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CHEMICAL SAFETY AND HAZARD COMMUNICATION IN BREWERIES



INTRODUCTION

- ▶ Hazardous chemicals are needed to help manufacture many of the products we use on a daily basis.
- ▶ One out of every four workers in the US comes into contact with a hazardous chemical while on the job.
- ▶ By knowing and understanding the basic nature of those chemicals and how to safely work with or around them, people can greatly decrease any risk that might be present.





WHAT IS A HAZARDOUS CHEMICAL?

- ▶ No comprehensive list!
- ▶ OSHA (29 CFR 1910.1200)
 - ▶ Element, compound, or mixture of elements that is a physical hazard or a health hazard.



HAZARDOUS CHEMICALS USED IN BREWING

- ▶ Caustic soda (sodium hydroxide)
- ▶ Acid cleaners (e.g., phosphoric acid, nitric acid, sodium hydroxide, potassium hydroxide)
- ▶ Sanitizers (e.g., potassium/sodium/calcium hypochlorite solutions, peracetic acid (PAA), chlorine dioxide)
- ▶ Disinfectants (ethanol)
- ▶ Chemicals used to control fermentation (e.g., yeast nutrients and pH adjusters)
- ▶ Preservatives, antioxidants, compressed gases, flavorings, maintenance fluids





HAZARDOUS MATERIALS

- ▶ UN3065, Alcoholic Beverages, 3, II
- ▶ UN1987, Alcohols, n.o.s., 3, I or II or III
- ▶ UN1170, Ethanol or Ethyl Alcohol or Ethanol Solutions or Ethyl Alcohol Solutions, 3, II or III





HAZARDOUS MATERIALS

- ▶ 49 CFR 173.120 Class 3 Flammable Liquids
 - ▶ A liquid having a flashpoint of not more than 60° C (140° F), or any material in a liquid phase with a flashpoint at or above 37.8° C (100° F) that is intentionally heated and offered for transportation or transported at or above its flashpoint in a bulk packaging.





CLASS 3 FLAMMABLE LIQUIDS HAZARDS

- ▶ Flammable vapor emissions can ignite
- ▶ Spills can create an ignition risk or a high concentration of vapors
- ▶ If they come into contact with incompatible materials, they can react violently
- ▶ Leaks to the environment can contaminate soil and water





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HEAVEN HILL DISTILLERY



Heaven Hill Fire

AIR DATE: 11/7/1996



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JIM BEAM WAREHOUSE





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RILEY'S BREWING





US OSHA VIOLATIONS: BREWERIES (ALL SIZES)

- ▶ Total Citations: 52
 - ▶ Top Citation: 29 CFR 1910.1200: Hazard Communication
- ▶ Total Inspections: 15
 - ▶ Top Inspection: 29 CFR 1910.1200: Hazard Communication
- ▶ Total Penalties: \$76,583
 - ▶ Hazard Communication Penalties: \$7,425



CHEMICAL SAFETY IN A BREWERY

- ▶ Isolate flammables from ignition sources





CHEMICAL SAFETY IN A BREWERY

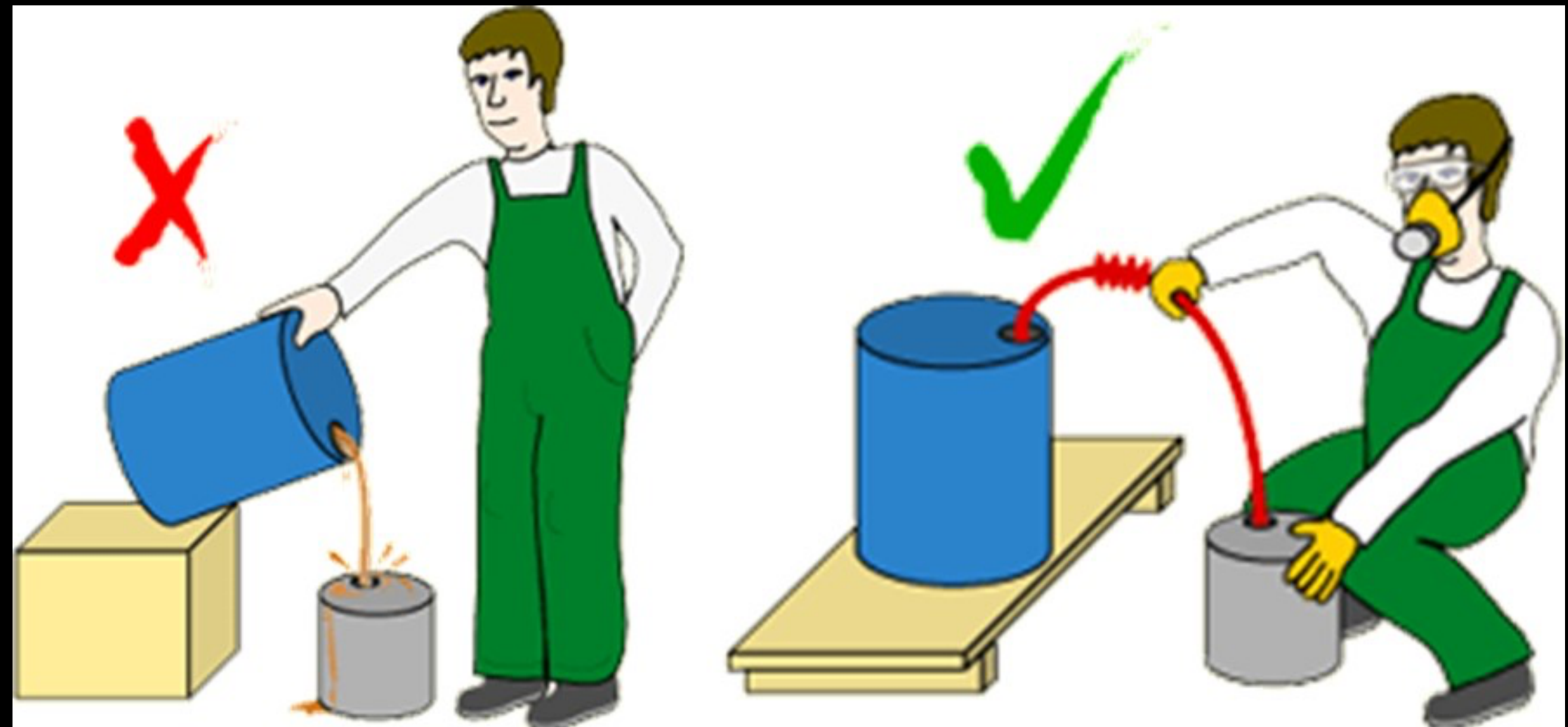
- ▶ Isolate flammables from ignition sources
- ▶ Segregate incompatible dangerous goods

DANGEROUS GOODS & COMBUSTIBLE LIQUIDS STORAGE COMPATIBILITY CHART													
Class or Subsidiary Risk													
FLAMMABLE GASES		OK TO STORE TOGETHER	OK TO STORE TOGETHER	SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	ISOLATE	SEGREGATE At least 3m	SEGREGATE At least 3m
NON TOXIC NON FLAMMABLE GASES		OK TO STORE TOGETHER	OK TO STORE TOGETHER	OK TO STORE TOGETHER	OK TO STORE TOGETHER	SEGREGATE At least 3m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	ISOLATE	SEGREGATE At least 3m	SEGREGATE At least 3m
TOXIC GAS		SEGREGATE At least 3m	OK TO STORE TOGETHER	MAY NOT BE COMPATIBLE CHECK MSDS AND NOTES	SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	ISOLATE	SEGREGATE At least 3m	SEGREGATE At least 3m
OXIDIZING GAS		SEGREGATE At least 3m	OK TO STORE TOGETHER	SEGREGATE At least 3m	OK TO STORE TOGETHER	SEGREGATE At least 3m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	ISOLATE	SEGREGATE At least 3m	SEGREGATE At least 3m
FLAMMABLE LIQUIDS & COMBUSTIBLE LIQUIDS		SEGREGATE At least 3m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	OK TO STORE TOGETHER	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	ISOLATE	SEGREGATE At least 3m	SEGREGATE At least 3m
FLAMMABLE SOLID		SEGREGATE At least 3m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 3m	OK TO STORE TOGETHER	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	ISOLATE	SEGREGATE At least 3m	MAY NOT BE COMPATIBLE CHECK MSDS AND NOTES
SPONTANEOUSLY COMBUSTIBLE		SEGREGATE At least 3m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 3m	OK TO STORE TOGETHER	SEGREGATE At least 5m	SEGREGATE At least 5m	ISOLATE	SEGREGATE At least 3m	SEGREGATE At least 3m
DANGEROUS WHEN WET		SEGREGATE At least 3m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	SEGREGATE At least 5m	OK TO STORE TOGETHER	SEGREGATE At least 5m	ISOLATE	SEGREGATE At least 3m	SEGREGATE At least 3m
OXIDIZING AGENT		SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 3m	KEEP APART	SEGREGATE At least 5m	SEGREGATE At least 5m	MAY NOT BE COMPATIBLE CHECK MSDS AND NOTES	ISOLATE	SEGREGATE At least 3m	SEGREGATE At least 3m
ORGANIC PEROXIDE		ISOLATE	ISOLATE	ISOLATE	ISOLATE	ISOLATE	ISOLATE	ISOLATE	ISOLATE	ISOLATE	OK TO STORE TOGETHER	ISOLATE	SEGREGATE At least 3m
TOXIC SUBSTANCES		SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 3m	ISOLATE	OK TO STORE TOGETHER	SEGREGATE At least 3m
CORROSIVE		SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 3m	MAY NOT BE COMPATIBLE CHECK MSDS AND NOTES	SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 3m	SEGREGATE At least 3m	MAY NOT BE COMPATIBLE CHECK MSDS AND NOTES



CHEMICAL SAFETY IN A BREWERY

- ▶ Isolate flammables from ignition sources
- ▶ Segregate incompatible dangerous goods
- ▶ Safe decanting and transferral of materials





CHEMICAL SAFETY IN A BREWERY

- ▶ Isolate flammables from ignition sources
- ▶ Segregate incompatible dangerous goods
- ▶ Safe decanting and transferral of materials
- ▶ Control static electricity





CHEMICAL SAFETY IN A BREWERY

- ▶ Isolate flammables from ignition sources
- ▶ Segregate incompatible dangerous goods
- ▶ Safe decanting and transferral
- ▶ Control static electricity
- ▶ Control hazardous vapors
- ▶ Minimize spillage





CHEMICAL SAFETY IN A BREWERY

- ▶ Isolate flammables from ignition sources
- ▶ Segregate incompatible dangerous goods
- ▶ Safe decanting and transferral of materials
- ▶ Control static electricity
- ▶ Control hazardous vapors





HAZARD COMMUNICATION STANDARD

- ▶ Requires your employer to inform you of:
 - ▶ Chemicals being used in your workplace
 - ▶ The associated hazards
 - ▶ How to protect yourself
- ▶ Exists to help:
 - ▶ Prevent injuries and illnesses
 - ▶ Save lives
 - ▶ Improve trade conditions





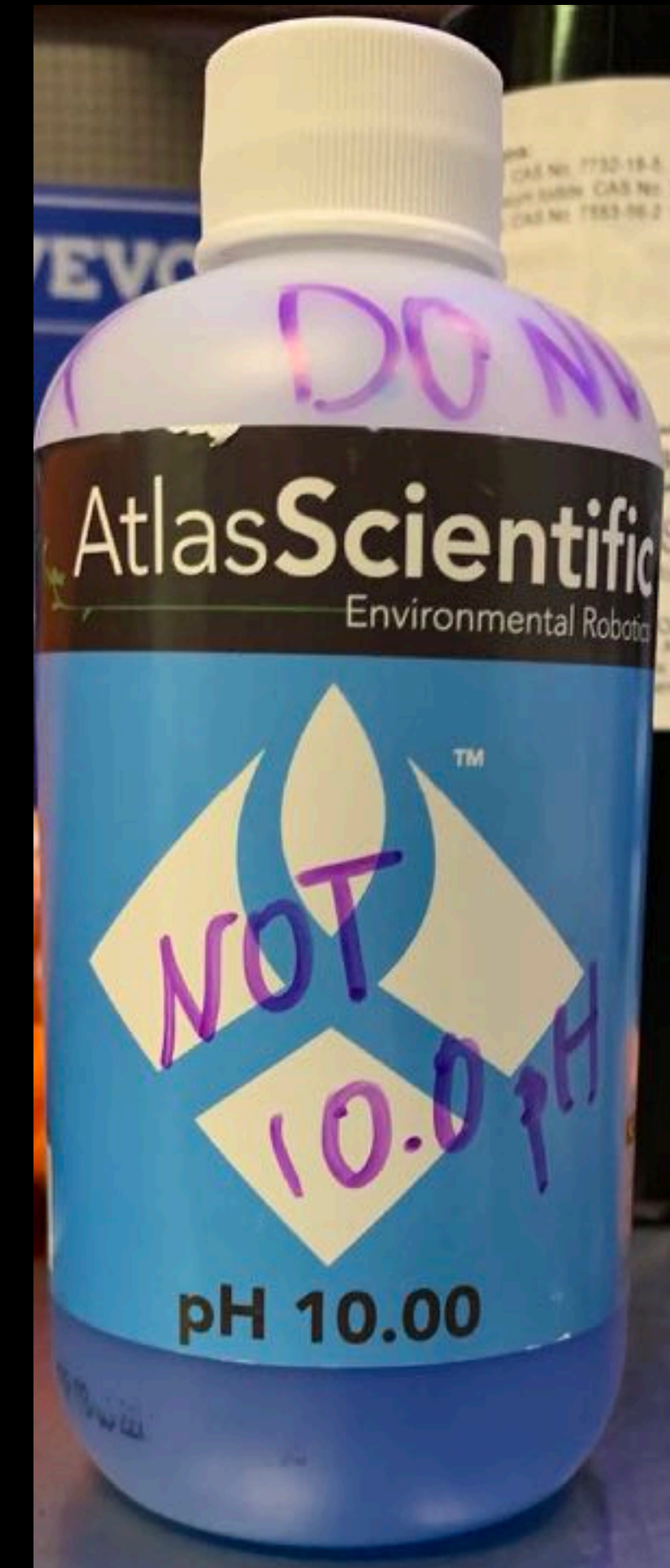
RIGHT-TO-KNOW

- ▶ OSHA says that employees have the “right-to-know” and understand the hazards of the chemicals they’re exposed to in the workplace.
- ▶ The chemical manufacturer or importer needs to document and share the identified hazard(s) associated with the chemicals.
- ▶ Employers are required to communicate this information to their employees and anyone else who may be exposed to the chemical(s).



EMPLOYER REQUIREMENTS

- ▶ Create an inventory of all hazardous chemicals
- ▶ Ensure each chemical has an SDS that is easily accessible
- ▶ Ensure each chemical container is properly labeled
- ▶ Create and provide training for workers
- ▶ Develop and maintain a written HazCom program





GLOBALLY HARMONIZED SYSTEMS (GHS)

- ▶ The US Hazard Communication Standard is aligned with the UN's Globally Harmonized System of Classification and Labeling of Chemicals (GHS).
- ▶ OSHA adopted the GHS hazard definitions, the container label elements, and the format and content of safety data sheets (SDSs).





CHEMICAL CLASSIFICATION

- ▶ **Manufacturer's Requirements**
 - ▶ The manufacturer or importer must identify any hazards of chemicals they offer.
- ▶ **Chemical Inventory**
 - ▶ Employers are required to develop and maintain a chemical inventory of all hazardous chemicals in the workplace.





HAZARDS OF CHEMICALS: PHYSICAL

- ▶ Combustible
- ▶ Explosive
- ▶ Flammable
- ▶ Oxidizer
- ▶ Reactive
- ▶ Unstable
- ▶ Water-Reactive
- ▶ Compressed Gases





HAZARDS OF CHEMICALS: HEALTH

- ▶ Toxins
- ▶ Corrosive or irritating to the skin or eyes
- ▶ A respiratory sensitizer
- ▶ A cause of cancer, birth defects, or reproductive issues
- ▶ Harmful to specific organs in the body
- ▶ Harmful or deadly when inhaled





GHS LABEL

- ▶ Product Identifier
- ▶ Signal Word
- ▶ Hazard Statement(s)
- ▶ Pictograms(s)
- ▶ Precautionary Statement(s)
- ▶ Name, Address, & Phone Number of the Responsible Party

Product Identifier
Pictogram *(Symbol in Red Frame)*



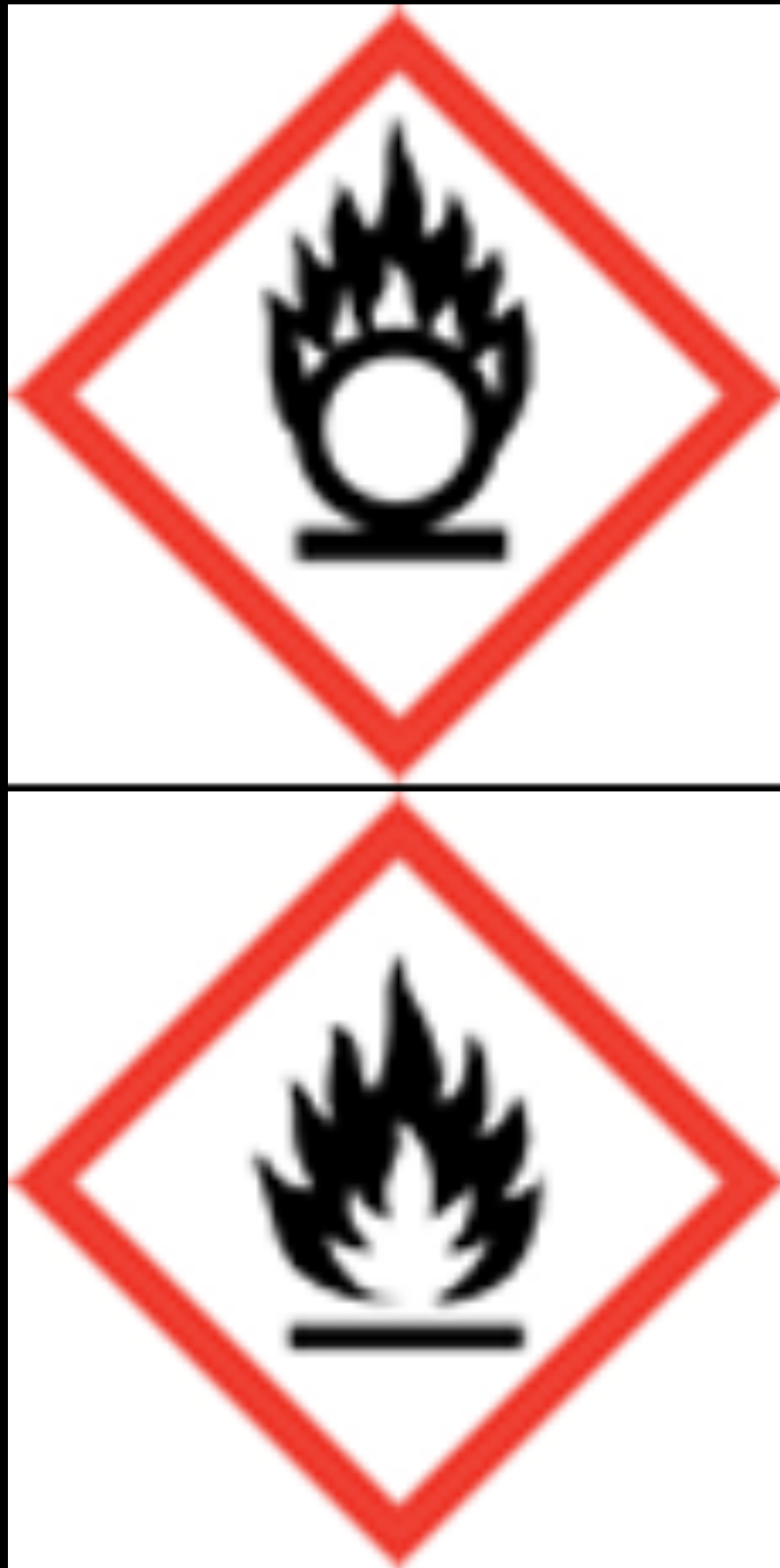
Signal Word *(Danger)*
Hazard Statement(s) *(Extremely flammable gas)*

Precautionary Statement(s) *(Keep away from heat and open flames. No smoking. Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so. Store in well-ventilated place.)*

**Name, Address, and Telephone Number
of Manufacturer, Importer, or Other Responsible Party**



GHS PICTOGRAMS



Flame Over Circle represents oxidizers.

Flame represents flammables, self-reactives, pyrophorics, self-heating materials, substances that emit flammable gas, and/or type B, C, D, and F organic peroxides.



GHS PICTOGRAMS



Exploding Bomb is used to represent explosives, self-reactives, and type A and B organic peroxides.

Skull and Crossbones represents acutely toxic materials.



GHS PICTOGRAMS

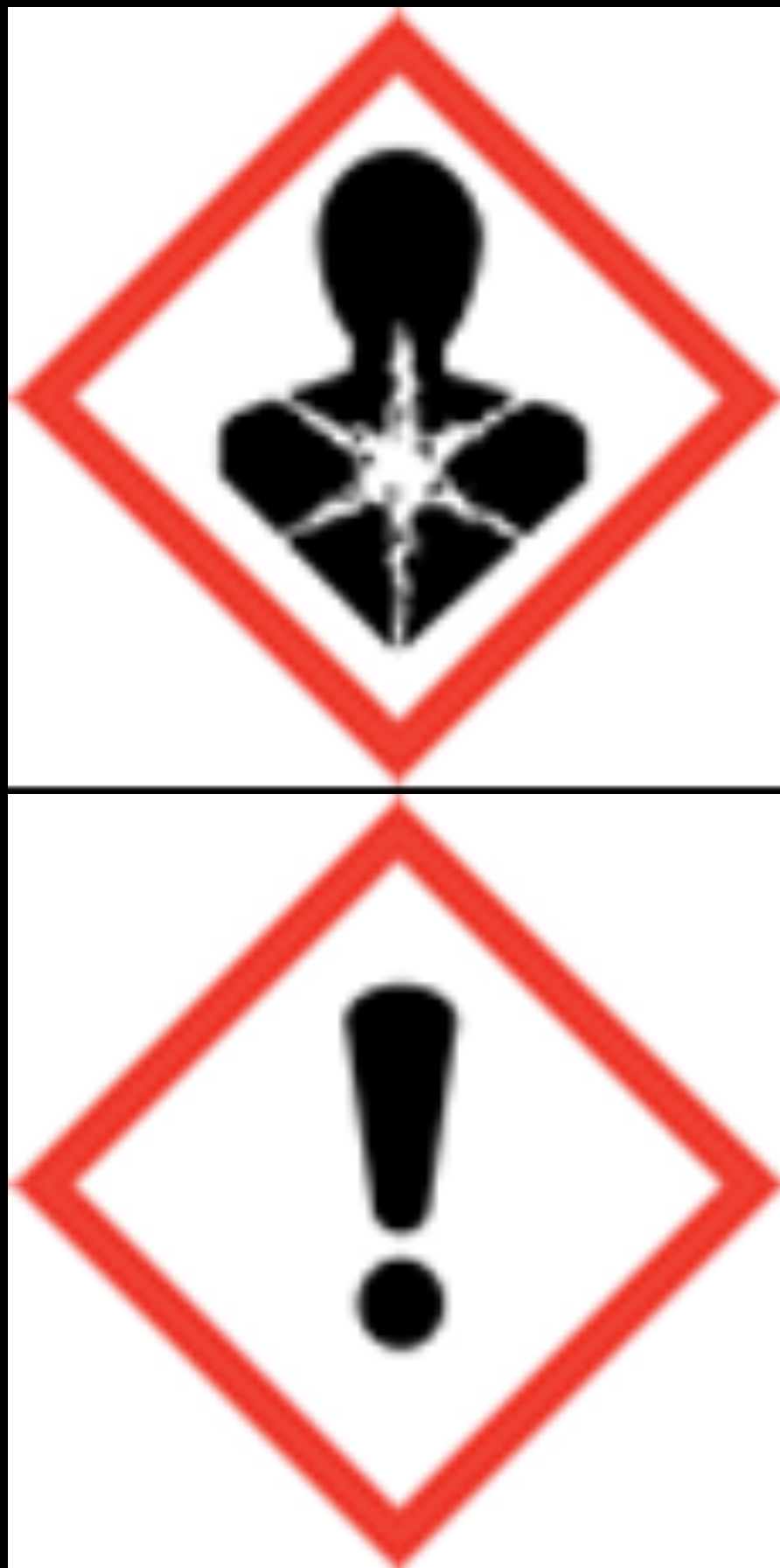


Corrosion represents skin corrosives, eye corrosives, and materials corrosive to metals.

Gas Cylinder represents gases under pressure.



GHS PICTOGRAMS



Health Hazard is used to represent carcinogens, respiratory sensitizers, reproductive toxicity, target organ toxicity, mutagenicity, and aspiration toxicity.

Exclamation Mark is used for skin and eye irritants, skin sensitizers, acute toxicity, narcotic effects, and respiratory tract irritants. This pictogram may also optionally be used to represent materials hazardous to the ozone layer.



GHS PICTOGRAMS



Environment is an optional pictogram used for aquatic toxicity.



SAFETY DATA SHEET

- ▶ Provides information you may need to work safely with a specific chemical





SDS SECTION 1: PRODUCT AND COMPANY IDENTIFICATION



1. Product and Company Identification

Product Name: Solvent X

Synonyms: Machine solvent, industrial solvent, equipment flushing solvent

CAS No.: Not applicable to mixtures

Molecular Weight: Not applicable to mixtures

Emergency Contact: +1-123-555-1212

Product Use: Various industrial uses

Restrictions: Not to be used as a skin cleaner

Chemical Formula: Not applicable to mixtures

Product Codes: UR-101

Manufacturer: U. R. Chemical

Little Hill Dr.

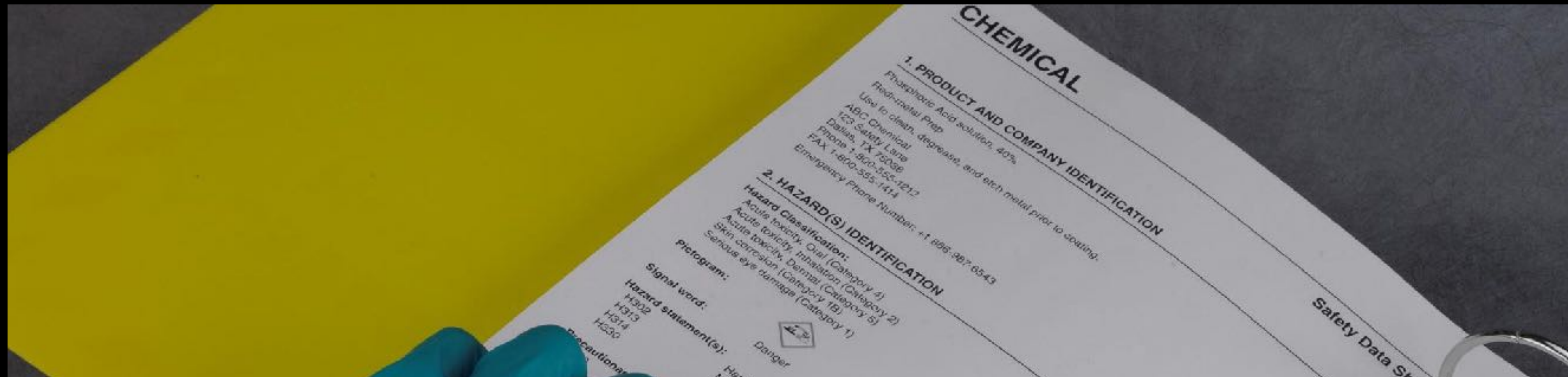
Little Hill, KS 01234

Telephone: +1-123-555-0101

Fax: +1-123-555-0102



SDS SECTION 2: HAZARD IDENTIFICATION



2. Hazards Identification

GHS CLASSIFICATION:

Health		Environmental		Physical
Acute Toxicity:	Category 4	Acute Toxicity:	None Known	
Skin Irritation:	Category 3	Chronic Toxicity:	None Known	
Skin Sensitization:	NO			
Eye:	Category 2B			

GHS LABEL:



Signal Word:
Warning

WHMIS CLASSIFICATION: CLASS D, DIVISION 1

Hazard Statements

H320: Causes eye irritation
 H335: May cause respiratory irritation
 H336: May cause drowsiness or dizziness
 H351: Suspected of causing cancer

Precautionary Statements

P210: Keep away from heat/sparks/open flames/hot surfaces – No smoking
 P261: Avoid breathing dust/fume/gas/mist/vapors/spray
 P280: Wear protective gloves/protective clothing/eye protection/face protection
 P337+P313: Get medical advice/attention
 P403+P233: Store in a well ventilated place. Keep container tightly closed
 P501: Dispose of contents/container in accordance with local regulation



SDS SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS



3. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Methylene Chloride	75-09-2	40%	Yes
Ethyl Alcohol	64-17-5	30%	Yes
Acetic Acid	64-19-7	15%	Yes
Paraffinic Petroleum Distillates	64742-65-0	15%	Yes





SDS SECTION 4: FIRST AID MEASURES



4. First Aid Measures

Inhalation: Remove to fresh air. Get medical attention for any breathing difficulty. If breathing stops, administer artificial respiration.

Ingestion: Do not induce vomiting. Keep individual calm. Obtain medical attention immediately.

Skin Contact: Remove contaminated clothing and shoes. Wash exposed area with soap and water for at least 15 minutes. Get medical advice if irritation develops. Wash contaminated clothing before reuse.

Eye Contact: Flush thoroughly with running water for at least 15 minutes, occasionally lifting the eyelids. Obtain medical attention.



SDS SECTION 5: FIRE FIGHTING MEASURES



5. Fire Fighting Measures

Fire: Fire is possible if concentrated vapors are exposed to elevated temperatures.

Fire Extinguishing Media: Water spray, dry chemical, alcohol foam, or carbon dioxide.

Special Information: In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.





SDS SECTION 6: ACCIDENTAL RELEASE MEASURES



6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Pick up spill for recovery or disposal and place in a closed container. Keep spilled material away from sewage/drainage systems and waterways.





SDS SECTION 7: HANDLING AND STORAGE

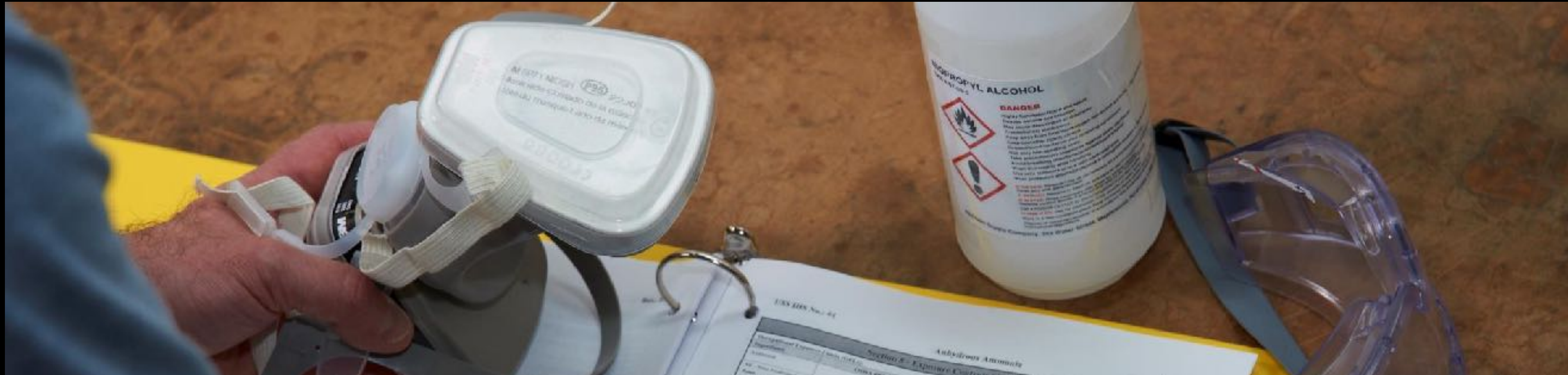


7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Observe all warnings and precautions listed for the product.



SDS SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION



8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

- OSHA Permissible Exposure Limit (PEL):
methylene chloride = 5000 ppm (TWA);
ethyl alcohol = 1000 ppm;
acetic acid = none established;
paraffinic petroleum distillates = 400 ppm.
- ACGIH Threshold Limit Value (TLV):
methylene chloride = 50 ppm (TWA);
ethyl alcohol = 1000 ppm;
acetic acid = none established;
paraffinic petroleum distillates = 400 ppm.

Ventilation System:

Sufficient to maintain vapor concentration below TLV. Do not use in a closed or confined space.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, wear an appropriate NIOSH N95 respirator, full-facepiece respirator, or airlined hood.

Skin Protection:

Wear impervious protective clothing, including gloves and apron, to prevent skin contact.

Eye Protection:

Use chemical safety goggles or full face shield when splashing is a concern. Maintain eye-wash fountain and quick-drench facility in the work area.

Other Control Measures:

Protective equipment for laboratory bench use should be chosen using professional judgment based on the size and type of reaction

Notice: Chemical and other data represented in this safety data sheet image is for example purposes only.



SDS SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES



9. Physical and Chemical Properties

Appearance:

Clear, yellowish liquid.

Odor:

Sweet, aromatic odor.

Solubility:

1.4 grams per 100 grams at 77°F

Specific Gravity:

1.2 at 77°F

pH:

No information found.

% Volatiles by volume @ 21°C (70°F):

Not available

Boiling Point:

No information found.

Melting Point:

199°C (390°F) Decomposes.

Freezing Point:

-96.7°C (-142.1°F)

Flash Point:

16°C (61°F)

Flammability:

Non-flammable liquid. Vapor will burn at high temperatures.

Vapor Density (Air=1):

No information found.

Vapor Pressure (mm Hg):

No information found.

Evaporation Rate (BuAc=1):

No information found.



SDS SECTION 10: STABILITY AND REACTIVITY



10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Burning may produce carbon monoxide, carbon dioxide, nitrogen oxides.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Strong oxidizers and reactive metals.

Conditions to Avoids:

Incompatibles and hot surfaces which can cause thermal decomposition.



SDS SECTION 11: TOXICOLOGICAL INFORMATION



11. Toxicological Information

Methylene chloride: oral rat LD50: 16000mg/kg; inhalation rat LC50: 52gm/m³; investigated as a tumorigen, mutagen, reproductive effector.
Ethyl alcohol: oral rat LD50= 7060mg/kg; inhalation rat LC50= 20,000ppm/10H; investigated as a tumorigen, mutagen, reproductive effector.
Acetic acid: No LD50/LC50 information found relating to normal routes of occupational exposure.
Paraffinic petroleum distillates: Not known.



SDS SECTION 12: ECOLOGICAL INFORMATION



12. Ecological Information

Environmental Fate:

When released into the soil, this material may biodegrade to a moderate extent. When released into the soil, this material is expected to leach into groundwater. When released into water, this material may biodegrade to a moderate extent. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into air, this material is expected to have a half-life between 10 and 30 days.

Ecotoxicological Data:

96 hr. NOEL (minnow) 110 mg/L

24 hr EC50 (Daphnia Magna) 460 mg/L



SDS SECTION 13: DISPOSAL CONSIDERATION



13. Disposal Considerations

Recover or recycle if possible. It is the responsibility of the waste generator to determine the proper waste classification and disposal methods in compliance with applicable federal, state, and local regulations. Do not dispose of in the environment, in drains or water courses. Drain container thoroughly. Send to recycler/reclaimer.



SDS SECTION 14: TRANSPORT INFORMATION



14. Transport Information

Transport in accordance with all federal, state, and local regulations.

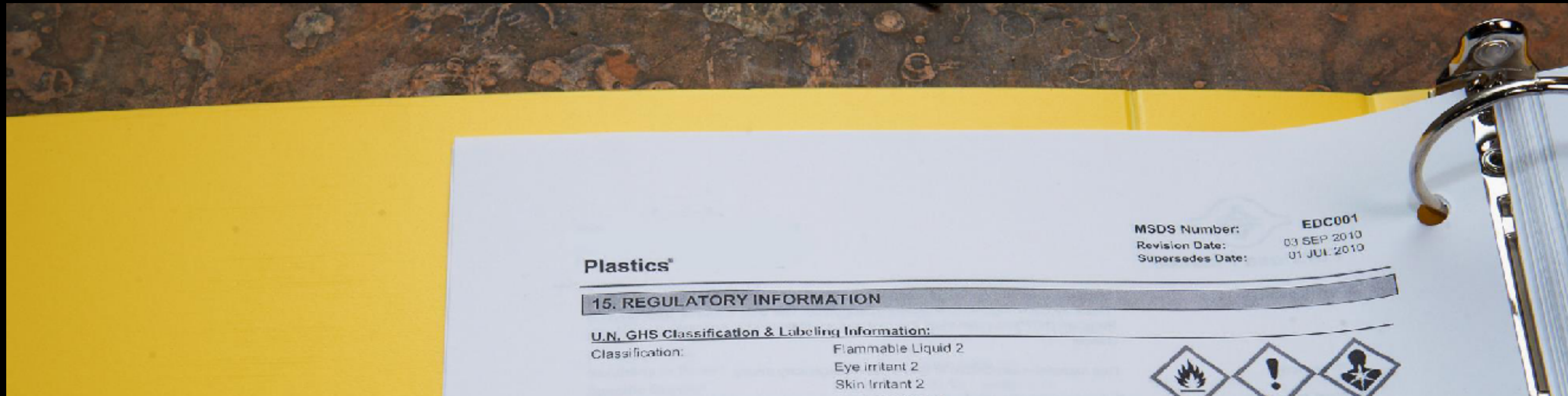
UN number 2929

UN proper shipping name Toxic liquid, flammable, n.o.s.

Hazards class 6.1; Packing Group III



SDS SECTION 15: REGULATORY INFORMATION



15. Regulatory Information

-----\Chemical Inventory Status - Part I\-----

Ingredient	TSCA	EC	Japan	Australia
Methylene Chloride (75-09-2)	Yes	Yes	Yes	Yes
Ethyl Alcohol (64-17-5)	Yes	Yes	Yes	Yes
Acetic Acid (64-19-7)	Yes	Yes	Yes	Yes
Paraffinic Petroleum Distillates (64742-65-0)	Yes	Yes	No	Yes

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: No
 SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
 Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: None allocated.

Poison Schedule: None allocated.

Health Rating: 3

3



SDS SECTION 16: OTHER INFORMATION



16. Other Information

NFPA Ratings: Health: **3** Flammability: **1** Reactivity: **0**
HMIS Ratings: Health: **3** Flammability: **1** Physical Hazard: **0**
This SDS was prepared by U. R. Chemical.

Revision Information: Revised 05/27/12



HOW TO USE AN SDS

- ▶ SDS identifies information to keep you, your coworkers, and the environment safe.
- ▶ Know where to find your company's SDS.
- ▶ Never use a chemical until you have reviewed the SDS and have the information you need to use it safely.





HAZARDOUS MATERIALS

- ▶ UN3065, Alcoholic Beverages, 3, II
- ▶ UN1987, Alcohols, n.o.s., 3, I or II or III
- ▶ UN1170, Ethanol or Ethyl Alcohol or Ethanol Solutions or Ethyl Alcohol Solutions, 3, II or III





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HAZARDOUS MATERIALS: EXCEPTION

- ▶ UN3065, Alcoholic Beverages, 3, II
 - ▶ 49 CFR 173.150(d): Wine and distilled spirits as defined in 27 CFR 4.10 and 5.11 when transported via motor vehicle, vessel, or rail is not subject to the requirements of this subchapter if the alcoholic beverage:
 - (I) Contains 24 percent or less alcohol by volume;
 - (II) Is contained in an inner packaging of 5L (1.3 gallons) or less; or
 - (III) Is a Packaging Group III alcoholic beverage contained in a packaging 250 liters (66 gallons) or less.



EMPLOYEE TRAINING

- ▶ Train your employees on the hazardous chemicals in their work area
 - ▶ Before their initial assignment and when new hazards/chemicals are introduced.
- ▶ Include the requirements of the Standard, hazards of the chemicals, necessary protective measures, and where/how to get more information.



HAZCOM Q&A

- ▶ A program that is based on the premise that employees have a need and a right to know what chemicals they are working with, as well as the hazards associated with them?
 - ▶ What is a HazCom Program?
- ▶ Presents detailed information on the potential hazards of a chemical, such as emergency first aid procedures, health hazards, physical hazards and routes of body entry.
 - ▶ What is a Safety Data Sheet (SDS)?
- ▶ Lists the names of the hazardous chemical; appropriate health and safety hazard warnings; and name and address of the chemical manufacturer, importer or distributor.
 - ▶ What is a label?



SUMMARY

- ▶ Learn the Standard/Identify Responsible Staff
- ▶ Prepare and implement a written Hazard Communication Program
- ▶ Ensure chemical containers are labeled
- ▶ Maintain SDSs
- ▶ Inform and train employees
- ▶ Evaluate and reassess your program



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