

Science at the heart of medicine

Hazard Communication Training

Albert Einstein College of Medicine
Department of Environmental Health & Safety

<http://www.einsteinmed.edu/ehs>

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Albert Einstein College of Medicine

Training Outline

- Federal Laboratory Standards
- Globally Harmonized System of Classification and Labeling of Chemicals (GHS)
- Potential Hazards at Einstein
- Safety Data Sheets (SDS)
- Chemical Toxicology
- Personal Protective Equipment (PPE)
- Chemical Storage/Disposal
- Emergency Procedures

What is Hazard Communication?

Defined under two Occupational Safety and Health Administration (OSHA) regulations:

- Hazard Communication Standard (HCS) [29 CFR 1910.1200]
- Occupational Exposure to Hazardous Chemicals in Laboratories (29 CFR 1910.1450)



Hazard Communication Goal



“Protect people from injuries and illnesses associated with using hazardous chemicals in the workplace”.

Hazard Communication Standard

Purpose:

- To ensure that the hazards of all chemicals produced or imported are classified and that the information is transmitted to employees.
- To provide employees with the necessary tools to protect themselves and their co-workers.
- HCS is aligned with the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS).



Hazard Communication Standard

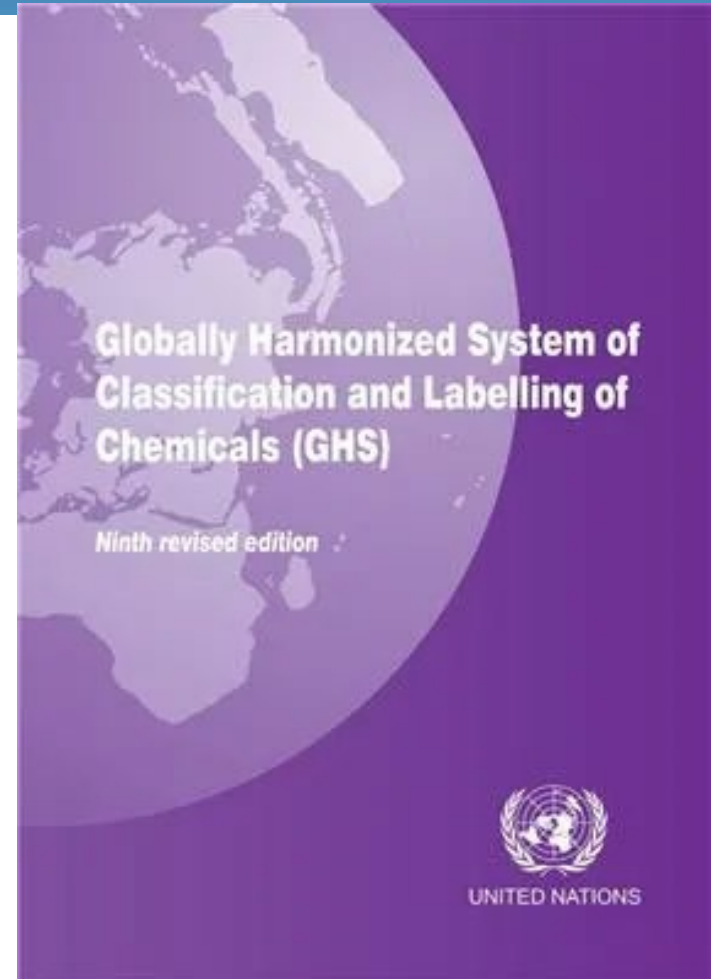
Accomplished via:

- Written Hazard Communication Plan
- Chemical inventory
- Employee training
- Safety Data Sheets (SDS)
- Personal Protective Equipment (PPE)
- Engineering controls
- Container labeling & warnings

What is the “Globally Harmonized System of Classification of Labeling of Chemicals” (GHS)?

- An international system for standardizing and harmonizing the classification of health, physical, and environmental hazards and labeling of chemicals including mixtures.

https://unece.org/sites/default/files/2021-09/GHS_Rev9E_0.pdf



What is the “GHS”? (Continued)

- Information about identities and hazards of the chemicals must be available and understandable to workers.



Globally Harmonized System of Classification of Labeling of Chemicals (GHS)

- Implemented to harmonize and improve safety information and to facilitate international trade through compatible classification methods, SDS and labels.
- Accomplished via:
 - Defining health, physical and environmental hazards of chemicals
 - Creating classification processes that use available data on chemicals for comparison with the defined hazard criteria
 - Communicating hazards and protective measures on labels and SDS.

HCS and Adoption of GHS

Major changes to the HCS are:

- **Hazard Classification:** Provides specific criteria for classification of health and physical hazards, as well as classification of mixtures.
- **Labels:** Chemical manufacturers and importers are required to provide a label that must include a harmonized signal word, pictogram, and hazard statement for each hazard class and category, and a Precautionary statement.
- **Safety Data Sheets:** Now have a 16-section format.
- **Information and Training:** Employers are required to train workers on the new label elements and SDS to facilitate recognition and understanding.

HCS Adoption of GHS – Labels & Warnings

Labels and Warnings

- Each container of hazardous chemicals leaving the chemical manufacturer must be labeled, tagged or marked.
- Workplace labeling: Check secondary container labels for consistency.
- Label identities should link to the SDS & chemical inventories.

SAMPLE LABEL

CODE _____ Product Name _____	} Product Identifier	Hazard Pictograms Signal Word Danger	Hazard Statements Highly flammable liquid and vapor. May cause liver and kidney damage.
Company Name _____ Street Address _____ City _____ State _____ Postal Code _____ Country _____ Emergency Phone Number _____	} Supplier Identification		

Precautionary Statements

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 (CO₂) 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.

Supplemental Information

Directions for Use

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

OSHA 3492-01R 2016

GHS – Labels



Provide employees with the specific information regarding the physical and health hazards of the hazardous chemicals.



GHS – Labels & Warnings

1. Product Identifier

- Name or number used for a hazardous chemical on a label or in the SDS.
- Unique means for user to identify chemical.
- Shall allow cross-reference among the hazardous chemicals in the inventory, written hazard communication program, labels, and SDSs.

The Basic Parts of A GHS-Compliant Label

1 → **n-Propyl Alcohol**

UN No. 1274
CAS No. 71-23-8

2 → **DANGER**

3 → Highly flammable liquid and vapor. Causes serious eye damage. May cause drowsiness and dizziness.

4 → Keep away from heat/sparks/open flames/hot surfaces. No smoking. Avoid breathing fumes/mist/vapours/spray. Wear protective gloves/protective clothing/eye protection/face protection. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present. Continue rinsing.

5 → Fill Weight: 18.65 lbs. Lot Number: B56754434
Gross Weight: 20 lbs. Fill Date: 6/21/2013
Expiration Date: 6/21/2020

Acme Chemical Company • 711 Roadrunner St. • Chicago, IL 60601 USA • www.acmechem.com • 123-444-5567

See SDS for further information.

6 → [Hazard Pictograms: Corrosive, Flammable, and Exclamation Mark]

GHS – Labels & Warnings

2. Signal Word

- Used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label.
- Signal words used are “**Danger**” and “**Warning**.”
 - Danger – More severe
 - Warning – Less severe

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See SDS for further information.

6 →

GHS – Labels & Warnings

3. Hazard Statements

- Phrase assigned to each product
- Means the nature of the physical or health hazards of the product, including where appropriate, the degree of hazard

➤ Physical

- Example: H200 unstable explosive
Highly Flammable, Flammable solid

➤ Health

- Example: H300 fatal if swallowed
Causes serious eye damage,
carcinogen, oral acute toxicity, etc.

➤ Environmental

- Example: H400 Very toxic to aquatic life

The Basic Parts of A GHS-Compliant Label

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UN No. 1274
CAS No. 71-23-8

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6 → See SDS for further information.

GHS – Labels & Warnings

4. Precautionary Statements

Phase describing the recommended measures to minimize or prevent adverse effects resulting from exposure to a hazardous chemical, or improper storage or handling.

Precautionary Statements:

1. Prevention – Ex. P235 “Keep cool”
2. Response in case of accidental spills or exposure- Ex. P380 Evacuate Area
3. Storage – Ex. P403 Store in a well-ventilated space
4. Disposal – dispose in approved waste disposal facility; contents, container
5. General -Ex. P102 Keep out of reach of children

The Basic Parts of A GHS-Compliant Label

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UN No. 1274
CAS No. 71-23-8

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5 → Fill Weight: 18.65 lbs. Lot Number: B56754421
Gross Weight: 20 lbs. Mfg Date: 6/21/2013
Expiration Date: 6/21/2020

6 → See SDS for further information.

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GHS – Labels & Warnings

5. Supplier Identification

Provides name, address, and telephone number of the manufacturer or supplier

(Some may have the company website)

The Basic Parts of A GHS-Compliant Label

1 → **n-Propyl Alcohol**
UN No. 1274
CAS No. 71-23-8

2 → **DANGER**

3 → Highly flammable liquid and vapor. Causes serious eye damage. May cause drowsiness and dizziness.

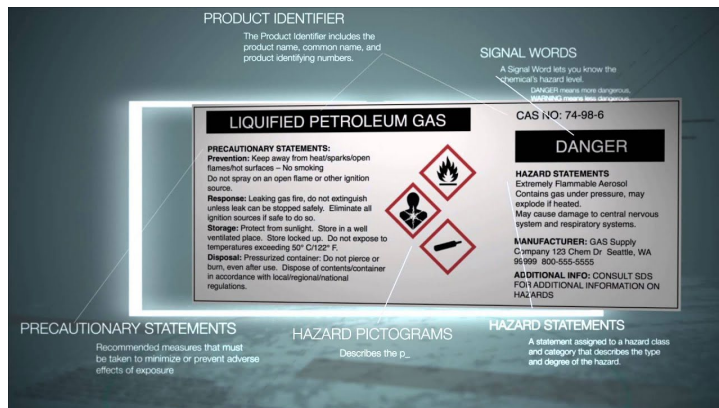
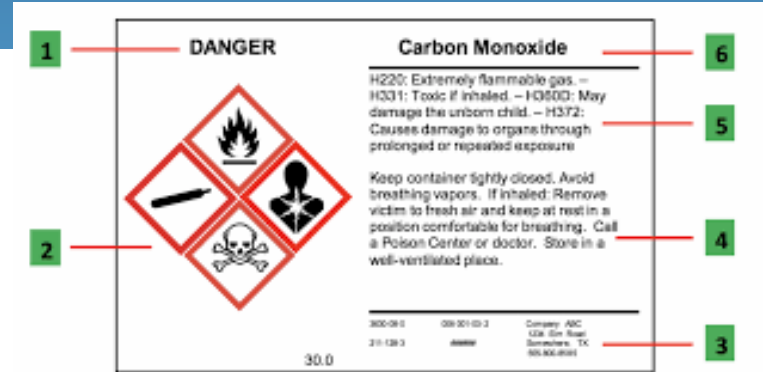
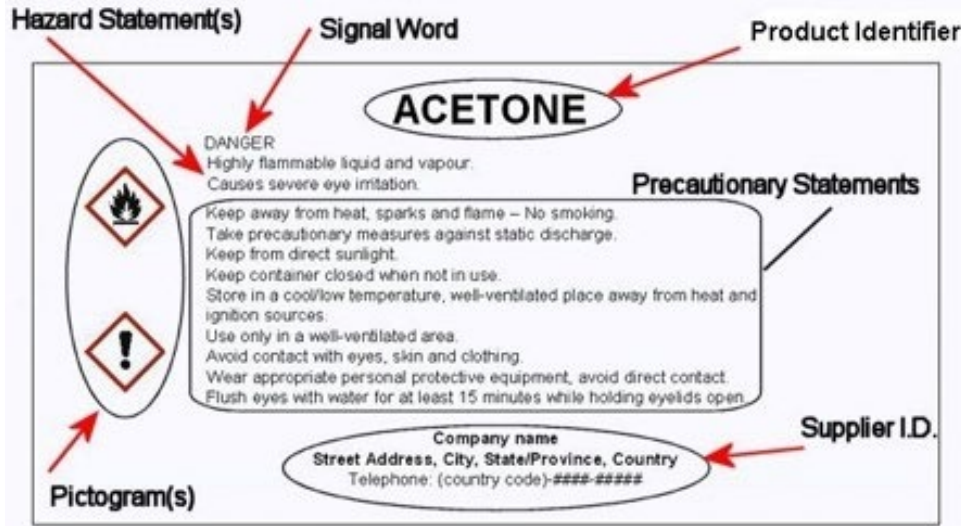
4 → Keep away from heat/sparks/open flames/hot surfaces. No smoking. Avoid breathing fumes/mist/vapours/spray. Wear protective gloves/protective clothing/eye protection/face protection. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present. Continue rinsing.

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6 → [Hazard Pictograms: Flammable liquid, Eye irritation, and Health hazard]

GHS – Labels & Warnings (Examples)












GHS –Labels & Warnings

Pictogram

- A symbol plus other graphic elements, such as a border, background pattern, or color that is intended to convey specific information about the hazards of a chemical.
- Eight are mandatory and designated for application to hazard category.

HCS Pictograms and Hazards

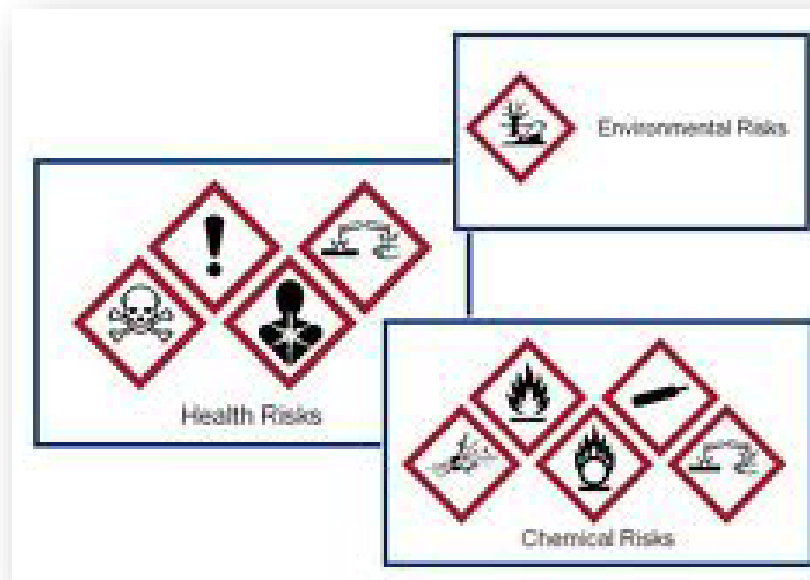
Health Hazard  <ul style="list-style-type: none">■ Carcinogen■ Mutagenicity■ Reproductive Toxicity■ Respiratory Sensitizer■ Target Organ Toxicity■ Aspiration Toxicity	Flame  <ul style="list-style-type: none">■ Flammables■ Pyrophorics■ Self-Heating■ Emits Flammable Gas■ Self-Reactives■ Organic Peroxides	Exclamation Mark  <ul style="list-style-type: none">■ Irritant (skin and eye)■ Skin Sensitizer■ Acute Toxicity■ Narcotic Effects■ Respiratory Tract Irritant■ Hazardous to Ozone Layer (Non-Mandatory)
Gas Cylinder  <ul style="list-style-type: none">■ Gases Under Pressure	Corrosion  <ul style="list-style-type: none">■ Skin Corrosion/Burns■ Eye Damage■ Corrosive to Metals	Exploding Bomb  <ul style="list-style-type: none">■ Explosives■ Self-Reactives■ Organic Peroxides
Flame Over Circle  <ul style="list-style-type: none">■ Oxidizers	Environment (Non-Mandatory)  <ul style="list-style-type: none">■ Aquatic Toxicity	Skull and Crossbones  <ul style="list-style-type: none">■ Acute Toxicity (fatal or toxic)

HCS Adoption of GHS – Pictograms

- Health Risk
 - Severe Toxics
 - Acute Toxics
 - Health Dangers
 - Corrosives
- Chemical Risk
 - Explosives
 - Flammables
 - Oxidizers
 - Gases under pressure
 - Corrosives

- Environmental Hazard Class

- OSHA does not regulate the Environmental Hazard Class; however, the EPA is expected to incorporate this element of GHS into their standards.



HCS Adoption of GHS – Workplace Labeling

- **Secondary Container** - Defined as any container being used beyond the original manufacturer's bottle that the chemical was shipped in.
 - Portable or working containers
 - Storage bottles that are created for distribution of smaller amounts of the chemical

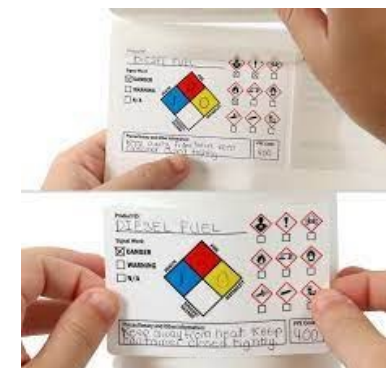
HCS Adoption of GHS – Workplace Labeling

- Employers may choose to label workplace containers
 - Use the same information from the shipping label including GHS information used to ship containers under the revised rule.
 - With label alternatives that meet the requirements for the standard (Product identifier, pictograms, symbols, or combination of information that provides hazards of the chemical)
- National Fire Protection Association (NFPA) 704 Hazard Rating and the Hazardous Material Information System (HMIS) for labeling are considered acceptable for workplace containers

HCS Adoption of GHS – Workplace Labeling

Best Practices:

1. Label your chemical secondary container with the same GHS format as the way they came into the facility
2. Use a dual-labeled approach to where you show both your NFPA/HMIS label alongside the GHS label



Labeling

- Manufacturer label

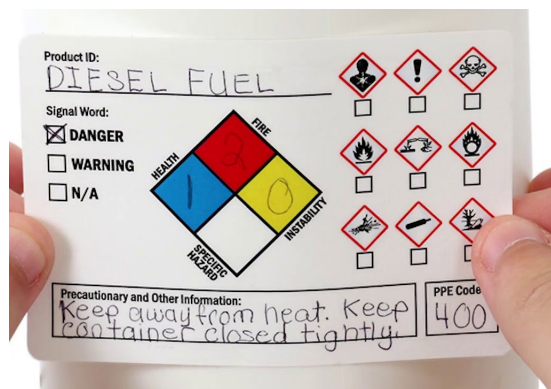
- Chemical name
- Appropriate warnings.
- Name and address of manufacturer.



Labeling (Continued)

■ In-house label

- Chemical name
- Appropriate warnings
 - Remember to label ALL secondary containers immediately after putting anything into them



NFPA Labels

- National Fire Protection Association (NFPA) Diamond
 - A system for identifying the hazards associated with chemicals.
 - Provide basic information for emergency personnel responding to a fire or spill and emergency response planners.



NFPA Warning Labels

Example: Propane

- Flammability (4)
 - Material will burn rapidly
- Reactivity (0)
 - Stable
- Health (1)
 - Slightly hazardous



Example: Sulfuric Acid

- Health (3)
 - Can Cause serious or permanent injury
- Flammability (0)
- Reactivity (2)
 - Readily undergoes violent chemical changes at elevated temperatures and pressures
- Special (W)
 - Reacts violently or explosively with water



Warning Labels

Additional warning labels for identifying the hazards associated with chemicals.

Class 1: Explosives

Divisions: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6



Class 6: Poison (Toxic) and Poison Inhalation Hazard

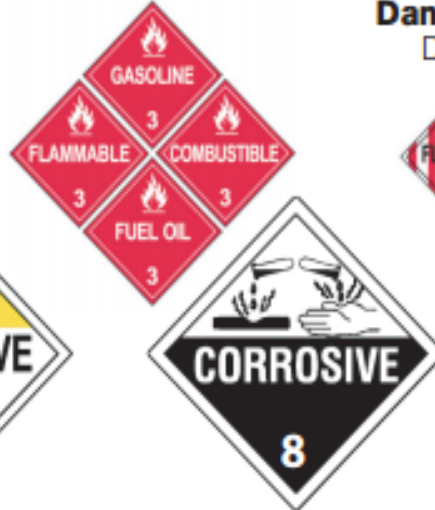
Class 2: Gases

Divisions: 2.1, 2.2, 2.3



Class 7: Radioactive

Class 3: Flammable Liquid and Combustible Liquid



Class 8: Corrosive

Class 4: Flammable Solid, Spontaneously Combustible, and Dangerous When Wet

Divisions 4.1, 4.2, 4.3



Class 9: Miscellaneous

Class 5: Oxidizer and Organic Peroxide

Divisions 5.1, 5.2



Dangerous

Revised 04/13

Classification Differences between HMIS/NFPA and GHS



HCS Adoption of GHS – Safety Data Sheets (SDS)


Previously, known as Material Safety Data Sheets (MSDS).

GHS standardized the order of information on SDS is presented for ease of use of employees along with improved accuracy.

Information must be provided in English. Employer may maintain copies in other languages.

Number of sections and headings increased from a 9-section format to a 16 sections.

Safety Data Sheet
According to OSHA HCS 2012 (29 CFR 1910.1200)



Section 1: Identification

Product Identifier:	Aviation Gasoline, 100 LL
Other means of identification:	100 Low Lead Gasoline; 100 Octane Aviation; ASTM 100/130 Aviation Gasoline; Avgas; Avgas 100; Aviation Fuel
SDS Number:	001769
MARPOL Annex I Category:	Gasoline and Spirits
Intended Use:	Fuel
Uses Advised Against:	All others





Manufacturer: Phillips 66 Company P.O. Box 4428 Houston, Texas 77210	SDS Information: Phone: 800-762-0942 Email: SDS@P66.com URL: www.Phillips66.com	Emergency Health and Safety Number: Chemtrec: 800-424-9300 (24 Hours)
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Customer Service:
800-234-6603 Technical Information:
918-977-4224

Section 2: Hazards Identification

Classified Hazards H224 – Flammable liquids – Category 1 H315 – Skin corrosion/irritation – Category 2 H304 – Aspiration Hazard – Category 1 H336 – Specific target organ toxicity (single exposure) – Category 3 H350 – Carcinogenicity – Category 1B H411 – Hazardous to the aquatic environment, chronic toxicity – Category 2	Other Hazards Electrostatic charges may be generated during handling.
--	---

Label Elements

	DANGER Extremely flammable liquid and vapor May be fatal if swallowed and enters airways Causes skin irritation May cause drowsiness or dizziness May cause cancer Toxic to aquatic life with long lasting effects
	Obtain special instructions before use; Keep away from heat/sparks/open flames/hot surfaces. - No smoking; Wear protective gloves / protective clothing / eye protection / face protection; IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician; Store in a well-ventilated place. Keep container tightly closed; Dispose of contents/container to approved disposal facility; Do not handle until all safety precautions have been read and understood; 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. Avoid breathing dust/fume/gas/mist/vapors/spray; Wash thoroughly after handling; Use only outdoors or in a well-ventilated area; Avoid release to the environment; Call a POISON CENTER or doctor/physician if you feel unwell; IF ON SKIN: Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower; If skin irritation occurs; Get medical advice/attention; Do NOT induce vomiting; IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing; Take off contaminated clothing and wash before reuse; In case of fire: Use dry chemical, carbon dioxide, or foam for extinction; Collect spillage
	
	

001769 - Aviation Gasoline, 100 LL
Date of Issue: 04-Mar-2013

Page 1/11
Status: FINAL

Safety Data Sheets Elements

1. Identification of the substance or mixture
2. Hazard Identification
3. Composition/information on ingredients
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 information
12. Ecological information*
13. Disposal information*
14. Transport information*
15. Regulatory information*
16. Information on the preparation and revision of the SDS

* Not enforced by OSHA, outside Agency jurisdiction



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Responsibilities of Einstein


Chemical Inventory

- Review chemical inventory
- Replace MSDS with SDS
- Dispose of expired or unwanted chemicals
- Annually review chemical inventory
 - Right-to-Know



Responsibilities of Einstein

- Chemical Hygiene Plan
- Provide training to all employees with potential exposure to hazardous materials.
- Collect SDS and make them available to all employees.



Chemical Hygiene Plan

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Einstein - SDS Stations

Forchheimer:

Ground & 4th Floor

Kennedy:

3rd Floor

Price:

Basement

1st, 4th & 5th Floors

Van Etten

Basement

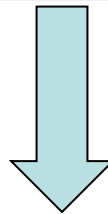


Employee Rights

- Request and obtain information on hazardous chemicals in your workplace.
- Be informed of hazardous chemicals you come in contact with on your job.
- Access to written material.
 - SDS
 - Chemical Hygiene Plan
 - Hazard Communication Program

NOTICE

**HAZARD
COMMUNICATION
POLICY
LOCATED HERE**



<https://intranet.einsteinmed.edu/download/?token=F3U4mtNk56VTr4YwmOleltOEedZjiAS3%2fX4zi1xF6i4>



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Employee Responsibilities

- Attend training classes.
- Learn the chemical hazard by reading the SDS.
- Know the signs and symptoms of exposure.
- Know the proper personal protective equipment (PPE) to use.
- Know emergency procedures.

Hazards at Einstein

■ Chemical

- Approximately 600 different chemicals on campus
- Flammable
 - Examples: Xylene, Ethanol
- Corrosive
 - Examples: Nitric Acid, Sodium Hydroxide
- Reactive
 - Examples: Sodium Metal, Sodium Azide, **Picric Acid (dry)**



■ Biological

- Examples: Allergens, Infectious Diseases, Toxins



Hazards at Einstein

■ Physical

➤ Temperature Extremes



➤ Electrical

➤ Fire

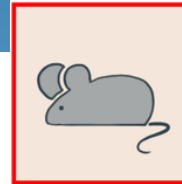


➤ Explosive

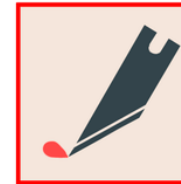


➤ Cryogenic Liquids

➤ Compressed Gasses



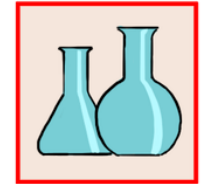
ANIMAL HAZARD



SHARP INSTRUMENT HAZARD



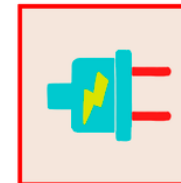
HEAT HAZARD



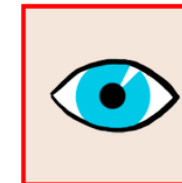
GLASSWARE HAZARD



CHEMICAL HAZARD



ELECTRICAL HAZARD



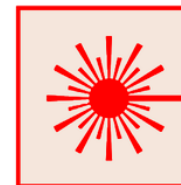
EYE & FACE HAZARD



FIRE HAZARD



BIOHAZARD



LASER RADIATION HAZARD



RADIOACTIVE HAZARD



EXPLOSIVE HAZARD



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Hazards at Einstein

- Picric Acid

- In a dry powdered state, it can become explosive when jolted (shock sensitive)



Hazards at Einstein

- Cryogenic Liquids
 - Liquid Nitrogen



- Compressed Gas Cylinders
 - Oxygen
 - Carbon Dioxide



Hazards at Einstein

■ Radiation

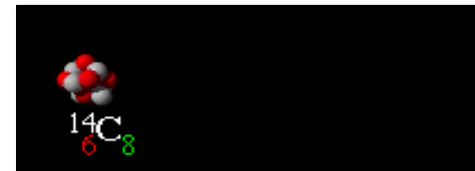
➤ Non-ionizing

- Near Ultraviolet
 - ❖ Damage to skin and eyes.
- Lasers
- Microwave



➤ Ionizing

- Alpha, Beta, Gamma and X-rays
 - ❖ Generates free radicals and ion pairs in living tissue, producing damaging intermediates.
 - ❖ Direct hits to DNA



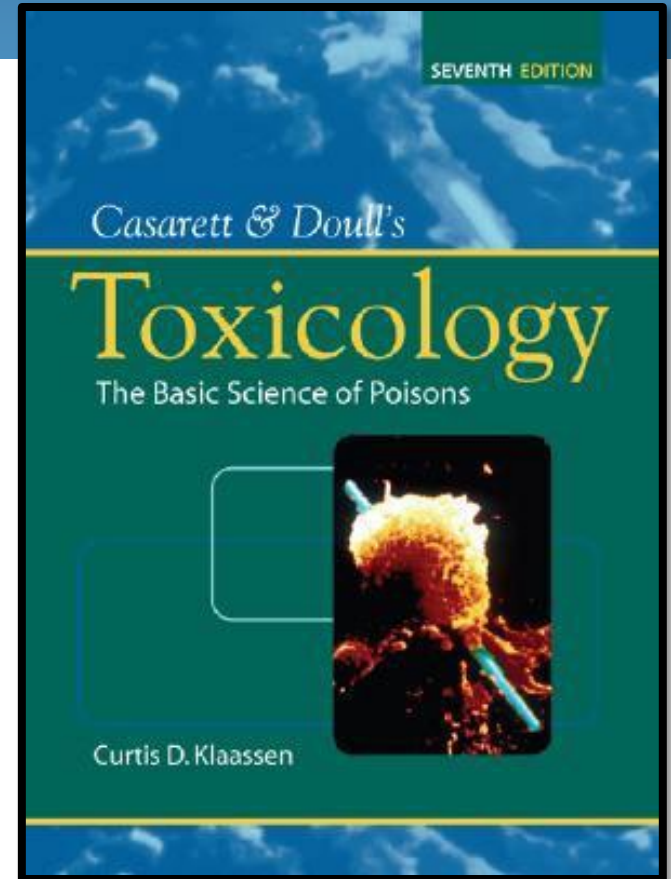
Chemical Toxicology

Toxicology is the study of the adverse effects of chemicals on living organisms.

Know the signs and symptoms associated with exposure to the chemicals in your workplace.

Be observant for these signs and symptoms.

Know what to do if you are exposed.



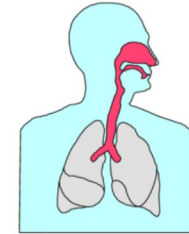
Chemical Toxicology

- Routes of Entry
 - Inhalation (Breathing)
 - Absorption (Direct Contact)
 - Ingestion (Eating)
 - Injection

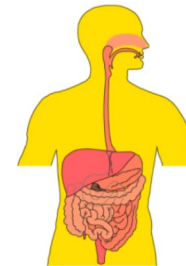
Biological Hazards Routes of Entry



Skin Absorption



Inhalation



Ingestion



Injection

Chemical Toxicology

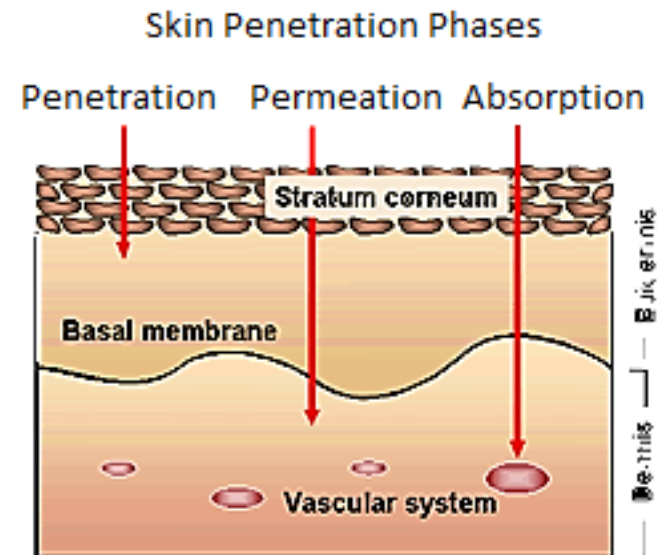
■ Inhalation

- The most common route of exposure.
- Can be in the form of a gas, vapor or dust.
- Can be deposited in the airways or absorbed through the lungs and into the blood stream.
 - Blood can then circulate the toxin to the rest of the body.



Chemical Toxicology

- Absorption
 - Skin acts as a barrier between the environment and the organs of the human body.
 - Skin can be attacked directly.
 - Examples: Acids and Bases
 - Skin can be penetrated.
 - Examples: Phenol, Nitrobenzene



Chemical Toxicology

Ingestion

- Rarely takes place by deliberate swallowing of toxic substances.
- Food and drinks can become contaminated by dust, mist and fumes.
- No eating or drinking in laboratories or storing food in laboratory refrigerators or cold rooms.



Chemical Toxicology

■ Injection

- Occurs through accidental needle sticks, puncture wounds or through broken skin/open wounds.
- May produce rapid response when injected because the chemical/toxin is introduced directly into the blood stream.



Health Hazards Effects

Acute Health Effects (Short-term):

*Develops immediately or within minutes, hours or even days after an exposure include dizziness, skin irritation, and throat irritation.

Examples:

- Burns
- Headache
- Vomiting
- Nausea

Chronic Health Effects (Long-term):

*Adverse health effect resulting from long-term exposure to a substance. Symptoms do not stop when the exposure stops.

Examples:

- Asthma
- Cancer
- Asbestosis, Mesothelioma



Personal Protective Equipment

- Lab Coat and Aprons
- Gloves
- Safety Glasses/Face Shields
- Hearing Protection
- Respirators



Personal Protective Equipment

Lab Coats and Aprons



Personal Protective Equipment

■ Glove Selection

- Gloves are made of many different types of materials, yet no one material type affords protection against all chemicals.
 - **Latex gloves provide little to no chemical protection.**



Butyl rubber



Neoprene



Nitrile



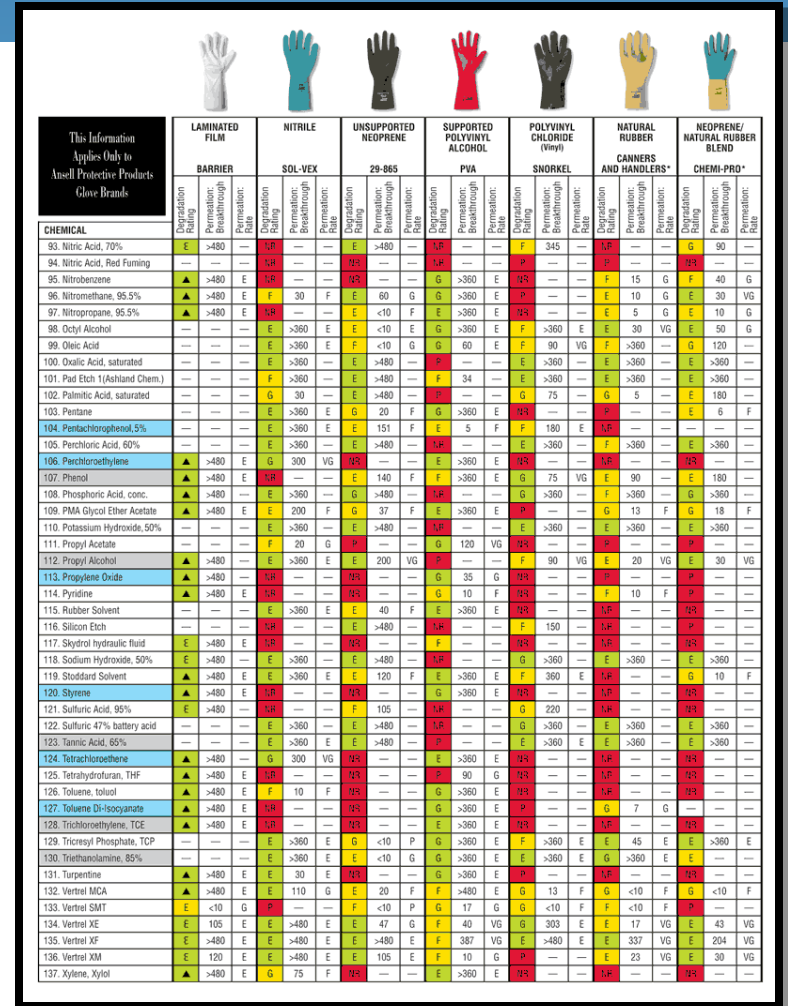
Latex



Personal Protective Equipment

■ Ansell Glove Guide

➤ <http://www.ansellpro.com/specware/guide.asp>



The table provides a comprehensive guide to Ansell gloves, including chemical resistance data and product specifications. It features icons for various glove types and a detailed table with columns for chemical types and specific chemical names. The table is color-coded to indicate performance levels for different glove materials.

CHEMICAL	LAMINATED FILM			NITRILE			UNSUPPORTED NEOPRENE			SUPPORTED POLYVINYL ALCOHOL			POLYVINYL CHLORIDE (Vynl)			NATURAL RUBBER			NEOPRENE/NATURAL RUBBER BLEND		
	BARRIER			SOL-VEX			29-965			PVA			SNORKEL			CANNERS AND HANDLERS*			CHEMI-PRO*		
	Degradation Rating	Permeation: Breaththrough	Permeation: Rate	Degradation Rating	Permeation: Breaththrough	Permeation: Rate	Degradation Rating	Permeation: Breaththrough	Permeation: Rate	Degradation Rating	Permeation: Breaththrough	Permeation: Rate	Degradation Rating	Permeation: Breaththrough	Permeation: Rate	Degradation Rating	Permeation: Breaththrough	Permeation: Rate	Degradation Rating	Permeation: Breaththrough	Permeation: Rate
93. Nitric Acid, 70%	E	>480	---	NR	---	---	E	>480	---	NR	---	---	F	345	---	NR	---	---	G	90	---
94. Nitric Acid, Red Fuming	---	---	---	NR	---	---	NR	---	---	NR	---	---	P	---	---	NR	---	---	NR	---	---
95. Nitrobenzene	▲	>480	E	NR	---	---	G	>360	F	NR	---	---	F	15	G	F	15	G	F	40	G
96. Nitromethane, 95.5%	▲	>480	E	F	30	F	E	60	G	G	>360	E	P	---	---	E	10	G	E	30	VG
97. Nitropropane, 95.5%	▲	>480	E	NR	---	---	E	<10	F	E	>360	E	NR	---	---	E	5	G	E	10	G
98. Octyl Alcohol	---	---	---	E	>360	E	E	<10	E	G	>360	E	F	>360	E	E	30	VG	E	50	G
99. Oleic Acid	---	---	---	E	>360	E	F	<10	G	G	60	E	90	VG	F	>360	E	120	---	---	---
100. Oxalic Acid, saturated	---	---	---	E	>360	---	E	>480	---	---	---	---	E	>360	---	---	---	---	E	>360	---
101. Pad Etch 1(Ashland Chem.)	---	---	---	F	>360	---	E	>480	---	F	34	---	E	>360	---	E	>360	---	E	>360	---
102. Palmitic Acid, saturated	---	---	---	G	30	---	E	>480	---	---	---	---	G	75	---	G	5	---	E	180	---
103. Pentane	---	---	---	E	>360	E	G	20	F	G	>360	E	NR	---	---	F	---	---	E	6	F
104. Perchlorophenol, 5%	---	---	---	E	>360	E	E	151	F	E	5	F	180	E	NR	---	---	---	---	---	---
105. Perchloric Acid, 60%	---	---	---	E	>360	---	E	>480	---	NR	---	---	E	>360	---	F	>360	---	E	>360	---
106. Perchloroethylene	▲	>480	E	G	300	VG	NR	---	---	E	>360	E	NR	---	---	NR	---	---	NR	---	---
107. Phenol	▲	>480	E	NR	---	---	E	140	F	F	>360	E	G	75	VG	E	90	---	E	180	---
108. Phosphoric Acid, conc.	▲	>480	---	E	>360	---	G	>480	---	NR	---	---	E	>360	---	F	>360	---	G	>360	---
109. PMA Glycol Ether Acetate	▲	>480	E	E	200	F	G	37	F	E	>360	E	P	---	---	G	13	F	G	18	F
110. Potassium Hydroxide, 50%	---	---	---	E	>360	---	E	>480	---	NR	---	---	E	>360	---	E	>360	---	E	>360	---
111. Propyl Acetate	---	---	---	F	20	G	P	---	---	G	120	VG	NR	---	---	P	---	---	P	---	---
112. Propyl Alcohol	▲	>480	---	E	>360	E	E	200	VG	F	---	---	F	90	VG	E	20	VG	E	30	VG
113. Propylene Oxide	▲	>480	---	NR	---	---	NR	---	---	G	35	G	NR	---	---	P	---	---	P	---	---
114. Pyridine	▲	>480	E	NR	---	---	NR	---	---	G	10	F	NR	---	---	F	10	F	P	---	---
115. Rubber Solvent	---	---	---	E	>360	E	E	40	F	E	>360	E	---	---	---	NR	---	---	NR	---	---
116. Silicon Etch	---	---	---	NR	---	---	E	>480	---	NR	---	---	F	150	---	NR	---	---	P	---	---
117. Skydrol hydraulic fluid	E	>480	E	NR	---	---	NR	---	---	F	---	---	NR	---	---	NR	---	---	NR	---	---
118. Sodium Hydroxide, 50%	E	>480	---	E	>360	---	E	>480	---	NR	---	---	G	>360	---	E	>360	---	E	>360	---
119. Stoddard Solvent	▲	>480	E	E	>360	E	E	120	F	E	>360	E	F	360	E	NR	---	---	G	10	F
120. Styrene	▲	>480	E	NR	---	---	NR	---	---	G	>360	E	NR	---	---	NR	---	---	NR	---	---
121. Sulfuric Acid, 95%	E	>480	---	NR	---	---	F	105	---	NR	---	---	G	220	---	NR	---	---	NR	---	---
122. Sulfuric 47% battery acid	---	---	---	E	>360	---	E	>480	---	NR	---	---	G	>360	---	E	>360	---	E	>360	---
123. Tannic Acid, 65%	---	---	---	E	>360	E	E	>480	---	---	---	---	E	>360	E	E	>360	---	E	>360	---
124. Tetrachloroethene	▲	>480	---	G	300	VG	NR	---	---	E	>360	E	NR	---	---	NR	---	---	NR	---	---
125. Tetrahydrofuran, THF	▲	>480	E	NR	---	---	NR	---	---	---	90	G	NR	---	---	NR	---	---	NR	---	---
126. Toluene, toluol	▲	>480	E	F	10	F	NR	---	---	G	>360	E	NR	---	---	NR	---	---	NR	---	---
127. Toluene Di-isocyanate	▲	>480	E	NR	---	---	NR	---	---	G	>360	E	P	---	---	G	7	G	---	---	---
128. Trichloroethylene, TCE	▲	>480	E	NR	---	---	NR	---	---	E	>360	E	NR	---	---	NR	---	---	NR	---	---
129. Tricresyl Phosphate, TCP	---	---	---	E	>360	E	G	<10	P	G	>360	E	F	>360	E	E	45	E	E	>360	E
130. Triethanolamine, 85%	---	---	---	E	>360	---	E	<10	G	E	>360	E	E	>360	E	G	>360	---	E	---	---
131. Turpentine	▲	>480	E	E	30	E	NR	---	---	G	>360	E	P	---	---	NR	---	---	NR	---	---
132. Vertrel MCA	▲	>480	E	E	110	G	E	20	F	F	>480	E	G	13	F	G	<10	F	G	<10	F
133. Vertrel SMT	E	<10	G	P	---	---	F	<10	P	G	17	G	<10	F	F	<10	F	P	---	---	---
134. Vertrel XE	E	105	E	E	>480	E	E	47	G	F	40	VG	G	303	E	E	17	VG	E	43	VG
135. Vertrel XF	E	>480	E	E	>480	E	E	>480	E	F	387	VG	E	>480	E	E	337	VG	E	204	VG
136. Vertrel XM	E	120	E	E	>480	E	E	105	E	F	10	G	P	---	---	E	23	VG	E	30	VG
137. Xylene, Xylol	▲	>480	E	G	75	F	NR	---	---	E	>360	E	NR	---	---	NR	---	---	NR	---	---

Personal Protective Equipment

- Safety Goggles/Face Shields



Personal Protective Equipment

Respirators

- N95 particulate respirator
- Filters 95% of particles 0.3 microns or greater
 - Not to be used for gases, vapors, or oxygen deficient areas



Personal Protective Equipment

- Hearing protection
 - Earplugs
 - Single use
 - Earmuffs



Engineering Controls

Ventilation

- Room air exchanges
 - ~10 exchanges per hour for laboratories.



Engineering Controls

- **Chemical Fume Hood** - Primary engineering control for containing and removing chemical gases, vapors, mist and fumes.
 - Fume Hoods must be able to remove hazardous vapors and odors from the breathing zone
 - Inspected annually
 - Face velocity of 80 - 120 feet per minute.
 - Sash height 12-18 inches
 - Close the sash when finished



Engineering Controls



- Do not overload the hood with extraneous equipment or chemicals.
- Not to be used as storage
- Do not evaporate chemicals
- A cluttered hood can compromise the airflow patterns and negate the hoods safety features

Chemical Storage/Disposal

- Order only what is needed
 - Each lab is required to store their own materials
- Make sure chemicals are labeled properly
 - As well as all secondary containers
- Avoid floor and top shelf storage
 - Nothing above eye level
- Store flammables in appropriate cabinets.
 - 15 gallons (56 liter) limit per lab.
 - 25 gallons (94 liter) limit per lab with sprinkler system (Golding, MRRC & Price Building)

Chemical Storage/Disposal

- Separate acids and bases

- Organics vs. Inorganics



- Examples:

- Hydrochloric Acid (HCl) and Sodium Hydroxide (NaOH)
 - Sulfuric Acid (H₂SO₄) and Formic Acid (HCOOH)

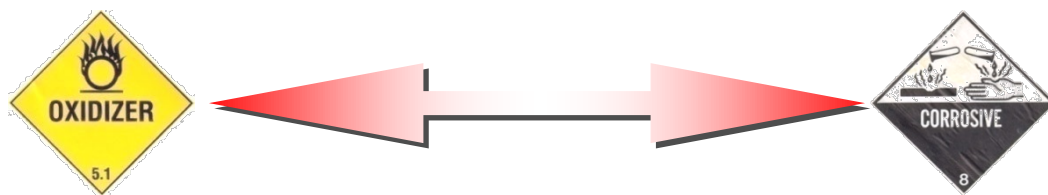
- Perchloric acid must be stored in glass containers separated from organic materials.

- Segregate oxidizers from organic liquids.

- Examples: Hydrogen peroxide, Permanganates, Nitrate compounds

Chemical Storage/Disposal

- Nitric acid must be isolated from other acids and bases.



Chemical Storage/Disposal

- Dispose of used / expired chemicals via EH&S.
 - Examples: Ethyl Ether, 2-Propanol
- May form explosive peroxides after one year. Exposure to light and/or air significantly increases the rate of peroxide formation.
 - Complete the required peroxide tests and forms



Chemical Storage/Disposal

■ Acid Storage

- Store in plastic secondary containers, not directly on metal shelves



■ Flammable Storage

- Do not store cardboard or Styrofoam



Chemical Storage/Disposal

- Chemical disposal is free.
- Use the proper waste container.
 - Examples: Bio Bins, Sharps, Ethidium Bromide gels, Radioactive, Office waste, Recycle waste.
- Rinse empty bottles and deface label.
- Label all chemical waste.

Hazardous Materials Spill Cleanup



MINOR CHEMICAL SPILLS CLEANUP PROCEDURES:

- Do not clean up the spill yourself, unless you know what spilled and how to properly clean it up.
- Immediately, notify others in the area that a spill has occurred.
- Turn off ignition and heat sources.
- Prevent others from coming in contact with the spilled chemical(s).
- Wear proper PPE (i.e., goggles, gloves)
- Use the appropriate material to confine or contain the spill to avoid spreading
- Absorb inorganic acids and bases and neutralize.
- Sweep up the absorbed spill from the outside toward the middle. Scoop up and deposit in a leak-proof container. Label and dispose of the container through the hazardous waste management program
- Collect the residue, place in a container, and dispose as hazardous waste.



NEVER PLACE HAZARDOUS MATERIALS OR SPILL CLEANUP MATERIALS IN THE BIOHAZARD BIN OR REGULAR TRASH.

- Clean spill area with water.
- Report spill to EH&S at X4150



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Hazardous Materials - Spill Cleanup

MAJOR CHEMICAL SPILLS CLEANUP PROCEDURES:

- If the chemical spill presents an immediate danger; turn off ignition and heat sources, evacuate all personnel, exit the room/area, and close the door behind you.
- Attend to anyone who may have been contaminated or injured and remove them from exposure.
- Instruct contaminated person to remove any contaminated clothing and wash the affected area for at least 15 minutes.
- Use the safety shower if necessary – know the location of the nearest safety shower and eye wash station in your work area.
- Notify EH&S at X4150 and Security at X4111



NEVER PLACE HAZARDOUS MATERIALS OR SPILL CLEANUP MATERIALS IN THE BIOHAZARD BIN OR REGULAR TRASH.

Emergency Procedures

Remain Calm.

Protect yourself and your colleagues from further harm.

Notify EH&S, Security, and/or Fire Department as appropriate.

x4150

x4111

911

Wash any chemical contact for 15 minutes.

Seek medical attention if needed.



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Summary

- SDS are available to anyone.
- Understand the new GHS and label requirements
- Understand the hazards of the chemicals you work with.
- Store chemicals properly.
- Wear the appropriate PPE.
- Always use a chemical fume hood.
- Keep the work area clean.
- Wash affected area for at least 15 minutes.
- Call EH&S with any questions.

Hazardous Communication Sign in Sheet and Quiz



https://einsteinmed.co1.qualtrics.com/jfe/form/SV_0rluXDP135pIhW6



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