrich
Index-No.	: 602-004-00-3
CAS-No.	: 75-09-2

## SECTION 2. HAZARDS IDENTIFICATION

**GHS classification in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)**

Skin irritation : Category 2

Eye irritation : Category 2A

Carcinogenicity : Category 2

Specific target organ toxicity - single exposure : Category 3 (Central nervous system)

### Other hazards

None known.

### GHS label elements

Hazard pictograms :



Signal Word : Warning

Hazard Statements : H315 Causes skin irritation.  
H319 Causes serious eye irritation.  
H336 May cause drowsiness or dizziness.  
H351 Suspected of causing cancer.

# Scenario 2: Dichloromethane (DCM)



- Must look at glove compatibility [Glove Compatibility Chart](#)
  - Nitrile is the most common glove material, but won't work here

  RED: Avoid use of the glove with this chemical.

**SPECIAL NOTE:** The chemicals in this guide highlighted in BLUE   are experimental carcinogens, according to the ninth edition of Sax' *Dangerous Properties of Industrial Materials*. Chemicals highlighted in GRAY   are listed as suspected carcinogens, experimental carcinogens at extremely high dosages, and other materials which pose a lesser risk of cancer.

CHEMICAL	LAMINATE FILM BARRIER™			NITRILE SOL-VEX®			UNSUPPORTED NEOPRENE 29-SERIES			SUPPORTED POLYVINYL ALCOHOL PVA™			POLYVINYL CHLORIDE (Vinyl) SNORKEL®			NATURAL RUBBER *CANNERS AND HANDLERS™			NEOPRENE/ NATURAL RUBBER BLEND *CHEMI-PRO®			BUTYL UNSUPPORTED CHEMTEK™ BUTYL			VITON/BUTYL UNSUPPORTED CHEMTEK™ VITON/BUTYL		
	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate
103. Methylene Chloride (DCM)	E	20	VG	NR	—	—	NR	—	—	G	>360	E	NR	—	—	NR	—	—	NR	—	—	G	13	P	E	29	G

- Should we even wear gloves when handling DCM?

Hand protection

Material : Viton®  
 Break through time : 120 min  
 Glove thickness : 0.7 mm  
 Protective index : Splash contact  
 Manufacturer : Vitoject® (KCL 890 / Aldrich Z677698, Size M)

- Know your process/procedure, and know how to choose the correct PPE for your circumstance

# Scenario 2: Dichloromethane (DCM)

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- Potential hazards
  - Irritant (skin and eye)
  - Acute toxicity
  - Chronic effects (suspected carcinogen)
  - Targets central nervous system
- Always use minimum PPE, include lab coat for protection against splashes and vapors
  - Proper gloves
- Use in a fume hood to prevent vapor inhalation



# Scenario 3: Acids or Bases

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- Hazardous to eyes (especially bases)
- Use splash protection with substances that have pH below 2.5 or above 10
  - $\text{pH} \geq 11.5$  or  $\leq 2$  is considered Serious Eye Damage Category 1 [OSHA](#)
- Wear appropriate PPE
  - Safety goggles
  - Face shield
  - Appropriate gloves



# Final Thoughts

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- PPE is the last line of defense
- Minimum PPE while in the lab includes safety glasses, gloves, long sleeves, long pants, closed-toe shoes
- Hazards should be assessed beforehand to determine proper PPE
- EHS provides safety trainings via Canvas
- Don't hesitate to remind peers in the lab to wear proper PPE
- Better to be safe than sorry!

# Upcoming Safety Meeting

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- November 19, 2025
- Topic: Mental Health Safety
- Guest speaker from CAPS (Counseling and Psychological Services)

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