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Hazardous Material Identification and Signage

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Hazard Communication Standard (HCS)

- Hazard Communication Standard that makes hazard communication standardized across industry sometimes abbreviated as HAZCOM or HCS
- Sometimes called the “workers right to know” program
- OSHA requires all employers to implement this program

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Effects of Hazardous Materials

- **Hazardous materials** are substances or chemicals that pose a health hazard, physical hazard or harm to the environment
  - Hazardous materials can pose all kinds of risks to you and your surroundings
- The **dose threshold** is the minimum amount of exposure to a hazardous material to produce a measurable effect
- **Lethal dose** is the amount of a substance that when exposed that is highly likely to cause death
- **Lethal concentration** is the amount of a substance that when inhaled that is highly likely to cause death
- **Target organ toxicity** are adverse affects that manifest in specific organs in the body

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Effects of Hazardous Materials

- **Irritants** are materials that cause irritation to the skin, eyes, nose and mouth, throat and upper respiratory tract
- **Asphyxiants** are substances that disrupt breathing so suffocation results
- **Narcotics** and **anesthetics** are substances that inhibit the central nervous system
- **Carcinogens** are substances that have been known to cause cancer or tumor cell growth
- **Mutagens** are materials or substances that cause genetic mutation that may be passed on to future generations (sometimes defined as germ cell mutagenicity)

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Flashpoint

- **Flashpoint** is the lowest temperature at which vapors of a combustible substance would ignite if exposed to heat or flame

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Environmental Concerns

- Some materials will never degrade or break down in the environment and when used need to be disposed of properly

- Some become more concentrated over time as more is introduced to the system. This is called **bioaccumulation**

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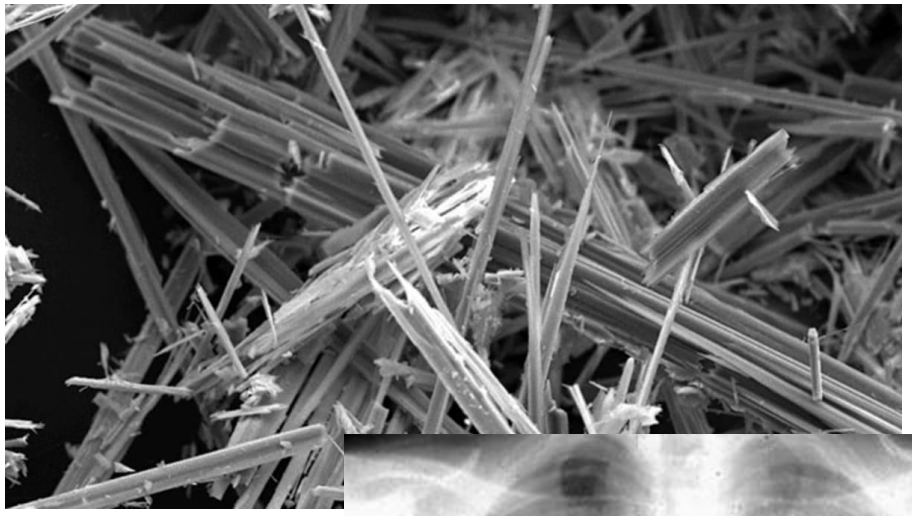
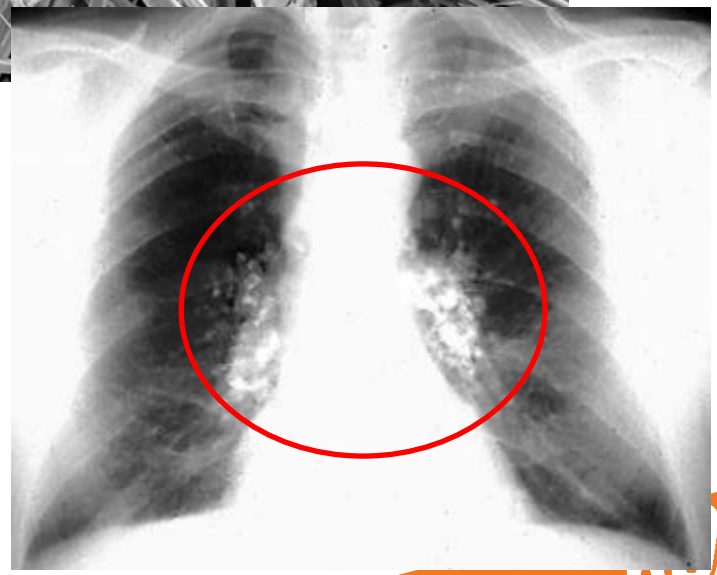
Special Considerations

Asbestos and silicon based material pose a special risk to your respiratory tract that can cause pulmonary fibrosis or cancer (mesothelioma)

IT IS IMPORTANT TO WEAR PROPER RESPIRATORS AND PPE WHEN WORKING WITH ASBESTOS OR ANYTHING CONTAINING SILICA (QUARTZ, SAND, OTHER TYPES OF ROCK)





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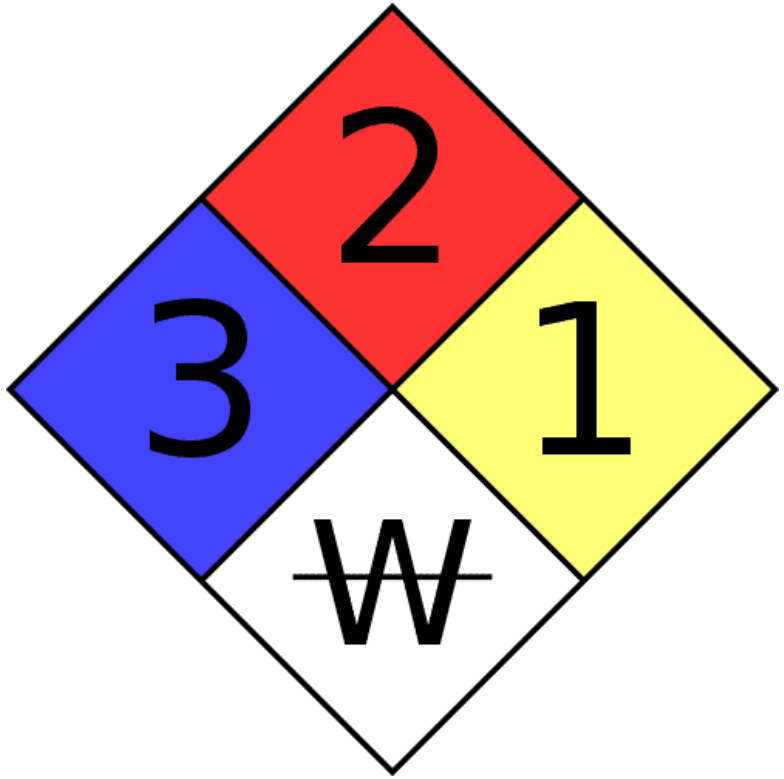
Hazard Classification

- NFPA 704 Hazard warning Labels
- Blue is for health hazards
- Red is for flammable hazards
- Yellow is for reactivity
  - explosive or instability
- White is for a special notice regarding the material



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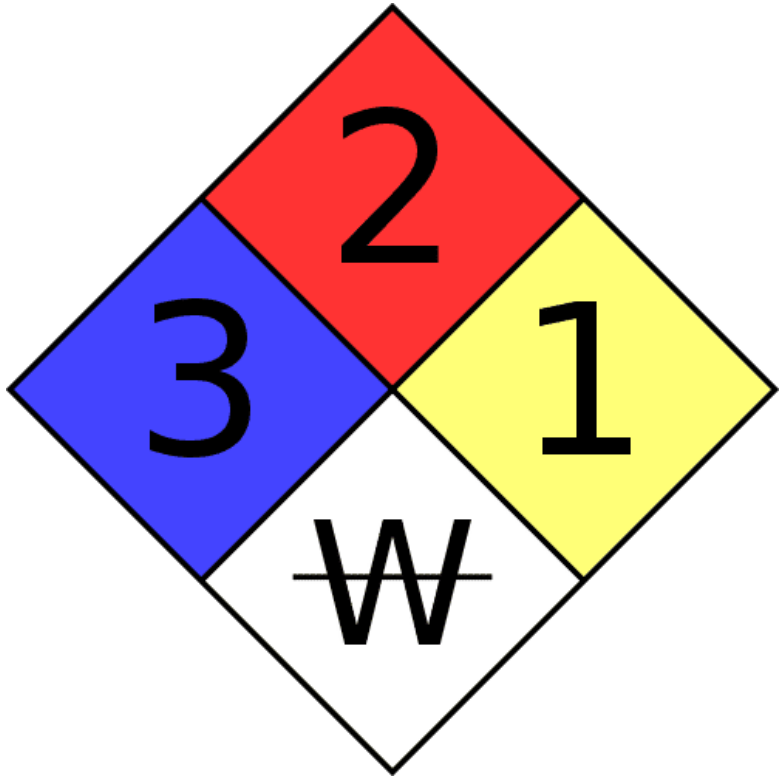
Hazard Classification

- Rankings are from 0 to 4

- 4 is the most hazardous
- 0 is normal or nominal (non hazardous)



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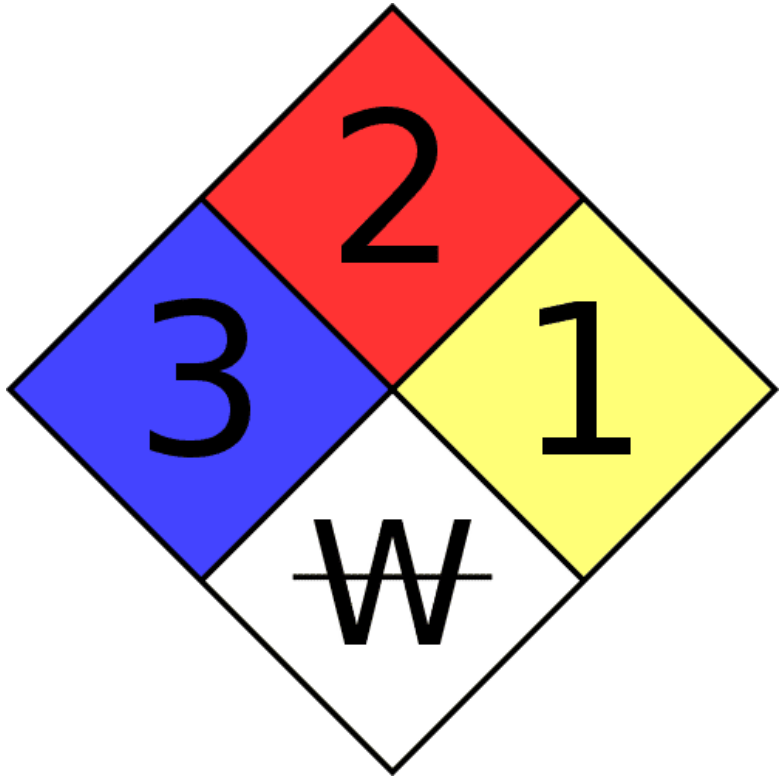
Hazard Classification

Health hazards (blue)

- 0 – Normal Material (non-hazardous)
- 1 – Lightly Hazardous
  - Irritating
- 2 – Hazardous
  - Use masks or special ventilation
- 3 – Severe Hazard
  - Use special clothing and masks
- 4 – Extreme Hazard
  - Avoid contact and breathing vapor



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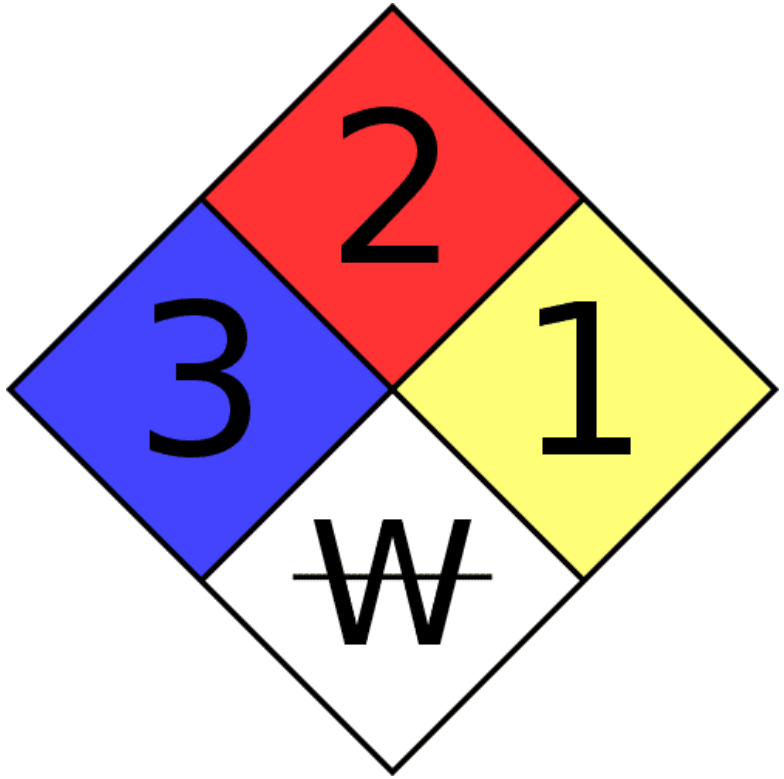
Hazard Classification

Flame Hazards (red)

- 0 – Normal Material (non-burning)
- 1 – Will burn at temps above 200 °F
- 2 – Will burn at temps above 100 °F
- 3 – Fire and Explosion Hazard at temps below 100 °F
- 4 – Extremely Dangerous Fire and Explosion Hazard below 73 °F



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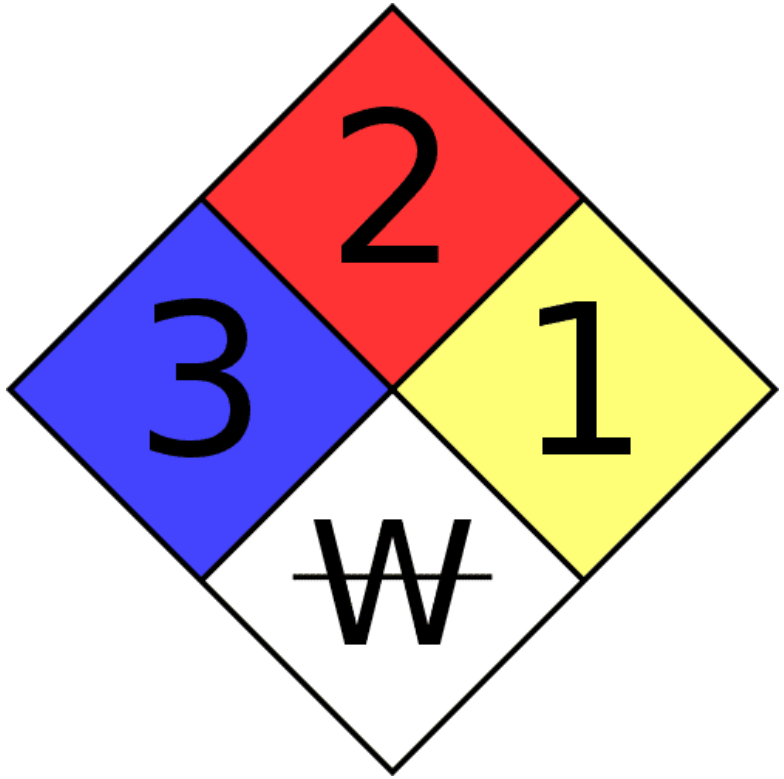
Hazard Classification

Reactivity (yellow)

- 0 – Normally Stable
- 1 – Unstable if heated
- 2 – Violent chemical change possible
- 3 – Severe explosion hazard
- 4 – Extreme hazard – vacate area in case of fire



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Hazard Classification

Special Notices (white)

OXY – oxidizing agent

ACID – Reacts violently with alkalis

ALK – Reacts violently with acids

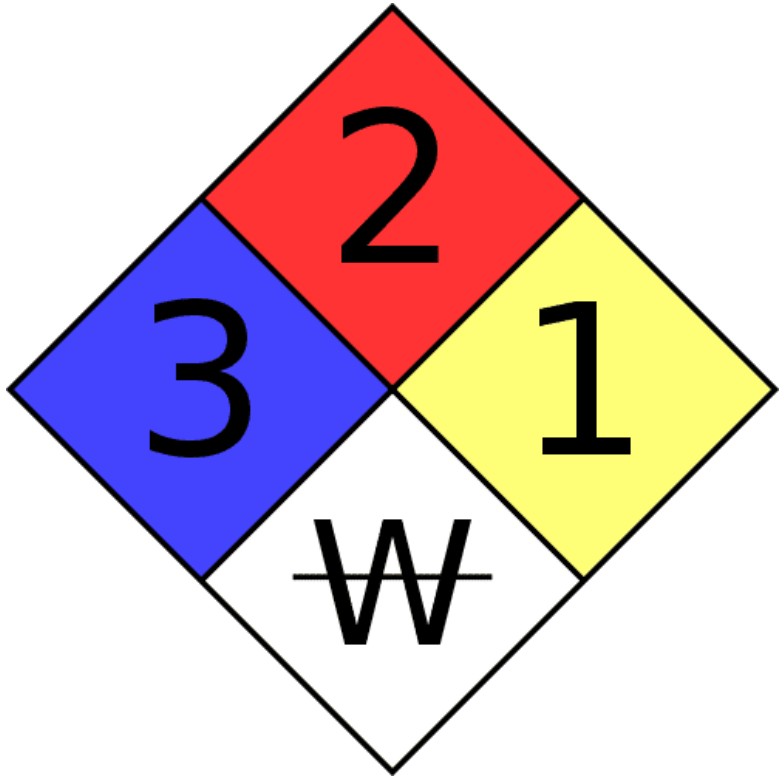
COR – Corrosive

SA – Simple Asphyxiant Gas

W – Use no water

P – Polymerizes

- Radioactive



DIESEL FUEL

DANGER

HAZARD STATEMENTS: Flammable liquid and vapor. Harmful if inhaled. Causes skin irritation. May be fatal if swallowed and enters airways. May cause drowsiness or dizziness. Suspected of causing cancer. May cause damage to thymus, blood and liver.

TARGET ORGANS: EYES. SKIN. RESPIRATORY TRACT.

PROTECTIVE EQUIPMENT FOR HANDLING MATERIALS

NO SMOKING | CHEMICAL GOGGLES | CHEMICAL GLOVES | EYE WASH | SHOWER

EMERGENCY PHONE NUMBERS

MEDICAL: _____ FIRE: _____ SPILL: _____

Sample Warning Label

Health

4 Extreme hazard—avoid contact or breathing vapor

3 Severe hazard—use special clothing and masks

2 Hazardous—use masks or special ventilation

1 Lightly hazardous—irritating

0 Normal material

Flammability

4 Extremely dangerous fire and explosion hazard—below 73° F

3 Fire and explosion hazard at normal temps—below 100° F

2 Will burn at temps above 100° F

1 Will burn at temps above 200° F

0 Will not burn

Special Notice

OXY—Oxidizing agent

ACID—Reacts violently with alkalis

ALK—Alkali—reacts violently with acids

COR—Corrosive

W—Use no water

P—Polymerizes

—Radioactive

Reactivity

4 Extreme hazard—vacate area in case of fire

3 Severe explosion hazard

2 Violent chemical change possible

1 Unstable if heated

0 Normally stable

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Knowledge Check 1

- Determine the hazards associated with propylene based on the NPFA label

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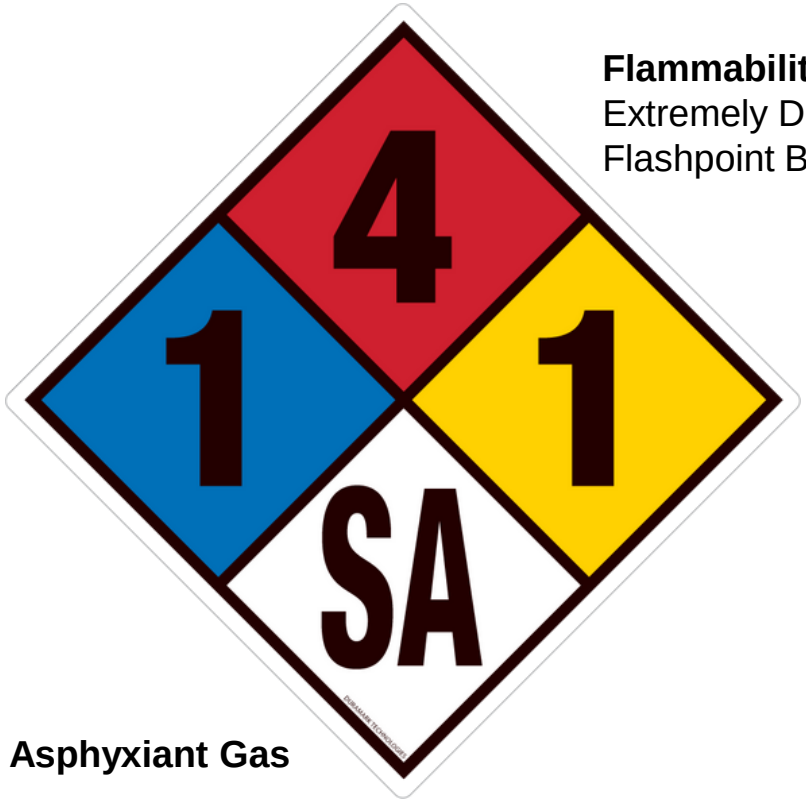
Knowledge Check 1

- Determine the hazards associated with propylene based on the NPFA label



Flammability Hazard Class 4
Extremely Dangerous Fire Hazard
Flashpoint Below 73 ° F

Health Hazard Class 1
Mildly Hazardous
Irritant

Reactivity Hazard Class 1
Unstable if Heated

Simple Asphyxiant Gas

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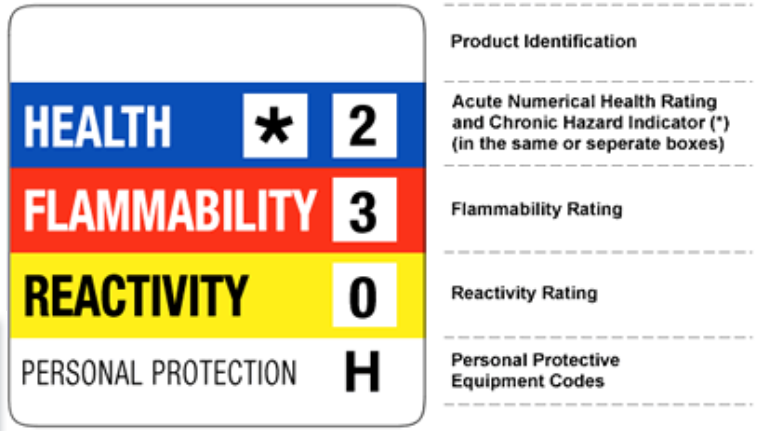
The HMIS

- The hazardous material identification system or HMIS is a way to classify the danger of a chemical substance
- It contains a pictogram, a hazard rating (similar to NFPA where 4 is a severe hazard and 0 is no hazard) and a color
- Health is blue
- Flammability is red
- Reactivity is yellow/ Physical Hazard is Orange
- Personal protection is white



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HMIS Personal Protection Index

A		Safety glasses
B		Safety glasses and gloves
C		Safety glasses, gloves, and apron
D		Face shield, eye protection, gloves, and apron
E		Safety glasses, gloves, dust respirator
F		Safety glasses, gloves, apron, and dust respirator
G		Safety glasses, gloves, vapor respirator
H		Splash goggles, gloves, apron, and vapor respirator
I		Safety glasses, gloves, dust and vapor respirator
J		Splash goggles, gloves, apron, dust and vapor respirator
K		Airline hood or mask, gloves, full suit, and boots


A - Safety glasses


N - Splash goggles


O – Face Shield & Eye Protection


P - Gloves


Q - Boots


R- Apron


S – Full Suit


T – Dust mask


U – Vapor Respirator


W – Dust & Vapor Respirator


Y- Full Face Respirator


Z – Airline Hood or Mask

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Pictograms

Each pictogram should be applied to the warning label for the material

Health Hazard  • Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity	**Flame**  • Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides	**Exclamation Mark**  • Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non-Mandatory)
Gas Cylinder  • Gases Under Pressure	**Corrosion**  • Skin Corrosion/ Burns • Eye Damage • Corrosive to Metals	**Exploding Bomb**  • Explosives • Self-Reactives • Organic Peroxides
Flame Over Circle  • Oxidizers	**Environment** (Non-Mandatory)  • Aquatic Toxicity	**Skull and Crossbones**  • Acute Toxicity (fatal or toxic)

GAS CYLINDER

CORROSION

EXPLODING BOMB

HEALTH HAZARD

FLAME

EXCLAMATION MARK

FLAME OVER CIRCLE

ENVIRONMENT

SKULL & CROSSBONES

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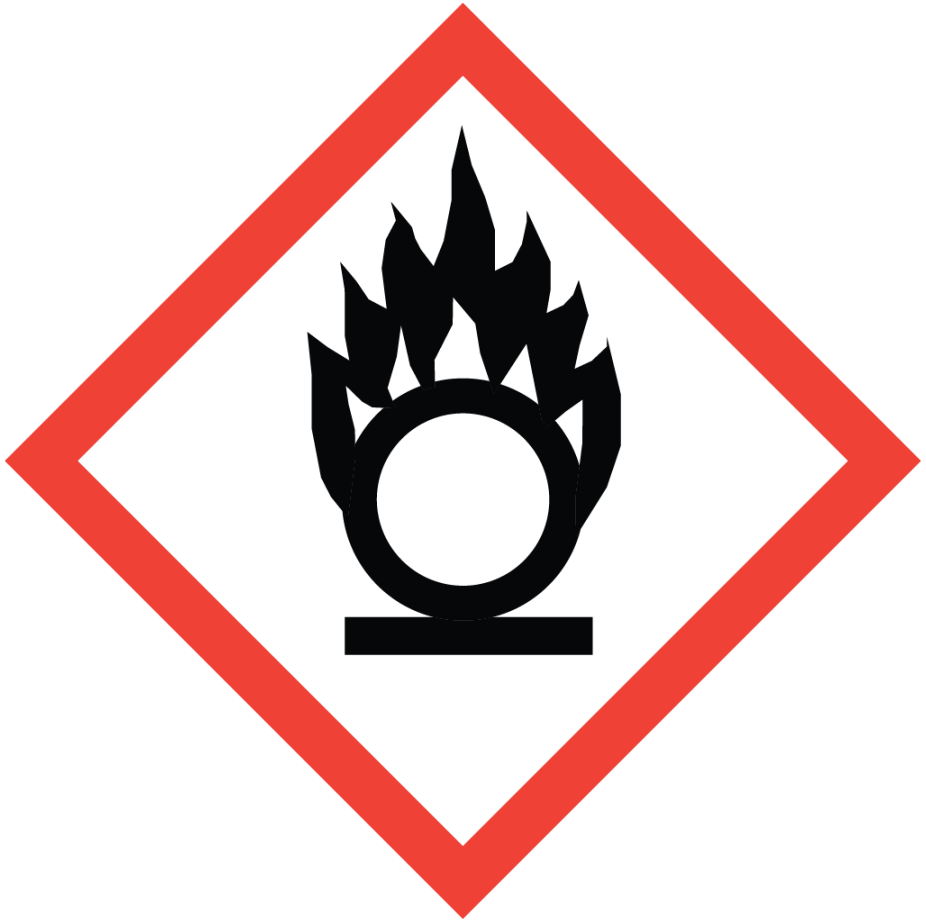
Flame Over Circle

- Oxidizers
  - Solids, liquids or gasses that react readily with most organic material or reducing agents with no energy input
  - Severe fire hazard
  - Intensifies combustion



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Flame

- Flammable materials
- Pyrophoric
- Self Heating
- Emits Flammable Gas
- Self-Reactive
- Organic Peroxides

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Exclamation Mark

- Irritant
  - Skin or eye
- Skin Sensitizer
- Acute Toxicity (harmful)
- Narcotic Effects
- Respiratory Tract Irritant
- Hazardous to Ozone
  - Non Mandatory

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Gas Cylinder

- Contents under pressure
  - Gasses or liquids

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Corrosion

- Skin/ corrosive burns
- Eye Damage
- Corrosive to metals

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Exploding Bomb

- Explosive
- Self-reactive
- Organic Peroxides

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Health Hazard

- Carcinogen
- Mutagenicity
- Reproductive Toxicity
- Respiratory Sensitizer
- Target Organ Toxicity
- Aspiration Toxicity

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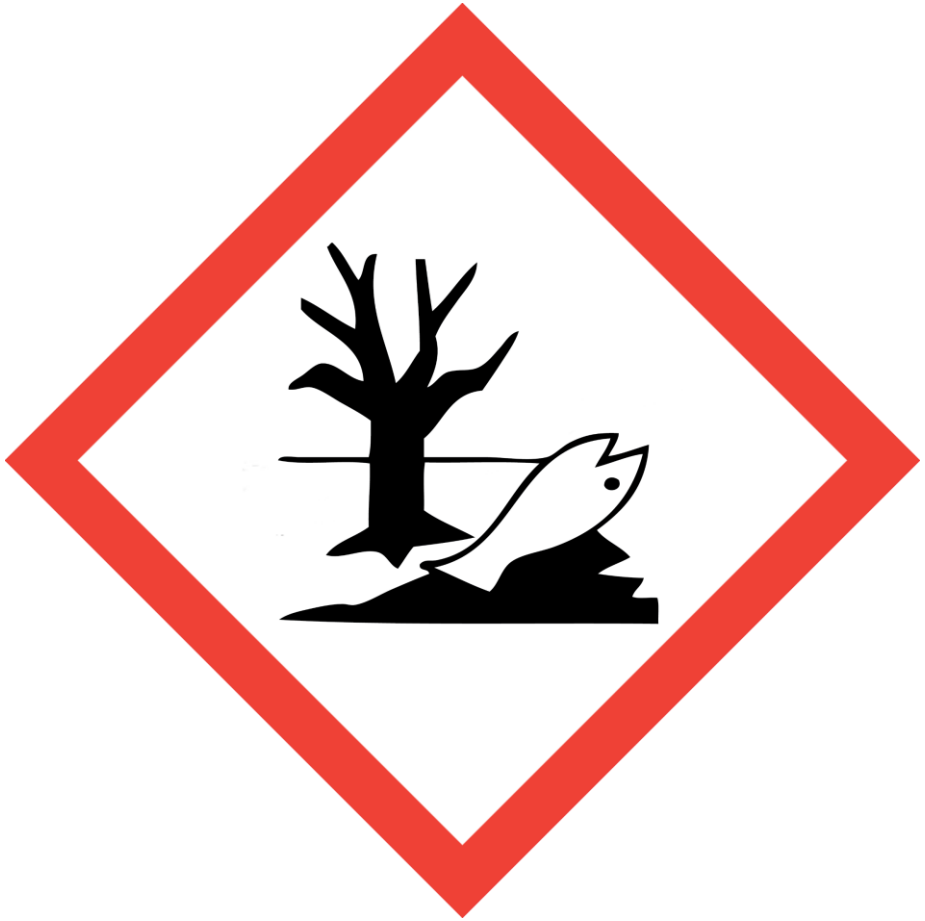
Environment (Non Mandatory)

- Aquatic Toxicity
  - The effects of the chemical or substance on organism living in water



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Skull and Crossbones

- Acute Toxicity
  - Fatal or Extremely Toxic

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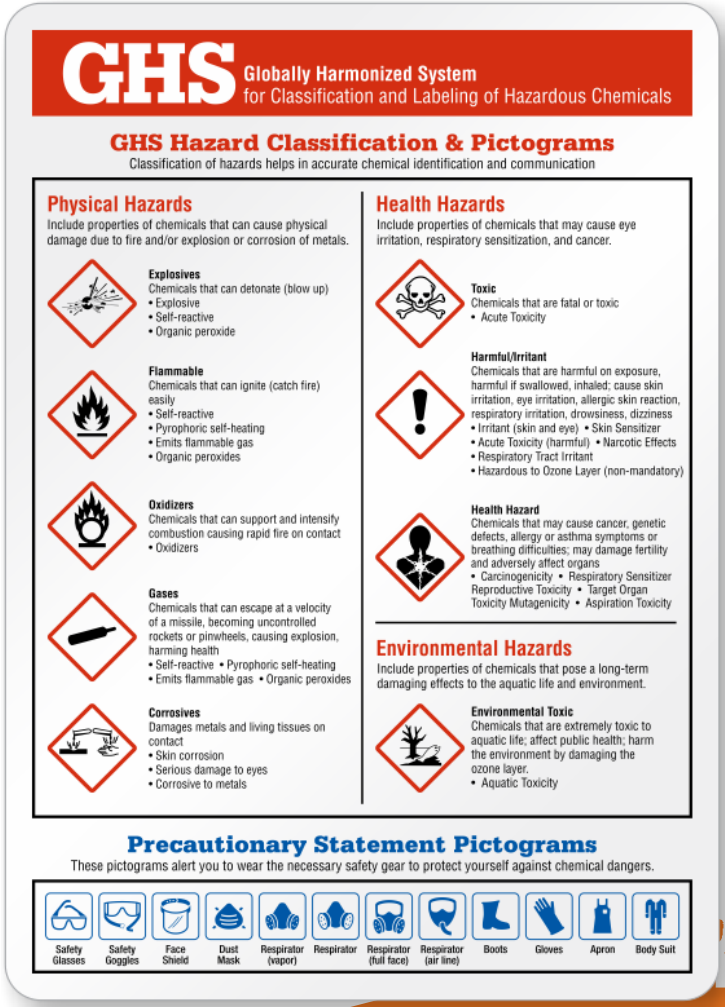
GHS (Globally Harmonized System)

- This system uses the same pictograms
- They have different “classes” and categories
- The three classes are Physical, Health and Environmental
- Then it has categories



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GHS Categories

- The hazards are given a number and a letter with 1 being the most hazardous something can be
  - Backwards from the NFPA and HMIS

- Each classification might have several categories and each have different rules to sort chemicals by category
  - Physical has 17
  - Health has 10
  - Environmental has 2

And Each are divided into subcategories

COMPARISON OF HMIS III/NFPA 704 RATING SYSTEMS & GHS HAZARD CATEGORIES	
HMIS III/NFPA 704 RATINGS	**GHS HAZARD CATEGORIES**
0 = Minimal Hazard	1 = Severe Hazard
1 = Slight Hazard	2 = Serious Hazard
2 = Moderate Hazard	3 = Moderate Hazard
3 = Serious Hazard	4 = Slight Hazard
4 = Severe Hazard	5 = Minimal Hazard

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The Physical Categories

1. Explosive
2. Flammable Gasses
3. Aerosols
4. Oxidizing Gasses
5. Gasses Under Pressure
6. Flammable Liquids
7. Flammable Solids
8. Self Reactive Substances
9. Pyrophoric Solids
10. Pyrophoric Liquids
11. Self-heating Substances and Mixtures
12. Flammable Gasses when Contact Water
13. Oxidizing Liquids
14. Oxidizing Solids
15. Organic Peroxides
16. Corrosive to Metals
17. Desensitized Explosives

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The Health Categories

1. Acute Toxicity
2. Skin Irritation/Corrosion
3. Serious Eye Damage/ Eye Irritation
4. Respiratory or Skin Sensitization
5. Germ Cell Mutagenicity
6. Carcinogenicity
7. Reproductive Toxicity
8. Target Organ Systemic Toxicity (single exposure)
9. Target Organ Systemic Toxicity (repeated exposure)
10. Aspiration Toxicity

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The Environmental Categories

1. Hazardous to Aquatic Environment
2. Hazardous to the Ozone Layer

Flammable Liquids

Category	Criteria
1	Flash point < 23 °C and initial boiling point ≤ 35 °C
2	Flash point < 23 °C and initial boiling point > 35 °C
3	Flash point ≥ 23 °C and ≤ 60 °C
4	Flash point > 60 °C and ≤ 93 °C

Source: UN GHS Purple Book

Flammable Solids

Category	Criteria
1	Burning rate test: Substances or mixtures other than metal powders: (a) wetted zone does not stop fire; and (b) burning time < 45 s or burning rate > 2.2 mm/s Metal powders: burning time ≤ 5 min
2	Burning rate test: Substances or mixtures other than metal powders: (a) wetted zone stops the fire for at least 4 min; and (b) burning time < 45 s or burning rate > 2.2 mm/s Metal powders: burning time > 5 min and ≤ 10 min

Source: UN GHS Purple Book

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Other Types of Warning Labels

- Radioactive material will most often be labeled with bright yellow background and magenta print

- Biohazard material will usually be orange (sometimes almost red) with black print

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ANSI Warning Labels

ANSI Z535 have its own standard for warning labels

Different colors for different levels

- Red for Danger
- Orange for Warning
- Yellow for Caution
- Blue for Notice

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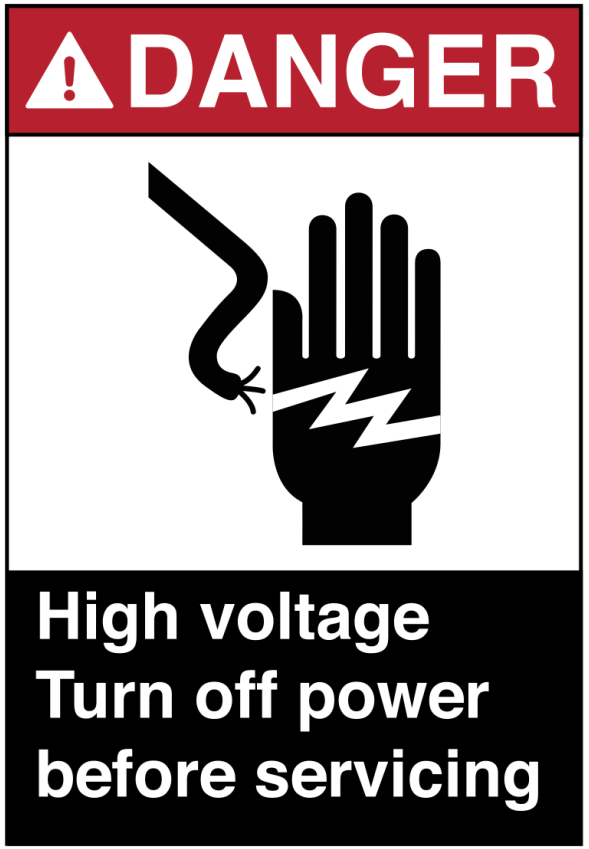
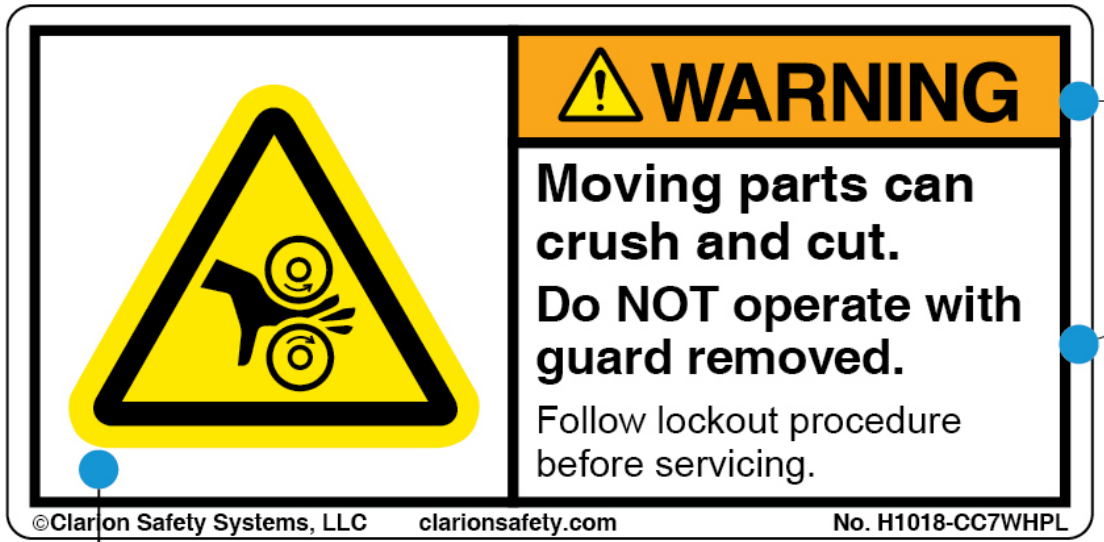
ANSI Warning Labels

- These warning labels also include physical hazard awareness, not just chemical
- Are more specific than the basic OSHA's pictograms
- Both OSHA and ANSI programs are acceptable, but companies might prefer one over the other





The signal word panel identifies the hazard severity level.

Full code-compliant word message identifies the hazard, the consequence of interaction with the hazard and how to avoid the hazard.

Harmonized ANSI/ISO Symbol visually identifies the hazard, the consequence of interaction with the hazard and how to avoid the hazard.


DANGER
Hazardous Waste


WARNING
Infectious Waste.
Dispose of Properly.


WARNING
Electrical hazard.

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Label Requirements

- Requires chemical manufacturers, importers, or distributors to ensure that each container of hazardous chemicals are labeled, tagged, or marked with the following information when transported

- Product Identifier
- Signal Word (danger, warning, caution)
- Hazard Statement
- Precautionary Statements
- Pictogram
- Contact information for the manufacturer

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Knowledge Check 2

- What color is the ANSI warning label for the signal word “Notice"

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Knowledge Check 2

- Blue is the color for the signal word “Notice” in the ASNI standard

Example 1: HS85 Label

HS85
Batch number: 85L6543

Warning
Harmful if swallowed

Wash hands and face thoroughly after handling. Do not eat, drink or smoke when using this product. Dispose of contents/container in accordance with local, state and federal regulations.

First aid:
If swallowed: Call a doctor if you feel unwell. Rinse mouth.

GHS Example Company, 123 Global Circle, Anyville, NY 130XX Telephone (888) 888-8888

Example 2B: OXI252 Label meeting DOT requirements for shipping[7]

OXI252
(disodiumflammy)
CAS #: 111-11-11xx

Danger
May cause fire or explosion; strong oxidizer
Causes severe skin burns and eye damage

Keep away from heat. Keep away from clothing and other combustible materials. Take any precaution to avoid mixing with combustibles. Wear protective neoprene gloves, safety goggles and face shield with chin guard. Wear fire/flame resistant clothing. Do not breathe dust or mists. Wash arms, hands and face thoroughly after handling. Store locked up. Dispose of contents and container in accordance with local, state and federal regulations.

First aid:
IF ON SKIN (or hair) or clothing: Rinse immediately contaminated clothing and skin with plenty of water before removing clothes. Wash contaminated clothing before reuse.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a doctor.
IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
Immediately call poison center.
Specific Treatment: Treat with doctor-prescribed burn cream.

Fire:
In case of fire: Use water spray. In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion.

Great Chemical Company, 55 Main Street, Anywhere, CT 064XX Telephone (888) 777-8888

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Employers Should

- Communicate information concerning hazards to employees and the appropriate protective measures
- Ensure that labels on incoming containers of hazardous chemicals are not removed or defaced
- Develop a written hazard communication program
- Provide training on the company's hazard communication program to employees

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End of Show

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