# Using the HARM Worksheet

To provide content and context for complex topics while teaching HAZWOPER classes

GLOBAL VISION CONSORTIUM

# By the End of This Presentation, Attendees will be able to:

| | |
|---|---|
| Identify | Identify the HARM worksheet and its component parts |
| Assess | Assess the application of the HARM worksheet in a training setting |
| Demonstrate | Demonstrate the use of the HARM worksheet |

# From whence it came-the HARM Worksheet

- First introduced to me at a NIEHS National Trainers' Exchange eons ago by the United Paper Workers (UPIU)
  - Which merged with the Oil, Chemical, and Atomic Workers (OCAW) creating PACE which merged with the United Steelworkers
- (labor historians correct me if I'm wrong)

# Evolution of the HARM Worksheet

Expanded the Worksheet primarily as a teaching tool

(many versions)

Can also be used for pre-event planning

# Evolution of the HARM Worksheet (cont)

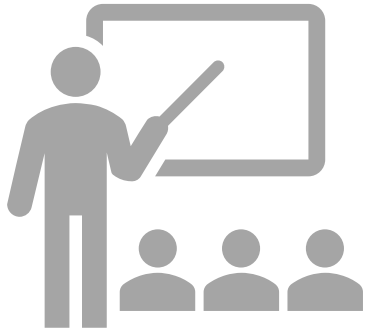
- Updated and expanded over the years:
  - CCC Oil Spill Response (Regular/Occasional Site Worker)
  - HazMat for Healthcare
  - SEIU
  - CCC General Site Worker

# The Current Setting:

- California Conservation Corps:
  - CA State Agency
  - Corpsmembers (CMs) are generally 18-24 years old
  - Often do not learn well in a traditional academic setting

# The Curriculum:

An OSHA Hazardous Waste Operations and Emergency Response General Site Worker (plus a First Responder Awareness and Operations course)



40 hours delivered as 4 ten-hour classes

# Modules of CCC GSW

- What We Do
- Rights, Writes, and Rites
- Health and Safety Programs
- What's So Hazardous About It?
- Toxicity and You
- Besides the Chemicals, What Can Hurt Me?
- Does This HazMat Suit Make My Butt Look Yellow?
- How do I know what I'm working with?
- Hazards and Safety
- What a Waste
- When the Toxic Waste Hits the Fan

- *We may jump around a bit, but be assured, we'll cover everything.*

# The Challenge:

- How to effectively convey basic:
  - Chemistry
  - Fire Science
  - Physical Properties
  - Toxicology
  - Response Resources
- And assist the CMs to synthesize into useful and useable information

In a couple of hours…

HARM / Risk Assessment Worksheet

**Product Name:**_____ **UN# (4 digits)**_____

**DOT Hazard Class:**_____ **Physical State:** _____
EX-FG-FL-FS-OX-PO-RA-CO-OT (at 68 degrees F) Solid/Liquid/Gas
1 2 3 4 5 6 7 8 9

**ERG Guide #**_____ **NFPA: H___ F___ R___ S___ (0-4)**

Poison Control Information = (800) 222-1222

| Hazard | Physical Description | Hazard Summary |
|---|---|---|
| **Toxicity**<br>Lower #'s and/or Narrow Range = higher hazard | ppm or mg/m³ TWA 8 Hrs STEL Short C Ceiling IDLH Danger | Toxicity?<br>Little, Somewhat, Very |
| **Flam lity**<br>Lower # ard<br>Wider | LEL / UEL: 0% 50% 100%<br>oint: 0° F 100° F 200° F<br>. =____ A.I.T. =____ (paper = 451° F) | Flammable?<br>Non, Somewhat, Very |
| | Soluble (swims) in:<br>☐ Water (W) ☐ Oil (O) | Soluble?<br>Not, Somewhat, Very<br>Not, Somewhat, Ver |
| **Sp** | Water = 1 (less floats, more sinks)<br>= | Liquid?<br>Float / Sink / Ne |
| | Air sinks)<br>= | Vapor?<br>Float / Sink / N |
| **Vapor Pressure**<br>Higher = more vapor<br>Lower = less vapor<br>Lower B.P. = more vapor | _____mmH B.P. =____ | Vapor Produ<br>Low, Mediu |
| **Corrosivity**<br>Closer to 0 or 14 = more corrosive | pH Value 0 2 8-14 12 14 | Corrosive?<br>Not, Somewhat, Ve |
| **Carcinogen** | | Cancer risk to staff<br>Yes / No |
| **Secondary Contamination Risk:** Yes / No (Transferable from victim or scene to othe | | |
| **PPE:** Can your team handle a victim decontamination incident with provided PPE? Yes / No<br>Can your team handle an internal incidental spill incident without special PPE? Yes / No | | |
| **Other Info of Interest:** | | |

**What challenges are there to you handling this?** _____

Name and Basic Info up top

Different Hazards on left

How measured in the middle

Relative Risk on right

Capabilities and limitations on bottom

# Hence:

# Approach:

Way too many topics to cover in a short period of time to an audience that has little background (or interest) in the material

Deconstruct each component in general and apply to a specific chemical

Build a picture of the individual hazards and relative risks

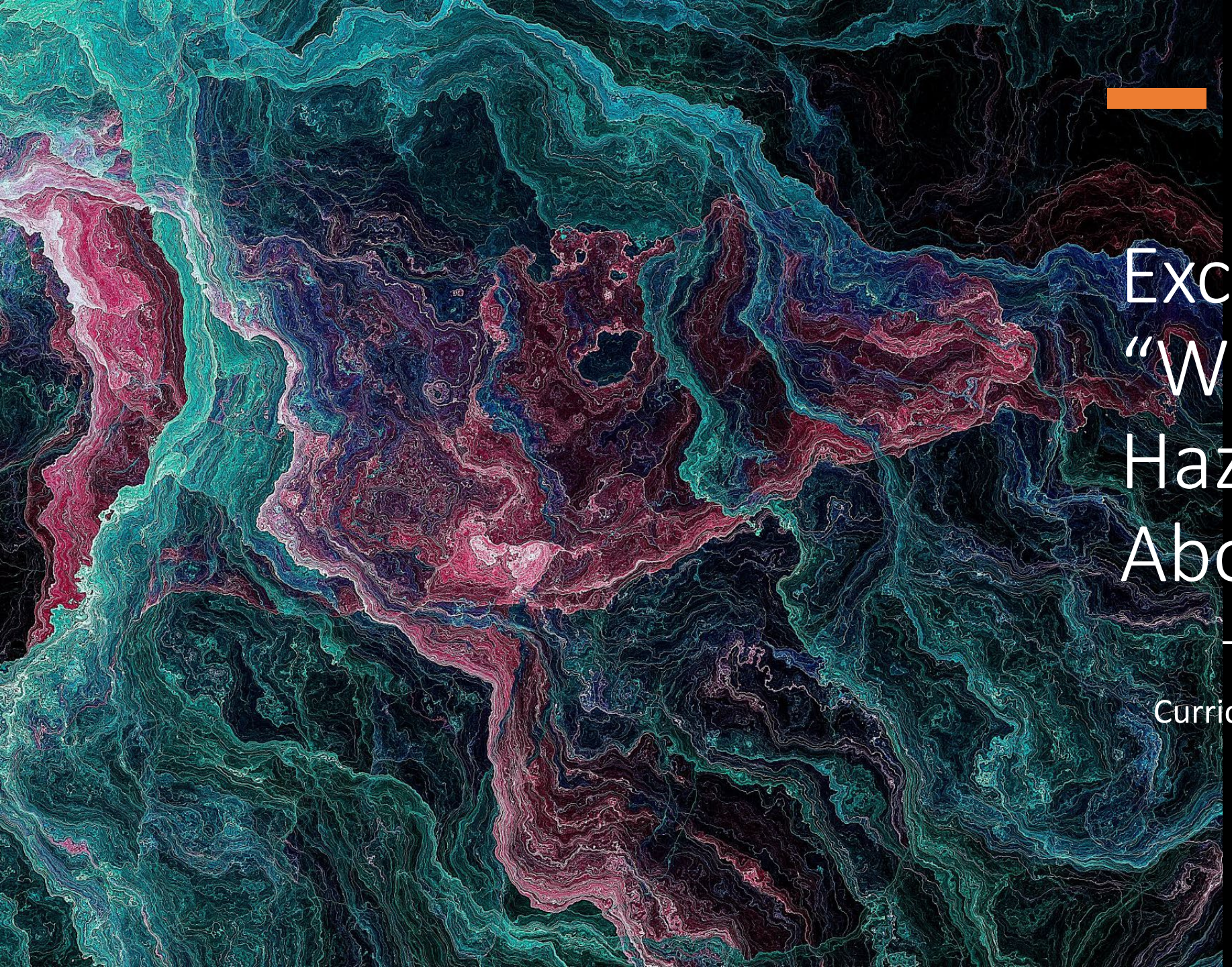
Bring together and put into perspective

Determine and demystify hazards and risks

Compare and Contrast with other chemicals

# How Presented:

- In the student handouts each has the following for Xylene:
  - Safety Data Sheet
  - NIOSH Pocket Guide
  - ATSDR Medical Management Guidelines
  - Yellow (number), Blue (name), Orange (guide) pages from the ERG
    - And WISER or other reputable searchable resources (“Cheating counts!”)
- Two copies of the HARM Worksheet
- First introduced in Module 4 “What’s So Hazardous About It?”



# Excerpts from “What’s So Hazardous About It?”

Curriculum has more depth than presented here

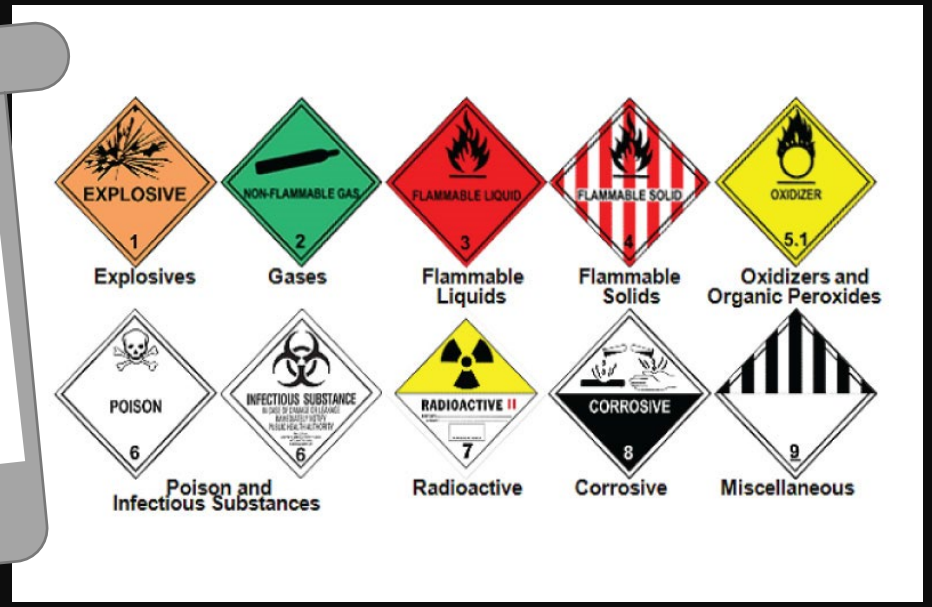
# Introducing- The HARM Form

H - Hazard

A - and

R - Risk

M - Management



# What HARM means to you

- **Toxicity – How poisonous is it?**
- **Flammability – How easily does it catch fire?**
- **Solubility – What does it mix with?**
- **Specific Gravity – Will it sink or float in water?**
- **Vapor Density – Will it settle/stay/float away in air?**
- **Vapor Pressure – How easily does it get into the air?**
- **Corrosivity – Will it eat away at me or my suit?**
- **Carcinogenic – Could it cause cancer in me?**

# Harm Risk Assessment Worksheet

What does the HARM Form do?

The HARM form is a tool to identify the chemical and physical hazards that may be present and the relative risk of those hazards

**HAZMAT FOR HEALTHCARE**

HARM / Risk Assessment Worksheet

**Product Name:**_____ **UN# (4 digits)**_____

**DOT Hazard Class:**_____ **Physical State:** _____
**EX-FG-FL-FS-OX-PO-RA-CO-OT** (at 68 degrees F) Solid/Liquid/Gas
1 2 3 4 5 6 7 8 9

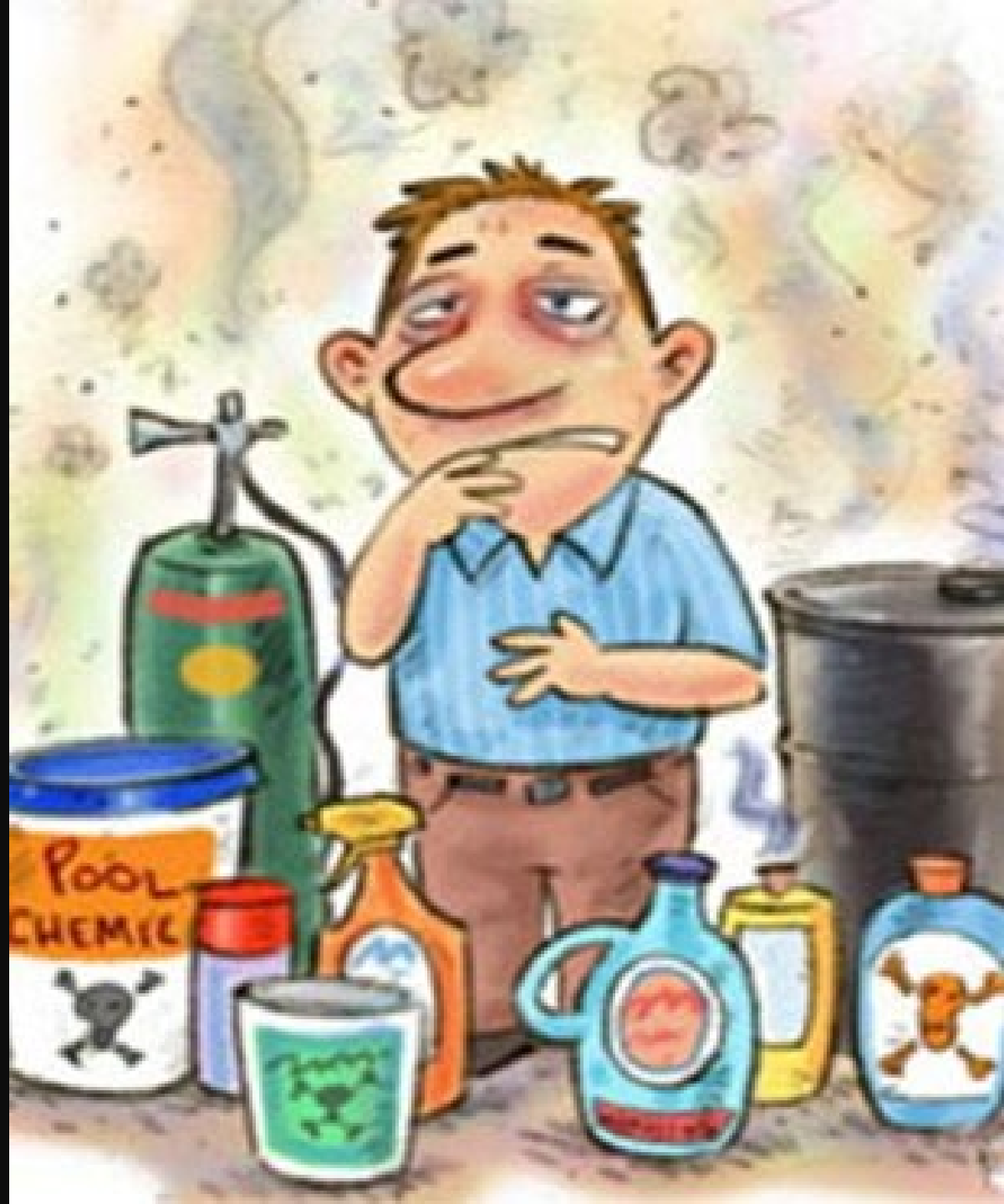
**ERG Guide #**_____ **NFPA: H___ F___ R___ S___ (0-4)**

**Poison Control Information = (800) 222-1222**

Key Point: This form is useful in evaluating chemical and physical hazards.

# Toxicity

- Toxicity is the degree to which a chemical substance or a particular mixture of substances can damage an organism.
- It's the degree to which a substance (a toxin or poison) can harm humans or animals.
- Acute toxicity involves harmful effects in an organism (that could be you) through a single or short-term exposure.
- A central concept of toxicology is that the effects of toxicants are dose-dependent; even water can lead to water intoxication when taken in too high a dose.



# Flammability / Combustible

- Combustible material is something that can combust (burn) in the air.
- Flammable materials are combustible materials that ignite easily at ambient temperatures.
- In other words, a combustible material ignites with some effort and flammable material catches fire immediately when exposed to a flame.

# Solubility

- Solubility is the property of a solid, liquid, or gaseous chemical substance called solute to dissolve in a solid, liquid, or gaseous solvent.
- When you put cooking oil into a measuring cup filled with water, what happens?  Is it soluble?  (no)

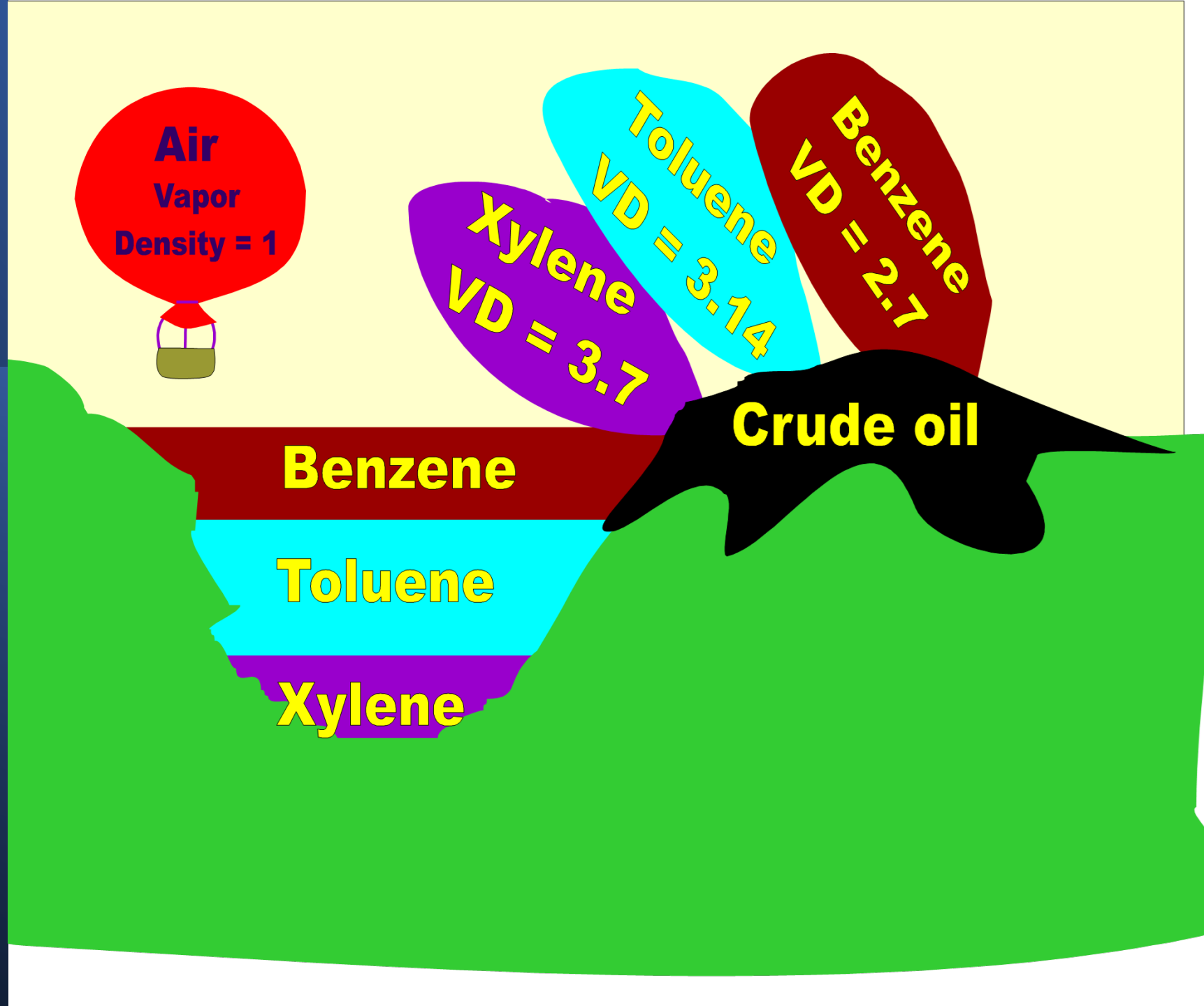
# Specific Gravity

- Specific gravity is the ratio of the density of a substance to the density of given reference material.
- Substance density / reference density = specific gravity
- Generally, water= 1: less than one rises, greater than one sinks
- Take buoyancy. If a substance has a specific gravity less than that of a fluid, like water, it will float on that fluid. Example:
  - Oil (SG <1)will form a slick on the water.

# Vapor Density

- Vapor Density tells us the relative weight of a gas or vapor compared to air, which has an arbitrary value of one.
- If a gas has a vapor density of less than one it will generally rise in the air.
- If the vapor density is greater than one the gas will generally sink in air.
- Vapor density indicates whether gas is denser (greater than one) or less dense (less than one) than air.
- For example, Helium-filled balloons will rise in the air.
- AKA “RgasD” NIOSH

# Vapor Density



# Vapor Pressure

Vapor pressure is a measure of the tendency of a material to change into the gaseous or vapor state, and it increases with temperature.

The temperature at which the vapor pressure at the surface of a liquid becomes equal to the pressure exerted by the surroundings is called the boiling point of the liquid.

For example, as the water boils at sea level, its vapor pressure is 1 atmosphere because the external pressure is also 1 atmosphere.

# Vapor Pressure


- Generally, a substance's vapor pressure increases as temperature increases; and decreases as temperature decreases (i.e. vapor pressure is directly proportional to temperature)

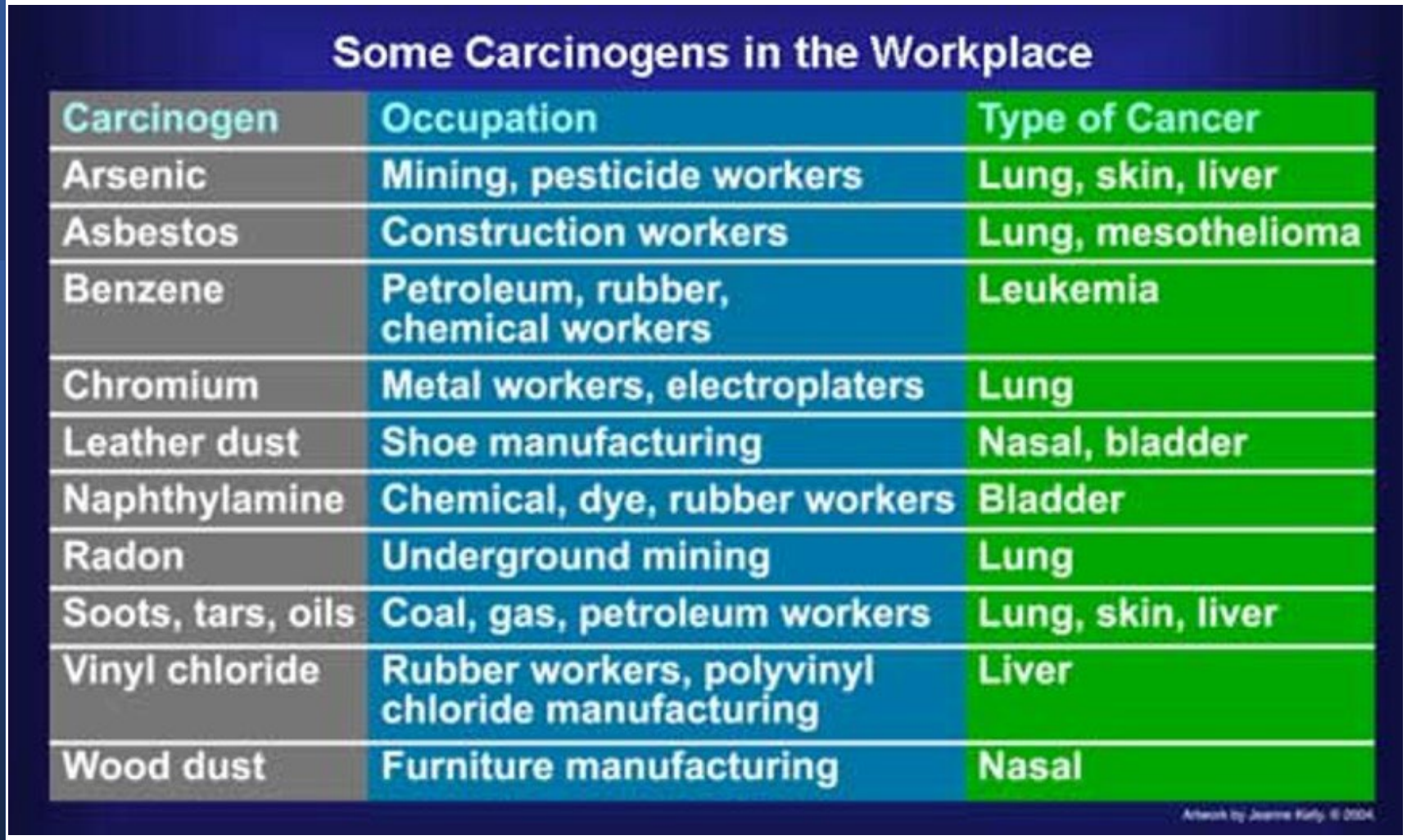
# Corrosivity

- Corrosivity is measured with something called pH- with water having a value of 7.
- Something that is basic (or caustic) is above 7 and something that is acidic is below 7.
- So, a liquid with a pH of 1 is very, very acidic and a liquid with a pH of 14 is very, very caustic.
- A substance that is corrosive is one that has the ability to damage or destroy other substances when they come into contact.
- This means it has the properties or qualities to corrode. (erode or eat away)
- Corrosive Chemicals on substances result in highly destructive and harmful effects.
- A corrosive substance can severely attack a number of materials, including organic compounds and metals.
- In addition to that, living tissues can also be greatly affected by the corrosivity of a substance.

# Corrosivity

- The cause was shipping a corrosive material in the aluminum cargo tank which was not compatible for that substance.

# Carcinogenetic



Some Carcinogens in the Workplace

| Carcinogen | Occupation | Type of Cancer |
|---|---|---|
| Arsenic | Mining, pesticide workers | Lung, skin, liver |
| Asbestos | Construction workers | Lung, mesothelioma |
| Benzene | Petroleum, rubber, chemical workers | Leukemia |
| Chromium | Metal workers, electroplaters | Lung |
| Leather dust | Shoe manufacturing | Nasal, bladder |
| Naphthylamine | Chemical, dye, rubber workers | Bladder |
| Radon | Underground mining | Lung |
| Soots, tars, oils | Coal, gas, petroleum workers | Lung, skin, liver |
| Vinyl chloride | Rubber workers, polyvinyl chloride manufacturing | Liver |
| Wood dust | Furniture manufacturing | Nasal |

# We’ll be using **Xylene** as an exemplar

# Small Group Activity
(Usually conducted after the initial HARM presentation)

Form small groups by table

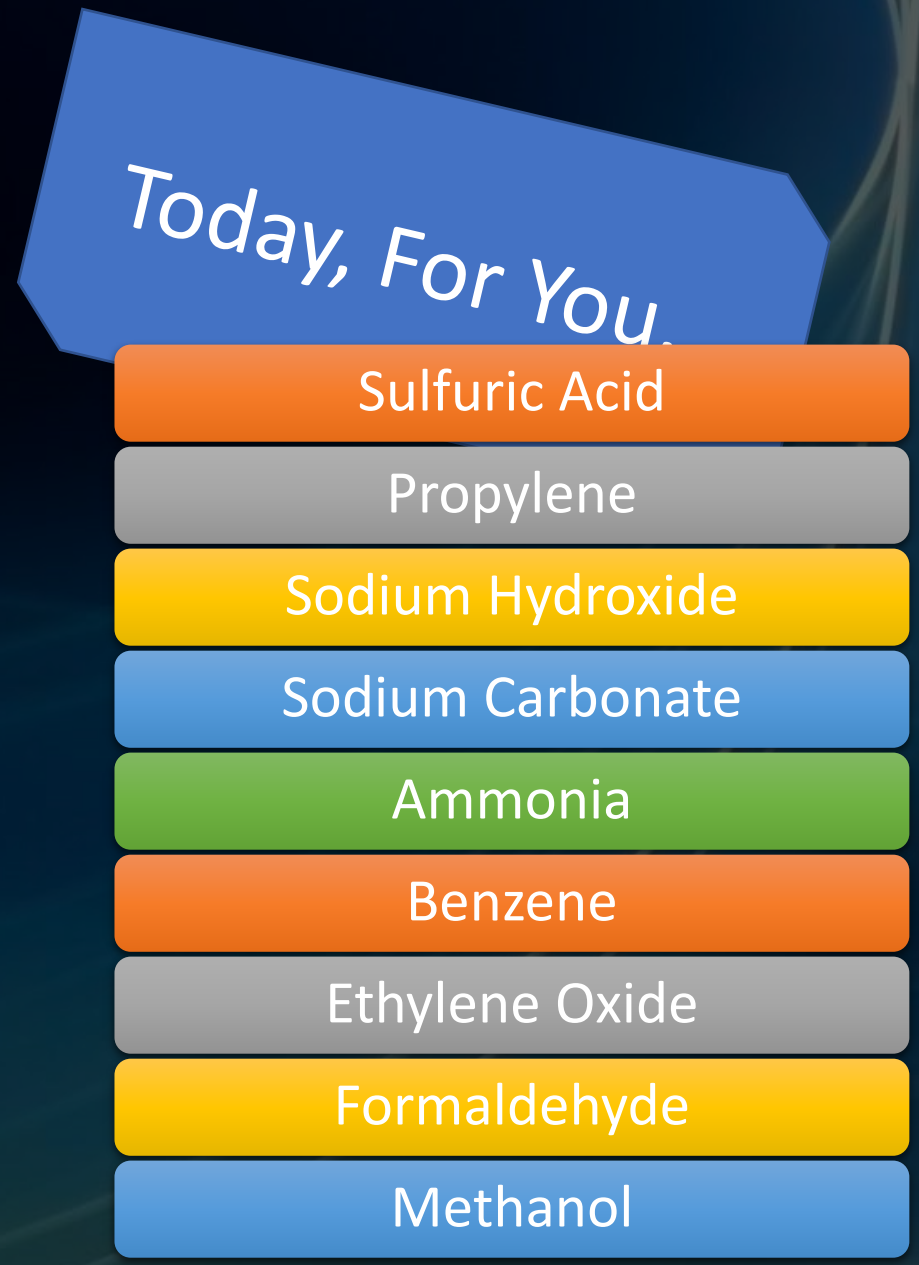
Choose a chemical

Research and fill out HARM worksheet as we go along

LATER:

Determine what is important to convey

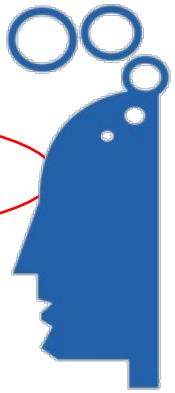
Report back



**HAZMAT FOR HEALTHCARE**
HARM / Risk Assessment Worksheet

# Let's get started

**HAZMAT FOR HEALTHCARE**
HARM / Risk Assessment Worksheet



**Product Name:**_____ **UN# (4 digits)**_____

**DOT Hazard Class:**_____ **Physical State:** _____
(at 68 degrees F) Solid/Liquid/Gas

**EX-FG-FL-FS-OX-PO-RA-CO-OT**
1 2 3 4 5 6 7 8 9

**ERG Guide #**_____ **NFPA: H___ F___ R___ S___ (0-4)**

**Poison Control Information = (800) 222-1222**

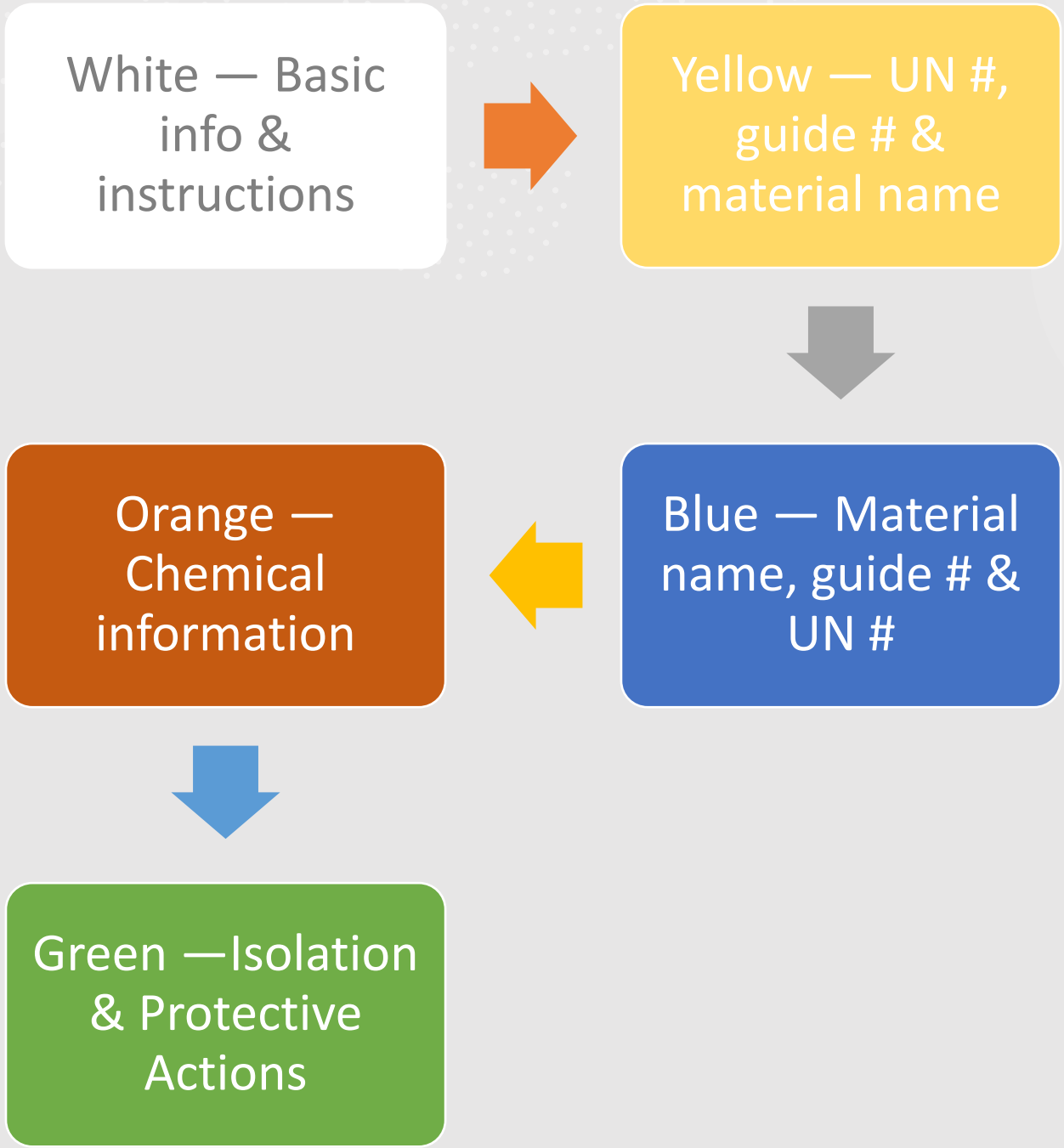
# DOT PHMSA Emergency Response Guidebook (ERG)


ERG purpose:

- Basic safety tool
- Basic identification
- Initial actions

# OVERVIEW OF THE
# EMERGENCY RESPONSE GUIDEBOOK (ERG) 2020

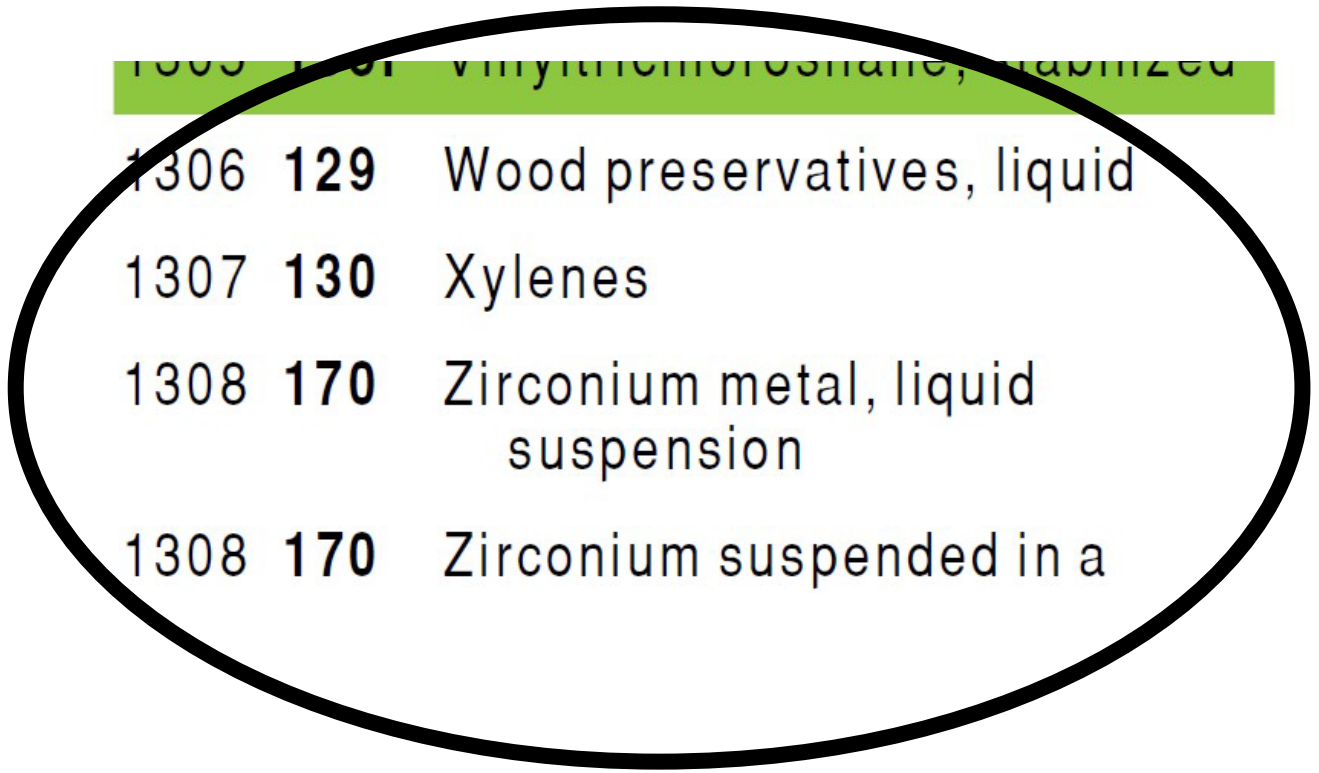
# Info Sources ERG Organization



# Listed by Placard Number

| ID No. | Guide No. | Name of Material |
|---|---|---|
| 1287 | 127 | Rubber solution |
| 1288 | 128 | Shale oil |
| 1289 | 132 | Sodium methylate, solution in alcohol |
| 1292 | 129 | Ethyl silicate |
| 1292 | 129 | Tetraethyl silicate |
| 1293 | 127 | Tinctures, medicinal |
| 1294 | 130 | Toluene |
| 1295 | 139 | Trichlorosilane |
| 1296 | 132 | Triethylamine |
| 1297 | 132 | Trimethylamine, aqueous solution |
| 1298 | 155 | Trimethylchlorosilane |
| 1299 | 128 | Turpentine |
| 1300 | 128 | Turpentine substitute |
| 1301 | 129P | Vinyl acetate, stabilized |
| 1302 | 127P | Vinyl ethyl ether, stabilized |
| 1303 | 130P | Vinylidene chloride, stabilized |
| 1304 | 127P | Vinyl isobutyl ether, stabilized |
| 1305 | 155P | Vinyltrichlorosilane, stabilized |
| 1306 | 129 | Wood preservatives, liquid |
| 1307 | 130 | Xylenes |
| 1308 | 170 | Zirconium metal, liquid suspension |
| 1308 | 170 | Zirconium suspended in a liquid (flammable) |
| 1309 | 170 | Aluminum powder, coated |
| 1310 | 113 | Ammonium picrate, wetted with not less than 10% water |
| 1312 | 133 | Borneol |
| 1313 | 133 | Calcium resinate |
| 1314 | 133 | Calcium resinate, fused |
| 1318 | 133 | Cobalt resinate, precipitated |
| 1320 | 113 | Dinitrophenol, wetted with not less than 15% water |
| 1321 | 113 | Dinitrophenolates, wetted with not less than 15% water |
| 1322 | 113 | Dinitroresorcinol, wetted with not less than 15% water |
| 1323 | 170 | Ferrocerium |
| 1324 | 133 | Films, nitrocellulose base |
| 1325 | 133 | Flammable solid, n.o.s. |
| 1325 | 133 | Flammable solid, organic, n.o.s. |
| 1325 | 133 | Fusee (rail or highway) |
| 1326 | 170 | Hafnium powder, wetted with not less than 25% water |
| 1327 | 133 | Bhusa, wet, damp or contaminated with oil |
| 1327 | 133 | Hay, wet, damp or contaminated with oil |
| 1327 | 133 | Straw, wet, damp or contaminated with oil |
| 1328 | 133 | Hexamethylenetetramine |
| 1328 | 133 | Hexamine |
| 1331 | 133 | Manganese resinate |
| 1331 | 133 | Matches, "strike anywhere" |
| 1332 | 133 | Metaldehyde |
| 1333 | 170 | Cerium, slabs, ingots or rods |
| 1334 | 133 | Naphthalene, crude |
| 1334 | 133 | Naphthalene, refined |
| 1336 | 113 | Nitroguanidine (Picrite), wetted with not less than 20% water |
| 1336 | 113 | Nitroguanidine, wetted with not less than 20% water |
| 1336 | 113 | Picrite, wetted |
| 1337 | 113 | Nitrostarch, wetted with not less than 20% water |



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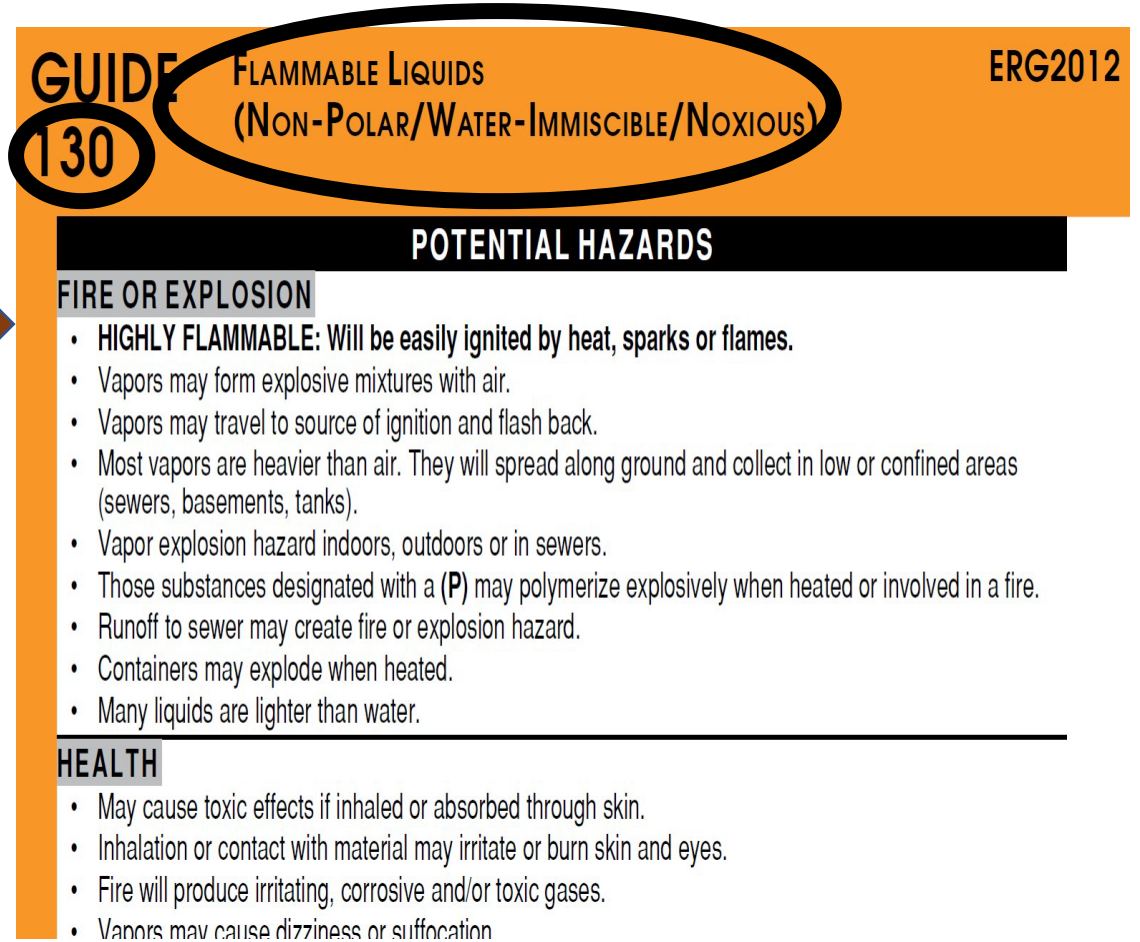
| | | |
|---|---|---|
| Xenon | **121** | 2036 |
| Xenon, compressed | **121** | 2036 |
| Xenon, refrigerated liquid (cryogenic liquid) | **120** | 2591 |
| Xylenes | **130** | 1307 |
| Xylenols | **153** | 2261 |
| Xylenols, liquid | **153** | 3430 |

| Name of Material | Guide No. | ID No. |
|---|---|---|
| Vanadyl sulphate | 151 | 2931 |
| Vehicle, flammable gas powered | 128 | 3166 |
| Vehicle, flammable liquid powered | 128 | 3166 |
| Vehicle, fuel cell, flammable gas powered | 128 | 3166 |
| Vehicle, fuel cell, flammable liquid powered | 128 | 3166 |
| Vinyl acetate, stabilized | 129P | 1301 |
| Vinyl bromide, stabilized | 116P | 1085 |
| Vinyl butyrate, stabilized | 129P | 2838 |
| Vinyl chloride, stabilized | 116P | 1086 |
| Vinyl chloroacetate | 155 | 2589 |
| Vinyl ethyl ether, stabilized | 127P | 1302 |
| Vinyl fluoride, stabilized | 116P | 1860 |
| Vinylidene chloride, stabilized | 130P | 1303 |
| Vinyl isobutyl ether, stabilized | 127P | 1304 |
| Vinyl methyl ether, stabilized | 116P | 1087 |
| Vinylpyridines, stabilized | 131P | 3073 |
| Vinyltoluenes, stabilized | 130P | 2618 |
| Vinyltrichlorosilane | 155P | 1305 |
| Vinyltrichlorosilane, stabilized | 155P | 1 |
| VX | 153 | 2 |
| Water-reactive liquid, corrosive, n.o.s. | 138 | 3 |
| Water-reactive liquid, n.o.s. | 138 | 3148 |
| Water-reactive liquid, poisonous, n.o.s. | 139 | 3130 |
| Water-reactive liquid, toxic, n.o.s. | 139 | 3130 |
| Water-reactive solid, corrosive, n.o.s. | 138 | 3131 |
| Water-reactive solid, flammable, n.o.s. | 138 | 3132 |
| Water-reactive solid, n.o.s. | 138 | 2813 |
| Water-reactive solid, oxidizing, n.o.s. | 138 | 3133 |
| Water-reactive solid, poisonous, n.o.s. | 139 | 3134 |
| Water-reactive solid, self-heating, n.o.s. | 138 | 3135 |
| Water-reactive solid, toxic, n.o.s. | 139 | 3134 |
| Wheelchair, electric, with batteries | 154 | 3171 |
| White asbestos | 171 | 2590 |
| White phosphorus, dry | 136 | 1381 |
| White phosphorus, in solution | 136 | 1381 |
| White phosphorus, molten | 136 | 2447 |
| White phosphorus, under water | 136 | 1381 |
| Wood preservatives, liquid | 129 | 1306 |
| Wool waste, wet | 133 | 1387 |
| Xanthates | 135 | 3342 |
| Xenon | 121 | 2036 |
| Xenon, compressed | 121 | 2036 |
| Xenon (cryogenic liquid) | | 2591 |
| Xylenes | 130 | 1307 |
| Xylenols | 153 | 2261 |
| Xylenols, liquid | 153 | 3430 |
| Xylenols, solid | 153 | 2261 |
| Xylidines | 153 | 1711 |
| Xylidines, solid | 153 | 1711 |
| Xylidines, solid | 153 | 3452 |
| Xylyl bromide | 152 | 1701 |
| Xylyl bromide, liquid | 152 | 1701 |
| Xylyl bromide, solid | 152 | 3417 |
| Yellow phosphorus, dry | 136 | 1381 |

# Both Lead to the Guide Page

Greatest hazard listed first

Other hazards



GUIDE 130

FLAMMABLE LIQUIDS (NON-POLAR/WATER-IMMISCIBLE/NOXIOUS)

ERG2012

**POTENTIAL HAZARDS**

**FIRE OR EXPLOSION**

- **HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.**
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a **(P)** may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.

**HEALTH**

- May cause toxic effects if inhaled or absorbed through skin.
- Inhalation or contact with material may irritate or burn skin and eyes.
- Fire will produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.

**HAZMAT FOR HEALTHCARE**
HARM / Risk Assessment Worksheet

**HAZMAT FOR HEALTHCARE**
HARM / Risk Assessment Worksheet

**Product Name:** Xylene

**UN# (4 digits)** 1307

**DOT Hazard Class:** Flammable Liquid

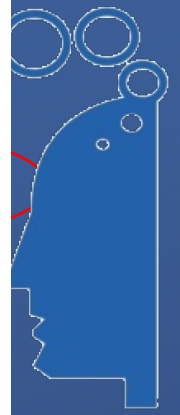
EX-FG-FL-FS-OX-PO-RA-CO-OT
1 2 3 4 5 6 7 8 9

**Physical State:** Liquid
(at 68 degrees F) Solid/Liquid/Gas

**ERG Guide #** 130

**NFPA: H___ F___ R___ S___ (0-4)**

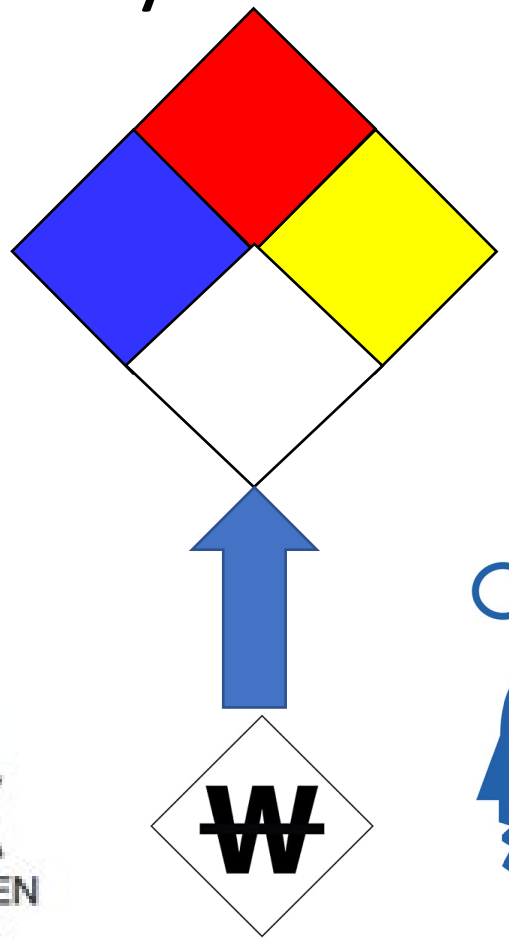
**Poison Control Information = (800) 222-1222**



# Info Sources to Aid IDHA

## National Fire Protection Association (NFPA) 704 System

- Blue = Health
- Red = Flammability
- Yellow = Instability (aka Reactivity)
- No color = special hazards
  - # in diamond  0 = No Hazard to 4 = Worst Hazard

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# XYLENE- [Material] Safety Data Sheet

- **16. Other Information**
- **NFPA Ratings: Health: 2 Flammability: 3 Instability: 0**
- **Label Hazard Warning:**
- DANGER! HARMFUL OR FATAL IF SWALLOWED. VAPOR HARMFUL. AFFECTS CENTRAL
- NERVOUS SYSTEM. CAUSES SEVERE EYE IRRITATION. CAUSES IRRITATION TO SKIN AND
- RESPIRATORY TRACT. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. CHRONIC EXPOSURE

**HAZMAT FOR HEALTHCARE**
HARM / Risk Assessment Worksheet

**HAZMAT FOR HEALTHCARE**
HARM / Risk Assessment Worksheet

**Product Name:** Xylene

**UN# (4 digits)** 1307

**DOT Hazard Class:** Flammable Liquid

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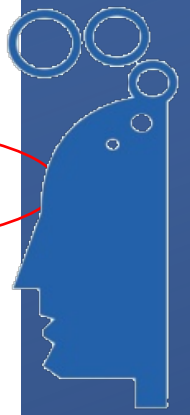
(at 68 degrees F) Solid/Liquid/Gas

**ERG Guide #** 130

**NFPA: H** 2 **F** 3 **R** 0 **S** ___ **(0-4)**

**Poison Control Information = (800) 222-1222**



Now "Instability"

From "FreSH" to "FISH"


Excerpts from “Toxicity and You?”

# Approximate Acute LD50 for various chemical compounds

***Which one is the most dangerous?***

| | |
|---|---|
| Ethyl Alcohol | 10000 |
| Sodium Chloride | 4000 |
| Morphine Sulfate | 900 |
| Phenobarbital Sodium | 150 |
| DDT | 100 |
| Nicotine | 50 |
| Vitamin D | 10 |
| Strychnine | 2 |
| Dioxin (TCDD) | 0.001 |
| Botulinus Toxin | 0.00001 |


Key Point: The lower the LD50 (and other exposure limits) the greater the hazard!

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# Threshold Limit Value (TLV)

- Upper limit of exposure
  - average person/average health
  - day to day basis
  - no adverse effects
- Recommended standard only
- Expressed in
  - mg/m3 - solids
  - PPM - gases/vapors
  - micrograms/m3 - fumes/mists

# Short Term Exposure Limit and TLV-C

**STEL**

- Generally, exposure level up to 15 minutes during work period

**TLV-C**

- Not to be exceeded
- Maximum permitted exposure




# TLV also shown as TLV-TWA, STEL, and TLV-C

- Threshold Limit Value-
- Time Weighted Average
  - through one work week (8 hours/day)
- Short Term Exposure Limit
  - Excursion (15 minutes)
- Ceiling
  - maximum limit allowed above TLV-TWA

| GAS | TLV- TWA (PPM) | STEL (PPM) | IDLH (PPM) |
|---|---|---|---|
| Hydrogen Sulphide ($H_2S$) | 10 | 15 | 100 |
| Sulphur Dioxide ($SO_2$) | 2 | 5 | 100 |
| Ammonia ($NH_3$) | 25 | 35 | 300 |
| Chlorine ($Cl_2$) | 0.5 | 1 | 10 |
| Carbon Monoxide (CO) | 25 | 50 | 1200 |
| Acetylene ($C_2H_2$) | | | |

Remember: The lower the exposure value/limit- the greater the hazard

# Permissible Exposure Limit

| Compound | PEL[2] (ppm) |
|---|---|
| Benzene | 1.0 |
| Carbon monoxide | 50 |
| Carbon tetrachloride | 10 |
| Chloroform | 50 |
| Nitrogen dioxide | 5 |
| Ozone | 0.1 |
| Sulfur dioxide | 5 |
| Tetrachloroethylene | 100 |
| Toluene | 200 |
| 1,1,1-Trichloroethane | 350 |
| Trichloroethylene | 100 |

[1]These exposure limits can be found at http://www.osha.gov, 1910.1000, Tables Z-1 and Z-2. The OSHA standards are updated frequently and readers are referred to the website for the most current information.

[2]PELs are 8-hour TWA (time weighted average) values for a normal 8-hour workday to which workers may be repeatedly exposed without adverse effects.

Maximum permitted eight-hour time-weighted average concentration airborne contaminant

- Equivalent definition to TLV-TWA
- PEL is a legal limit
- Enforced by OSHA

Remember: The Permissible Exposure Limit is the one that is enforceable

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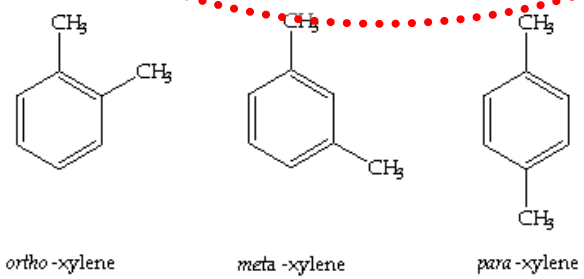
# Back to Xylene…

NIOSH Pocket Guide to Chemical Hazards

| m-Xylene | | |
|---|---|---|
| **Synonyms & Trade Names**<br>1,3-Dimethylbenzene; meta-Xylene; m-Xylol | | |
| **CAS No.**<br>108-38-3 | **RTECS No.**<br>ZE2275000 | **DOT ID & Guide**<br>1307 130 |
| **Formula**<br>$C_6H_4(CH_3)_2$ | **Conversion**<br>1 ppm = 4.34 mg/m³ | **IDLH**<br>900 ppm<br>See: 95476 |
| **Exposure Limits**<br>**NIOSH REL**<br>: TWA 100 ppm (435 mg/m³) ST 150 ppm (655 mg/m³)<br>**OSHA PEL**<br>†: TWA 100 ppm (435 mg/m³) | | **Measurement Methods**<br>**NIOSH** 1501 , 3800 ;<br>**OSHA** 1002<br>See: NMAM or OSHA Methods |
| **Physical Description**<br>Colorless liquid with an aromatic odor. | | |




*ortho* -xylene *meta* -xylene *para* -xylene

Introduce “Isomers”

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# [Material] Safety Data Sheet 1 of 2

**8. Exposure Controls/Personal Protection**

**Airborne Exposure Limits:**

-OSHA Permissible Exposure Limit (PEL):

100 ppm (TWA) xylene

100 ppm (TWA) ethylbenzene

-ACGIH Threshold Limit Value (TLV):

xylene: 100 ppm (TWA) 150 ppm (STEL), A4 - Not classifiable as a human carcinogen.

ethyl benzene: 100 ppm (TWA) 125 ppm (STEL), A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans.

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# [Material] Safety Data Sheet 2 of 2

**8. Exposure Controls/Personal Protection**

**Airborne Exposure Limits:**

**Ventilation System:**

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area.

Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices, most recent edition, for details. Use* explosion-proof equipment.

**Personal Respirators (NIOSH Approved):**

If the exposure limit is exceeded and engineering controls are not feasible, a half-face organic vapor respirator

# ATSDR Medical Management Guidelines (MMG)

**Standards and Guidelines**

OSHA PEL (permissible exposure limit) = 100 ppm (averaged over an 8-hour work shift)
NIOSH IDLH (immediately dangerous to life or health) = 900 ppm

Exposure values are also found in the General Information section of the MMG.

## HAZMAT FOR HEALTHCARE

# HARM / Risk Assessment Worksheet

**Product Name:**_____ **UN# (4 digits)**_____

**DOT Hazard Class:**_____

**EX-FG-FL-FS-OX-PO-RA-CO-OT**
1 2 3 4 5 6 7 8 9

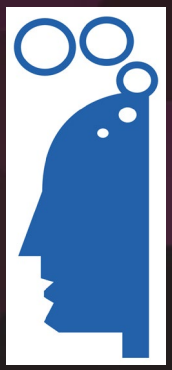
**Physical State:** _____
**(at 68 degrees F)** **Solid/Liquid/Gas**

**ERG Guide #**_____ **NFPA: H___ F___ R___ S___ (0-4)**

**Poison Control Information = (800) 222-1222**

| Hazard | Physical Description | Hazard Summary |
|---|---|---|
| **Toxicity**<br>Lower #'s and/or Narrow Range = higher hazard | **ppm or mg/m³** 100 (**TWA** 8 Hrs) 150 (**STEL** Short) **C** Ceiling — 900 (**IDLH** Danger) | Toxicity?<br>**Little, Somewhat, Very** |
| **Flammability**<br>Lower # = higher hazard<br>**Wider Range = higher hazard** | **LEL / UEL:** **0%** **50%** **100%** | Flammable? |

# Physical Properties



XYLENE

| | | | | | |
|---|---|---|---|---|---|
| **NIOSH REL**<br>: TWA 100 ppm (435 mg/m³) ST 150 ppm (655 mg/m³)<br>**OSHA PEL**<br>†: TWA 100 ppm (435 mg/m³) | | | | **NIOSH** 1501 , 3800 ;<br>**OSHA** 1002<br>See: NMAM or OSHA Methods | |
| **Physical Description**<br>Colorless liquid with an aromatic odor. | | | | | |
| **MW:**<br>106.2 | **BP:**<br>282°F | **FRZ:**<br>-54°F | **Sol:**<br>Slight | **VP:**<br>9 mmHg | **IP:**<br>8.56 eV |
| **Sp.Gr:**<br>0.86 | **Fl.P:**<br>82°F | **UEL:**<br>7.0% | **LEL:**<br>1.1% | | |
| Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F. | | | | | |
| **Incompatibilities & Reactivities**<br>Strong oxidizers, strong acids | | | | | |
| **Exposure Routes**<br>inhalation, skin absorption, ingestion, skin and/or eye contact | | | | | |

# NIOSH Pocket Guide to Chemical Hazards

# ATSDR Medical Management Guidelines

## Physical Properties

XYLENE

Description: Clear, colorless liquid
Warning properties: Adequate; sweet, aromatic odor at 1 ppm
Molecular weight: 106.2 daltons
Boiling point (760 mm Hg)*: 292ºF (144ºC), 269ºF (139ºC), and 281ºF (138ºC)
Freezing point*: -13ºF (-25ºC), -54ºF (-48ºC), and 56ºF (13ºC)
Specific gravity*: 0.88, 0.86, and 0.86 (water = 1)
Vapor pressure*: 5, 6, and 6.5 mm Hg at 68ºF (20ºC)
Gas density: 3.8 (air = 1)
Water solubility: insoluble
Flammability*: 63ºF (17ºC), 81ºF (27ºC), 81ºF (27ºC)
Flammable range: 1.0% to 7.0% (concentration in air)
*ortho-, meta-, and para-xylene, respectively.

## 9. Physical and Chemical Properties

The following physical data is for xylene.

**Appearance:**

Clear, colorless liquid.

**Odor:**

Characteristic odor.

**Solubility:**

Insoluble in water.

**Specific Gravity:**

0.86 @ 20C/4C


**pH:**

Not applicable.

**% Volatiles by volume @ 21C (70F):**100

**Boiling Point:**

137 - 140C (279 - 284F)

**Melting Point:**

-25C (-13F)

**Vapor Density (Air=1):** 3.7

**Vapor Pressure (mm Hg):**

8 @ 20C (68F)

**Evaporation Rate (BuAc=1):** 0.7

Key Point: Importance of using multiple credible resources and significance of minor/major variations

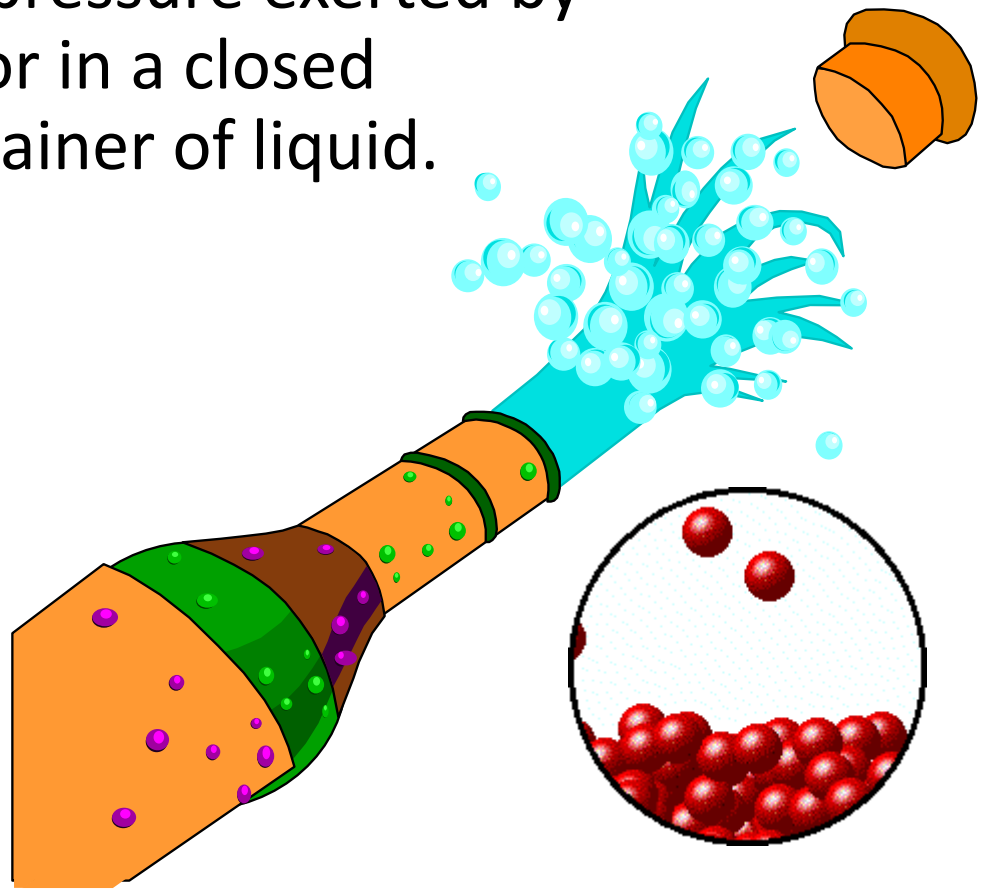
**HAZMAT FOR HEALTHCARE**

# HARM / Risk Assessment Worksheet

| Lower # = higher hazard | **I.T. =_____ A.I.T. =_____** (paper = 451° F) | |
|---|---|---|
| **Solubility** | Soluble (swims) in:<br>☒ **Water (W)** ☐ **Oil (O)** | Soluble?<br>**Not, Somewhat, Very (W)**<br>**Not, Somewhat, Very (O)** |
| **Specific Gravity** | Water = 1 (less floats, more sinks)<br>**S.G. =** .86-.88 | Liquid?<br>**Float / Sink / Neither** |
| **Vapor Density** | Air = 1 (less rises, more sinks)<br>**V.D. =** 3.7 | Vapor?<br>**Float / Sink / Neither** |
| **Vapor Pressure**<br>Higher = more vapor<br>Lower = less vapor | Water @ 17.5 mmHg (0.33 psi) = Low<br>1 PPM = 4.34 Mg/M$^3$<br>_____**mmHg** | Vapor Production?<br>**Low, Medium, High** |
| Lower B.P. = more vapor | 279-284 F<br>**B.P. =** _____ | |

# Vapor Pressure

…Is pressure exerted by vapor in a closed container of liquid.



## Converting Pressures

- 760 mm Hg = 760 torr
- 1 atm = 760 mm Hg
- 1 atm = 101.3 kPa
- 760 mm Hg = 101.3 kPa
- Converting Pressures:
  - Convert 740 torr to kPa
    - 740 torr (current pressure) x 101.3kPa (1 atm in kPa) /760 torr (atm in torr)
    - (740)(101.3kPa /760)
    - 740/760 is the fraction of 1 atm in torrs.
  - Convert 2 atm to mm Hg
    - 2 atm (760 mm Hg/1 atm)

Key Point: A product with a high vapor pressure evaporates quickly, sending the vapors up unto the air or builds pressure in a container.

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# NIOSH Pocket Guide to Chemical Hazards

## XYLENE

| | |
|---|---|
| : TWA 100 ppm (435 mg/m³) ST 150 ppm (655 mg/m³)<br>**OSHA PEL**<br>†: TWA 100 ppm (435 mg/m³) | **NIOSH** 1501 , 3800 ;<br>**OSHA** 1002<br>See: NMAM or OSHA Methods |

**Physical Description**
Colorless liquid with an aromatic odor.

| MW: | BP: | FRZ: | Sol: | VP: | IP: |
|---|---|---|---|---|---|
| 106.2 | 282°F | -54°F | Slight | 9 mmHg | 8.56 eV |
| **Sp.Gr:** | **Fl.P:** | **UEL:** | **LEL:** | | |
| 0.86 | 82°F | 7.0% | 1.1% | | |

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

**Incompatibilities & Reactivities**
Strong oxidizers, strong acids

**Exposure Routes**
inhalation, skin absorption, ingestion, skin and/or eye contact

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[M]SDS

**9. Physical and Chemical Properties**

The following physical data is for xylene.

**Appearance:**

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**Odor:**

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**Solubility:**

Insoluble in water.

**Specific Gravity:**

0.86 @ 20C/4C

pH:

Not applicable.

Not applicable.

**% Volatiles by volume @ 21C (70F):**100

**Boiling Point:**

137 - 140C (279 - 284F)

**Melting Point:**

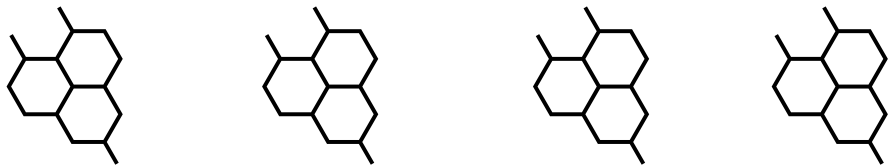
-25C (-13F)

**Vapor Density (Air=1):** 3.7

**Vapor Pressure (mm Hg):**

8 @ 20C (68F)

**Evaporation Rate (BuAc=1):** 0.7



# ATSDR Medical Management Guidelines

## Physical Properties

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Gas density: 3.8 (air = 1)
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Flammability*: 63ºF (17ºC), 81ºF (27ºC), 81ºF (27ºC)
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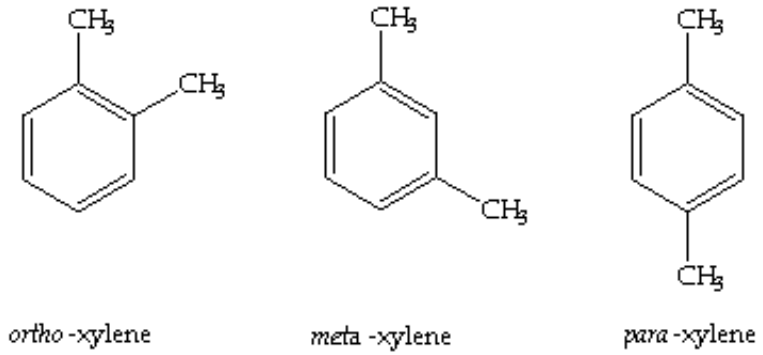
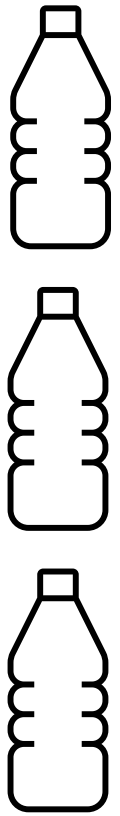
*ortho-, meta-, and para-xylene, respectively.




*ortho* -xylene *meta* -xylene *para* -xylene



—Hydrofluoric to Jesse Pinkman
—Walter White to Jesse Pinkman.

# Corrosive Material

- Corrosives are materials that can attack and chemically destroy exposed body tissues. Corrosives can also damage or even destroy metal.
- Two categories
  - Acids
  - Bases (Alkaline)
- Measured by the pH

"*Hydrofluoric acid won't eat through plastic. It will, however, dissolve metal, rock, glass, ceramic. So there's that.*"
—Walter White to Jesse Pinkman.

Interesting Point: At Iron Mountain, the acid mine drainage has a negative pH

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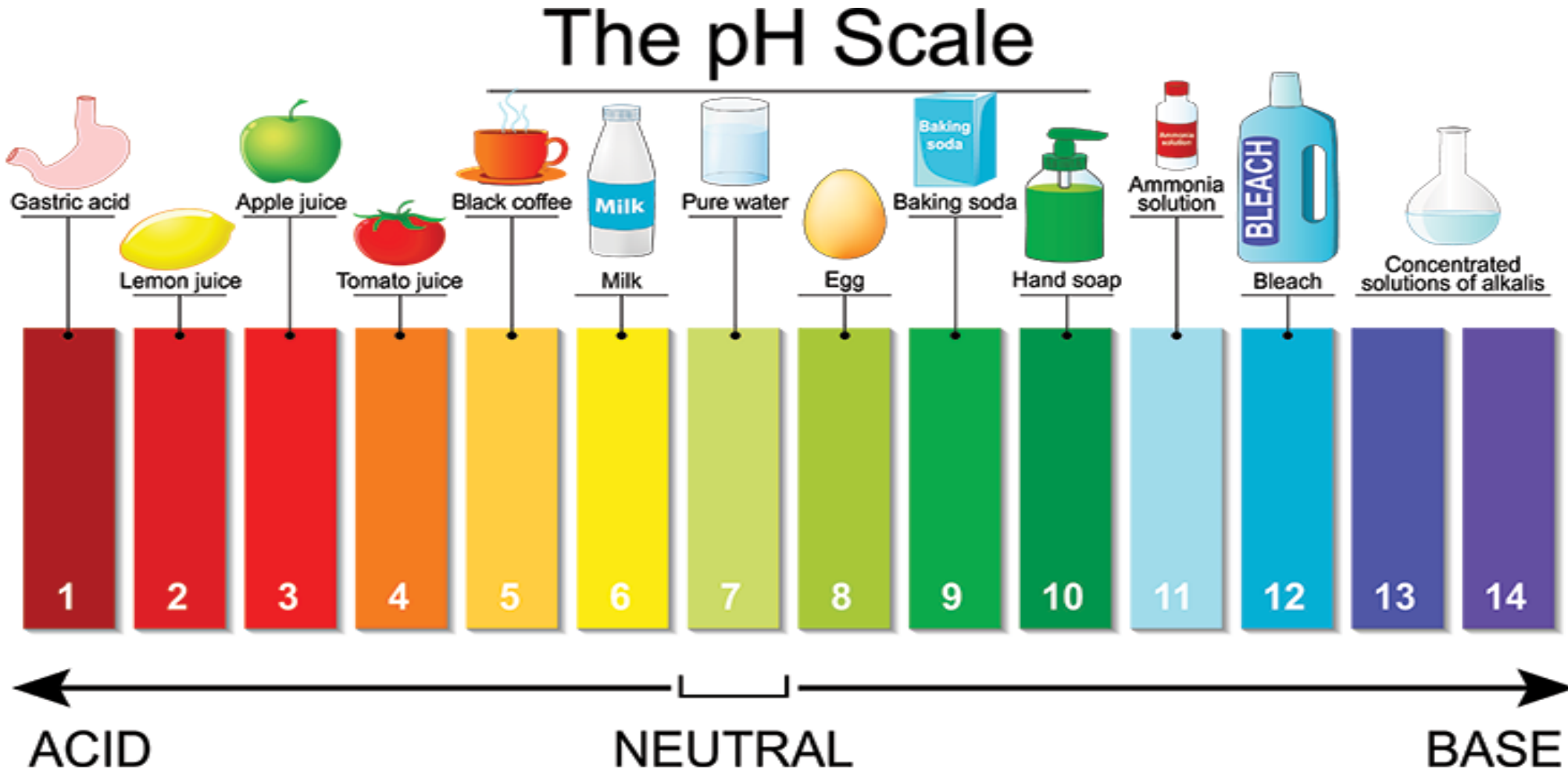
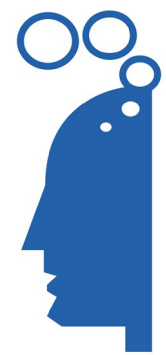



**H2SO4-36M Tons annually in US**
**NaOH 14M Tons**



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**HAZMAT FOR HEALTHCARE**

# HARM / Risk Assessment Worksheet

| | | |
|---|---|---|
| | V.D. =_____ | Float / Sink / Neither |
| **Vapor Pressure**<br>Higher = more vapor<br>Lower = less vapor<br>Lower B.P. = more vapor | Water @ 17.5 mmHg (0.33 psi) = Low<br>1 PPM = 4.34 Mg/M$^3$<br>5-9 **mmHg**<br>**B.P. =_____** | Vapor Production?<br>**Low, Medium, High** |
| **Corrosivity**<br>Closer to 0 or 14 = more corrosive | Acid 0-6 Base 8-14<br>pH Value<br>0 2 7 12 14 | Corrosive?<br>**Not, Somewhat, Very** |
| **Carcinogen** | **Yes / No** | Cancer risk to staff?<br>**Yes / No** |
| **Secondary Contamination Risk:** **Yes / No** | (Transferable from victim or scene to others?) | |
| **PPE:** Can your team handle a victim decontamination incident with provided PPE? | | |

Vapor Pressure
1 atm= 760mmHg= 760
Torr= 101.3 kPa= 14.7 psi

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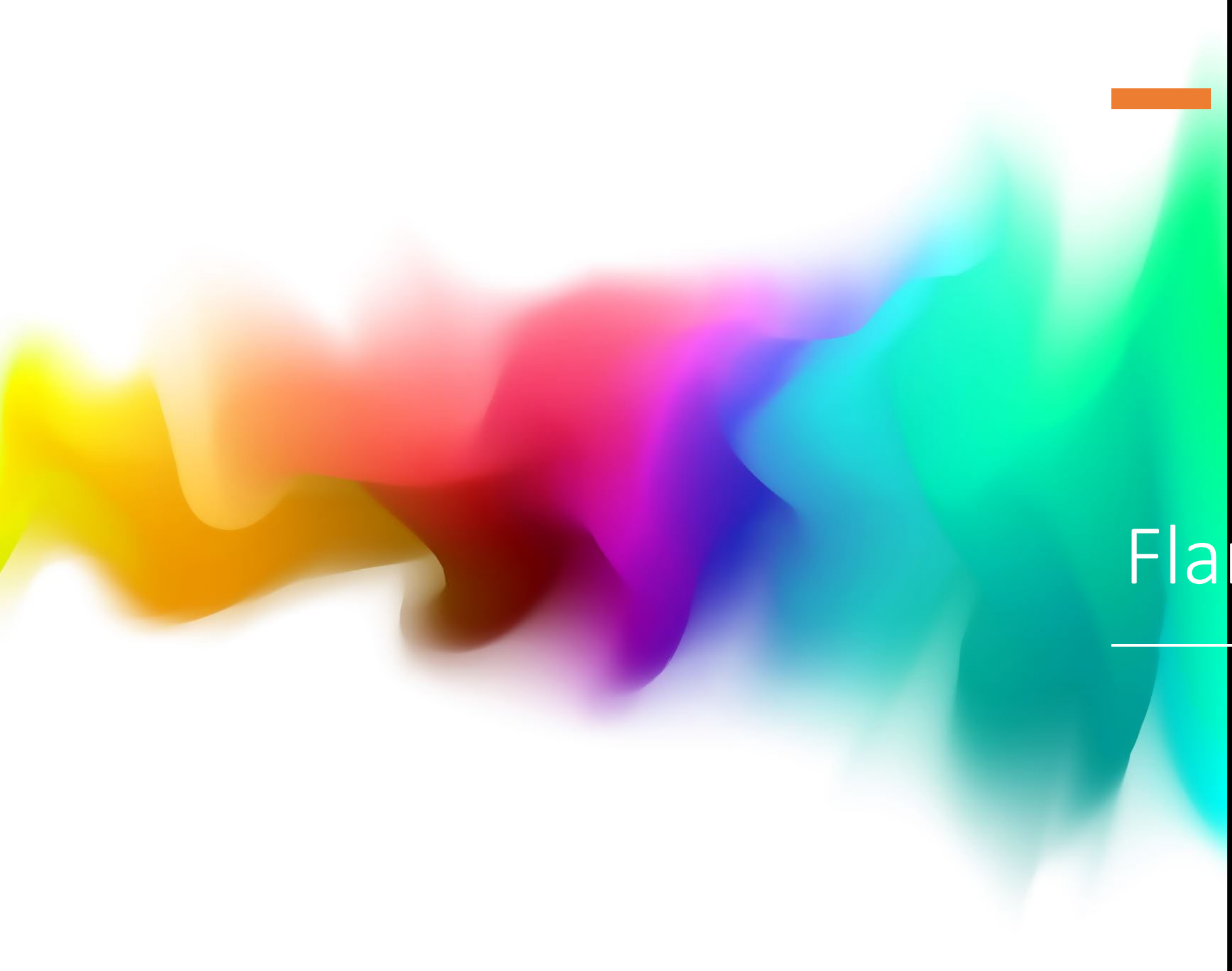
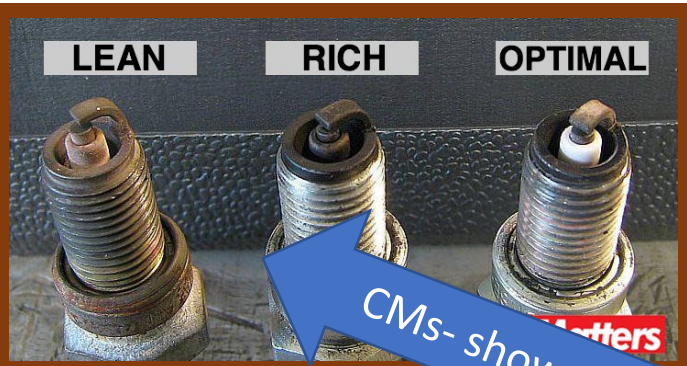


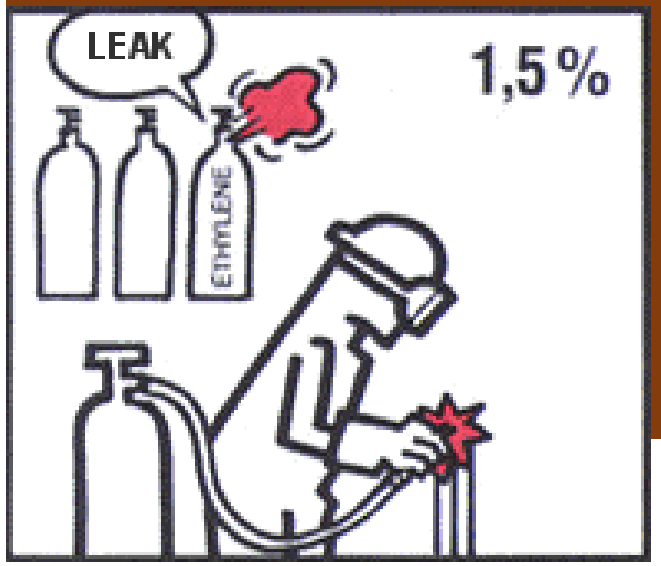
# Flammability

# IDHA - Acronyms and Terms

- LEL and UEL
  - Lower Explosive Limit/ Upper Explosive Limit
- FR and FL
  - Flammable Range/Flammable Limit




CMs- show what they know



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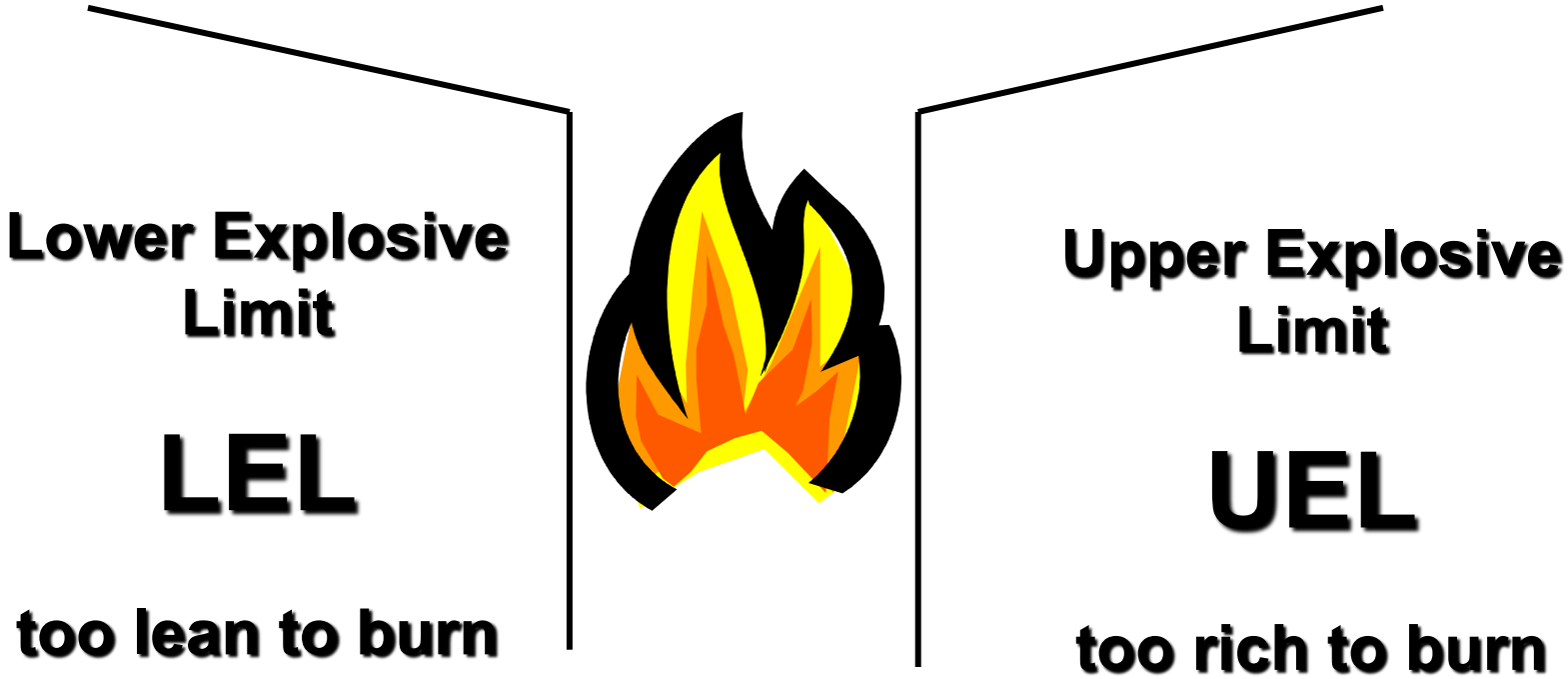
# Explosive/Flammable Range

Vapor to Air concentrations that ignite/burn

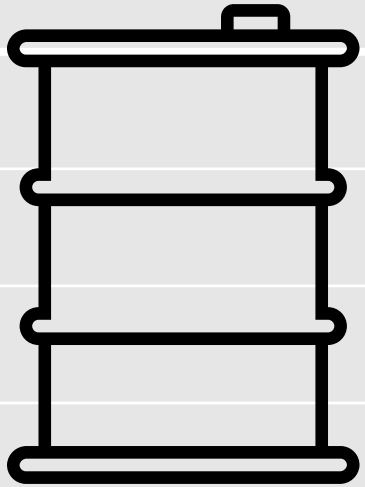



Can the atmosphere still be dangerous below the LEL or above the UEL?

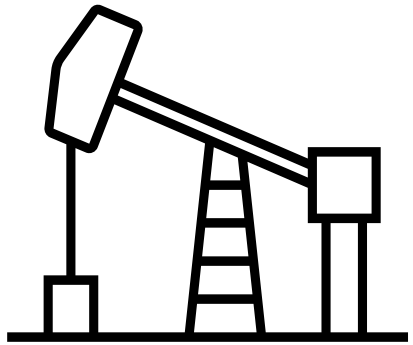
# Flammable Range

# Flammable Range

| PRODUCTS/CHEMICAL | FLAMMABLE RANGE |
|---|---|
| Gasoline | 1.4% - 7.6% |
| Anhydrous Ammonia | 15% - 28% |
| Propane | 2.1% - 9.5% |
| Acetylene | 2.5% - 100% |

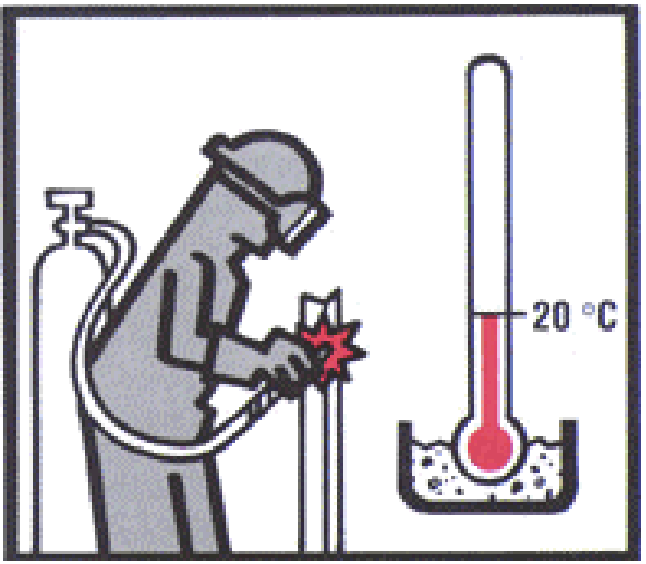


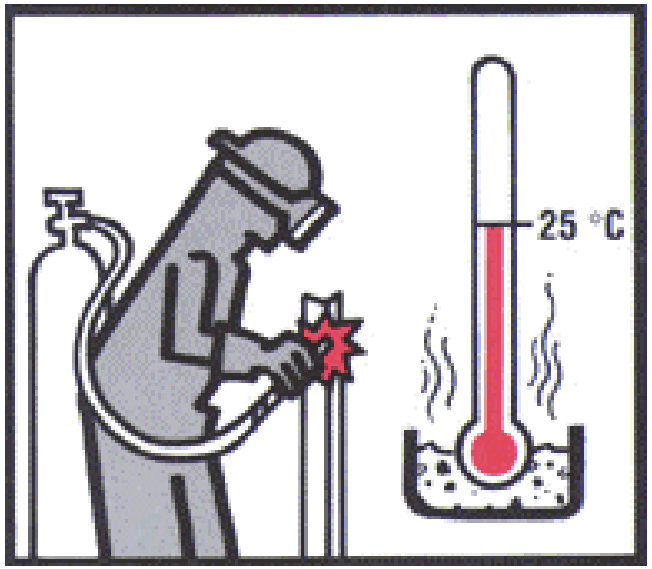
**Which product has the highest flammable range?**



Key Point: The greater the flammable range the greater the hazard

# IDHA - Acronyms and Terms





- **FP - Flash Point**
  - **The temperature at which the liquid phase gives off enough vapor to flash when exposed to an external ignition source. [Gasoline = minus 40$^{o}$ F/C]**
- IT - Ignition Temperature/Fire Point
  - The temperature at which a liquid is capable of sustained fire with an external ignition source. [Gasoline = minus 35$^{o}$ F]
- AIT – Auto-Ignition Temperature
  - The temperature at which a mixture of flammable vapor and air would ignite without a spark or flame. (It is always a higher temperature than the Ignition Temperature) [Gasoline = 536$^{o}$ F and Paper = 451$^{o}$ F]

Key Point: The term “point” often refers to temperature.

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# NIOSH Pocket Guide to Chemical Hazards

## XYLENE

| | | | | | |
|---|---|---|---|---|---|
| **NIOSH REL**<br>: TWA 100 ppm (435 mg/m³) ST 150 ppm (655 mg/m³)<br>**OSHA PEL**<br>†: TWA 100 ppm (435 mg/m³) | | | | **NIOSH** 1501 , 3800 ;<br>**OSHA** 1002<br>See: NMAM or OSHA Methods | |
| **Physical Description**<br>Colorless liquid with an aromatic odor. | | | | | |
| **MW:**<br>106.2 | **BP:**<br>283°F | **FRZ:**<br>-54°F | **Sol:**<br>Slight | **VP:**<br>9 mmHg | **IP:**<br>8.56 eV |
| **Sp.Gr:**<br>0.86 | **Fl.P:**<br>82°F | **UEL:**<br>7.0% | **LEL:**<br>1.1% | | |
| Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F. | | | | | |
| **Incompatibilities & Reactivities**<br>Strong oxidizers, strong acids | | | | | |
| **Exposure Routes** | | | | | |

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[M]SDS

**Xylene- Fire:**

Flash point: 29C (84F) CC

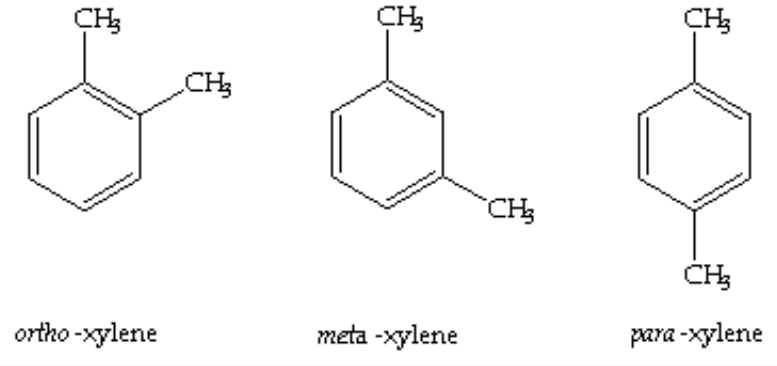
Autoignition temperature: 464C (867F)

Flammable limits in air % by volume:

lel: 1.0; uel: 7.0

Key Point: For flammable liquids, the liquid does not burn. The vapors above the liquid can burn if within the flammable range and above the flash point

# Flammability




| Flammability | | Flammable? |
|---|---|---|
| Lower # = higher hazard<br>Wider Range = higher hazard | LEL / UEL: 1-7 (0% – 50% – 100%) | |
| Lower # = higher hazard | Flashpoint: 63-84 (0° F – 100° F – 200° F) | Non, Somewhat, Very |
| Lower # = higher hazard | I.T. = _____ A.I.T. = _____ (paper = 451° F) | |

Flammability*: 63ºF (17ºC), 81ºF (27ºC), 81ºF (27ºC)
Flammable range: 1.0% to 7.0% (concentration in air)
*ortho-, meta-, and para-xylene, respectively.

From ATSDR MMG

# Filled out HARM Worksheet

**HAZ MAT FOR HEALTHCARE**
HARM / Risk Assessment Worksheet

**Product Name:** XYLENE **UN# (4 digits)** 1307

**DOT Hazard Class Category:** 3 (flammable liquid) (1 to 9) **Physical State:** liquid (at 68 degrees F) Solid/Liquid/Gas

**ERG Guide #** 130 **NFPA:** H 2 F 3 R 0 S ___ (0-4)

| Hazard | Physical Description | Hazard Summary |
|---|---|---|
| **Toxicity**<br>Lower #'s and/or Narrow Range = higher hazard | ppm or mg/cm³ — ~~100~~ TWA 8 Hrs; STEL Short; ~~150~~ C Ceiling; ~~900~~ IDLH Danger | Toxicity?<br>Little, Somewhat, Very |
| **Corrosivity**<br>Closer to 1 or 14 = corrosive | Acid 1-6 Base 8-14<br>pH _n/a___ | Corrosive?<br>Not, Somewhat, Very |
| **Flammability**<br>Lower #'s and/or Wider Range = higher hazard<br>Lower # = higher hazard | LEL / UEL: ~~1%~~ ~~7%~~ 0% 50% 100%<br>Flashpoint: 0°F 63 ~~90~~ 100 °F 200 °F<br>I.T.: 867 | Flammable?<br>Non, Somewhat, Very |
| **Vapor Density** | Air = 1 (less rises, more sinks)<br>V.D.: 3.7 | Vapor?<br>Float / Sink |
| **Specific Gravity** | Water = 1 (less floats, more sinks)<br>S.G.: 0.86 | Liquid?<br>Float / Sink |
| **Solubility** | Soluble (swims) in:<br>☐ Water (W) ☒ Oil (O) | Soluble?<br>Not Somewhat Very (W)<br>Not Somewhat Very (O) |
| **Vapor Pressure**<br>Higher = more vapor, Lower = less vapor | 1 atm = 760 torr (mmHg) = 14.7 psia<br>_____ Atm 8 mmHg<br>e.g., At 17°C $H_2O$=14.5 mmHg, Diethyl Ether = 335.6 mmHg<br>(Higher temperature= higher VP) | Vapor Production?<br>Low, Medium, High |
| **Carcinogen** | Yes / No | Cancer risk to staff?<br>Yes / No |

**Secondary Contamination Risk:** Yes / No

**PPE:** Can your team handle a decontamination incident with provided PPE?
Yes / No
Can your team handle an internal spill incident with provided PPE?
Yes / No Not sure

**Other Info of interest:** CNS depressant, narcotic effect

**What challenges are there to you handling this?** Could be flammable in some circumstances

# Result:  Clarity or Mental V-Fib?  Bringing it Together

- Small Group Activity
  - Same resources, different chemicals
    - Ammonia, Parathion, Formaldehyde/Formalin, Phenol, Mercury, Hydrogen Chloride
  - Groups are instructed as being assigned as part of the Technical Specialist and Assistant Safety Officer team
    - Contaminated victims due to arrive in 20 minutes
    - Tasked with researching the chemical and reporting to the Victim Decon Team what are the important things to know for a safe and effective response

**HAZ MAT FOR HEALTHCARE**

HARM / Risk Assessment Worksheet

**Product Name:** Formalin **UN# (4 digits)** 2209

**DOT Hazard Class Category:** 6 Poison (1 to 9) **Physical State:** Liquid (at 68 degrees F) Solid/Liquid/Gas

**ERG Guide #** 132 **NFPA:** H 2 F 2 R 0 S___ (0-4)

| Hazard | Physical Description | Hazard Summary |
|---|---|---|
| **Toxicity**<br>Lower #'s and/or Narrow Range = higher hazard | Ppm .75 2<br>or mg/cm³ TWA 8 Hrs; STEL Short; C Ceiling; IDLH Danger | Toxicity?<br>Little, Somewhat, Very |
| **Corrosivity**<br>Closer to 1 or 14 = corrosive | Acid 1-6 Base 8-14<br>pH __7___ | Corrosive?<br>Not, Somewhat, Very |
| **Flammability**<br>Lower #'s and/or Wider Range = higher hazard<br>Lower # = higher hazard | LEL / UEL: 7 — O% 50% 100%<br>Flashpoint: 185 — 0°F 100 °F 200 °F<br>I.T.:_____ | Flammable?<br>Non, Somewhat, Very<br>(High flash point) |
| **Vapor Density** | Air = 1 (less rises, more sinks)<br>V.D.:__1.09_____ (see below) | Vapor?<br>Float / Sink |
| **Specific Gravity** | Water = 1 (less floats, more sinks)<br>S.G.:_~1_____ (see below) | Liquid?<br>Float / Sink |
| **Solubility** | Soluble (swims) in:<br>x☐ Water (W) ☐ Oil (O) | Soluble?<br>Not Somewhat Very (W)<br>Not Somewhat Very (O) |
| **Vapor Pressure**<br>Higher = more vapor, Lower = less vapor | 1 atm = 760 torr (mmHg) = 14.7 psia<br>_____ Atm _~14.5_mmHg<br>e.g., At 17°C $H_2O$=14.5 mmHg, Diethyl Ether = 335.6 mmHg<br>(Higher temperature= higher VP) | Vapor Production?<br>Low, Medium, High |
| **Carcinogen** | Yes / No | Cancer risk to staff?<br>Yes / No |

**Secondary Contamination Risk:** Yes / No

**PPE:** Can your team handle a decontamination incident with provided PPE?
Yes / No
Can your team handle an internal spill incident with provided PPE?
Yes / No

**Other Info of interest: Irritant CARCINOGEN 3-4% formaldehyde, 1-1.5 methyl alcohol, water; evaporates like water, vapors mix easily in air, liquid mix easily in water**

**What challenges are there to you handling this? Spills over a small amount (100 ml) with vapor generation require emergency response w/respiratory protection.**



**HAZ MAT FOR HEALTHCARE**

HARM / Risk Assessment Worksheet

**Product Name:** Phenol (Carbolic Acid) **UN# (4 digits)** 2821

**DOT Hazard Class Category:** 6 Poison (1 to 9) **Physical State:** liquid (at 68 degrees F) Solid/Liquid/Gas

**ERG Guide #** 153 **NFPA:** H 4 F 2 R 0 S____ (0-4)

| Hazard | Physical Description | Hazard Summary |
|---|---|---|
| **Toxicity**<br>Lower #'s and/or Narrow Range = higher hazard | ppm 5 15.6 250<br>or mg/cm³ TWA 8 Hrs; STEL Short; C Ceiling; IDLH Danger | Toxicity?<br>Little, Somewhat, Very |
| **Corrosivity**<br>Closer to 1 or 14 = corrosive | Acid 1-6 Base 8-14<br>pH _____ | Corrosive?<br>Not, Somewhat, Very |
| **Flammability**<br>Lower #'s and/or Wider Range = higher hazard<br>Lower # = higher hazard | LEL / UEL: O% 1.75-8.6 50% 100%<br>Flashpoint: 0°F 100 °F 175 200 °F<br>I.T.:__715C_____ | Flammable?<br>Non, Somewhat, Very |
| **Vapor Density** | Air = 1 (less rises, more sinks)<br>V.D.:_3.24_____ | Vapor?<br>Float / Sink |
| **Specific Gravity** | Water = 1 (less floats, more sinks)<br>S.G.:__1.06_____ | Liquid?<br>Float / Sink |
| **Solubility** | Soluble (swims) in:<br>☐ Water (W) x☐ Oil (O) | Soluble?<br>Not Somewhat Very (W)<br>Not Somewhat Very (O) |
| **Vapor Pressure**<br>Higher = more vapor, Lower = less vapor | 1 atm = 760 torr (mmHg) = 14.7 psia<br>_____ Atm __.36__mmHg<br>e.g., At 17°C $H_2O$=14.5 mmHg, Diethyl Ether = 335.6 mmHg<br>(Higher temperature= higher VP) | Vapor Production?<br>Low, Medium, High |
| **Carcinogen** | Yes / No | Cancer risk to staff?<br>Yes / No |

**Secondary Contamination Risk:** Yes / No

**PPE:** Can your team handle a decontamination incident with provided PPE?
Yes / No
Can your team handle an internal spill incident with provided PPE?
Yes / No

**Other Info of interest: Irritant, poison, especially skin absorption**

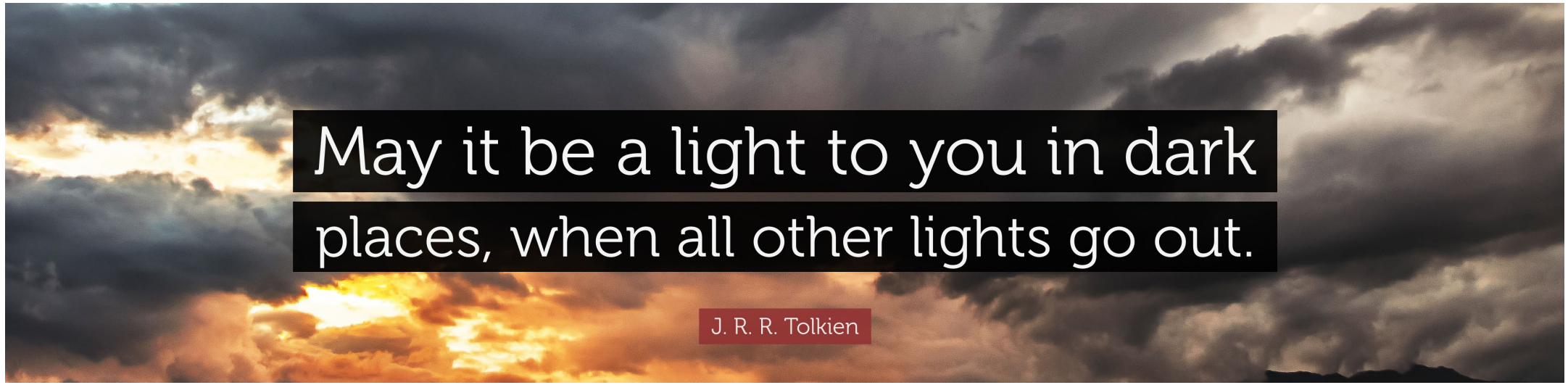
**What challenges are there to you handling this?** _____

© HAZ MAT FOR HEALTHCARE
HARM-Risk Assessment Worksheet

# Groups Report Out

- Instructor provides further information on chemical and compares and contrasts hazards and risks, e.g.,
  - Which is the most toxic?
  - Which is the most flammable?
  - Why do some have no pH?
  - Which is less flammable on a cool morning than a hot afternoon?
  - If I have a monitoring device, which vapors would be found on the ground or by the ceiling?
  - If I'm taking a drum sample which would be found on the bottom or top of the drum?
  - What about discrepancies between resources?

# Light goes on (hopefully)!



Back to the Small Group Activity…

Determine what is important to convey

Report back

- Sulfuric Acid
- Propylene
- Sodium Hydroxide
- Sodium Carbonate
- Ammonia
- Benzene
- Ethylene Oxide
- Formaldehyde
- Methanol

**WHY THESE CHEMICALS?**

# Groups Report Out

- Instructor provides further information on chemical and compares and contrasts hazards and risks, e.g.,
  - Which is the most toxic?
  - Which is the most flammable?
  - Why do some have no pH?
  - Which is less flammable on a cool morning than a hot afternoon?
  - If I have a monitoring device, which vapors would be found on the ground or by the ceiling?
  - If I'm taking a drum sample which would be found on the bottom or top of the drum?
  - What about discrepancies between resources?

HARM / Risk Assessment Worksheet

**Product Name:**_____ **UN# (4 digits)**_____

**DOT Hazard Class:**_____ **Physical State:** _____
EX-FG-FL-FS-OX-PO-RA-CO-OT (at 68 degrees F) Solid/Liquid/Gas
1 2 3 4 5 6 7 8 9

**ERG Guide #**_____ **NFPA: H___ F___ R___ S___ (0-4)**

**Poison Control Information = (800) 222-1222**

| Hazard | Physical Description | Hazard Summary |
|---|---|---|
| **Toxicity**<br>Lower #'s and/or Narrow Range = higher hazard | ppm or mg/m³ — TWA 8 Hrs; STEL Short; C Ceiling; IDLH Danger | Toxicity?<br>**Little, Somewhat, Very** |
| **Flam… lity**<br>Lower #… Wider… ard | LEL / UEL: 0% 50% 100%<br>…point: 0° F 100° F 200° F<br>…. =_____ **A.I.T. =**_____ (paper = 451° F) | Flammable?<br>**Non, Somewhat, Very** |
| **Sp…** | Soluble (swims) in:<br>☐ **Water (W)** ☐ **Oil (O)**<br>Water = 1 (less floats, more sinks)<br>…=____ | Soluble?<br>**Not, Somewhat, Very**<br>**Not, Somewhat, Ver…**<br>Liquid?<br>**Float / Sink / Ne…** |
| | Air … sinks)<br>…= | Vapor?<br>**Float / Sink / N…** |
| **Vapor Pressure**<br>Higher = more vapor<br>Lower = less vapor<br>Lower B.P. = more vapor | _____ **mmH…**<br>**B.P. =**_____ | Vapor Produ…<br>**Low, Mediu… …gh** |
| **Corrosivity**<br>Closer to 0 or 14 = more corrosive | **pH Value** 0 2 … 8-14 … 12 14 | Corrosive?<br>**Not, Somewhat, Very** |
| **Carcinogen** | | Cancer risk to staff?<br>**Yes / No** |

**Secondary Contamination Risk:** **Yes / No** **(Transferable from victim or scene to others?)**

**PPE:**
Can your team handle a victim decontamination incident with provided PPE?
**Yes / No**
Can your team handle an internal incidental spill incident without special PPE?
**Yes / No**

**Other Info of Interest:**

**What challenges are there to you handling this?** _____

Name and Basic Info up top

To Review

Different Hazards on left

How measured in the middle

Relative Risk on right

Capabilities and limitations on bottom

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# By the End of This Presentation, Attendees will be able to:

| | |
|---|---|
| Identify | Identify the HARM worksheet and its component parts |
| Assess | Assess the application of the HARM worksheet in a training setting |
| Demonstrate | Demonstrate the use of the HARM worksheet |

Did we...

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**Thanks!**


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