CHEMICAL HAZARD & LABELS

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Lab Safety & Operating System (PHAR 315)

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Outline

- ✓Chemical Hazard
- ✓Chemical Labels

Objectives

- Identify various types of Chemical Labels.
- Emphasize the importance of Chemical Labels in laboratory work integrity.

Chemical Hazard

- A **chemical hazard** is any substance, regardless of its form that can potentially cause physical and health hazards to people, or can result in harm to the environment.

Hazardous products are divided into two hazard groups:

- Physical Hazards
- Health Hazards

The two hazard groups are further divided into hazard classes. Each hazard class contains at least one category.

Physical Hazards

- Flammable gases, liquids, solids, and aerosols
- Oxidizing gases, liquids, and solids
- Gases under pressure
- Self-reactive substances and mixtures
- Pyrophoric gases, liquids and solids
- Self-heating substances and mixtures
- Substances and mixtures which, in contact with water, emit flammable gases
- Combustible dusts

Health Hazards

- Skin corrosion/irritation
- Serious eye damage/eye irritation
- Respiratory or skin sensitization
- Carcinogenicity
- Reproductive toxicity
- Specific target organ toxicity – single exposure
- Specific target organ toxicity –repeated exposure
- Aspiration hazard
- Biohazardous infectious materials

Physical Hazard Class

Hazard Class	General Description
Flammable gases Flammable aerosols Flammable liquids Flammable solids	These four classes cover products that have the ability to ignite (catch fire) easily and the main hazards are fire or explosion.
Oxidizing gases Oxidizing liquids Oxidizing solids	These three classes cover oxidizers, which may cause or intensify a fire or cause a fire or explosion.
Gases under pressure	This class includes compressed gases, liquefied gases, dissolved gases and refrigerated liquefied gases. Compressed gases, liquefied gases and dissolved gases are hazardous because of the high pressure inside the cylinder or container. The cylinder or container may explode if heated. Refrigerated liquefied gases are very cold and can cause severe cold (cryogenic) burns or injury.

Physical Hazard Class

Self-reactive substances and mixtures	These products may react on their own to cause a fire or explosion, or may cause a fire or explosion if heated.
Pyrophoric liquids Pyrophoric solids Pyrophoric gases	These products can catch fire very quickly (spontaneously) if exposed to air.
Self-heating substances and mixtures	These products may catch fire if exposed to air. These products differ from pyrophoric liquids or solids in that they will ignite only after a longer period of time or when in large amounts.
Substances and mixtures which, in contact with water, emit flammable gases	As the class name suggests, these products react with water to release flammable gases. In some cases, the flammable gases may ignite very quickly (spontaneously).
Combustible dust	This class is used to warn of products that are finely divided solid particles. If dispersed in air, the particles may catch fire or explode if ignited.

Health Hazard Class

Hazard Class	General Description
Skin corrosion/irritation	This class covers products that cause severe skin burns (i.e., corrosion) and products that cause skin irritation.
Serious eye damage/eye irritation	This class covers products that cause serious eye damage (i.e., corrosion) and products that eye irritation.
Respiratory or skin sensitization	A respiratory sensitizer is a product that may cause allergy or asthma symptoms or breathing difficulties if inhaled. Skin sensitizer is a product that may cause an allergic skin reaction.
Carcinogenicity	This hazard class includes products that may cause or are suspected of causing cancer.
Reproductive toxicity	This hazard class includes products that may damage or are suspected of damaging fertility or the unborn child (baby).

Health Hazard Class

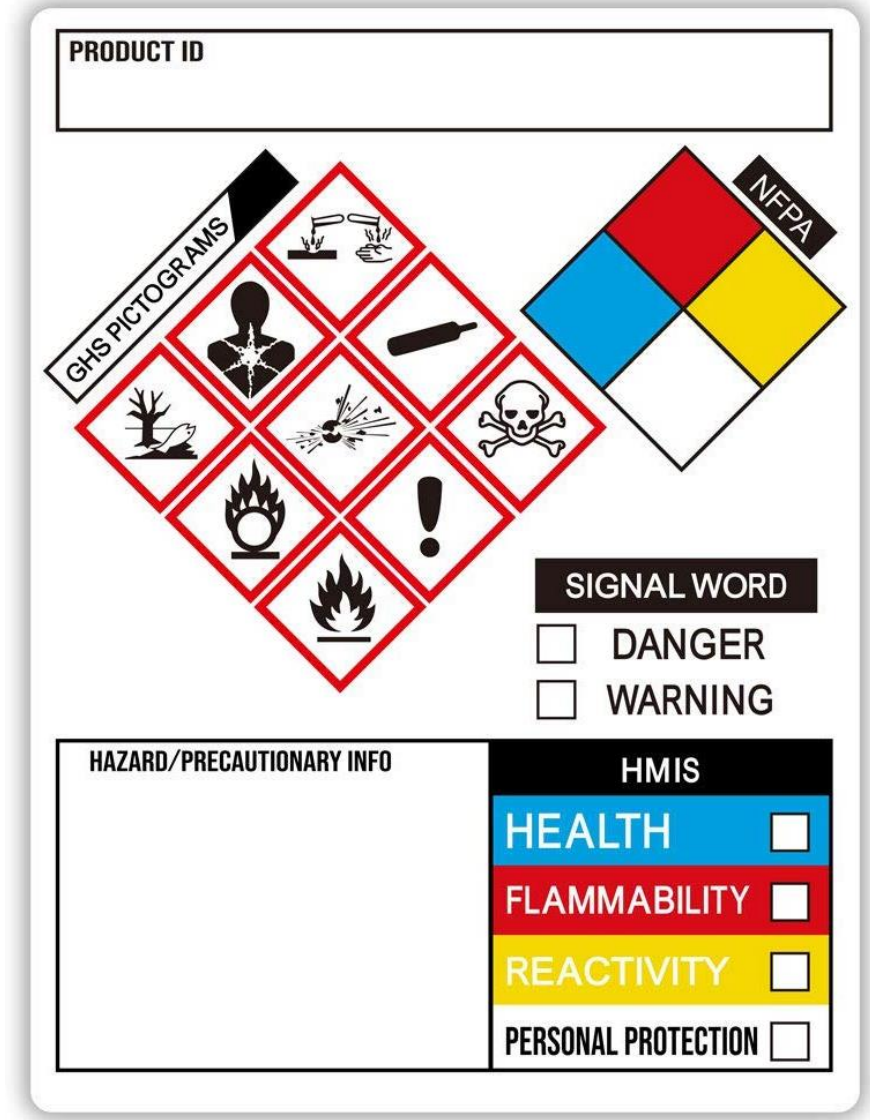
Specific target organ toxicity – single exposure	This hazard class covers products that cause or may cause damage to organs (e.g., liver, kidneys, or blood) following a single exposure. This class also includes a category for products that cause respiratory irritation or drowsiness or dizziness.
Specific target organ toxicity – repeated exposure	This hazard class covers products that cause or may cause damage to organs (e.g., liver, kidneys, or blood) following prolonged or repeated exposure.
Aspiration hazard	This hazard class is for products that may be fatal if they are swallowed and enter the airways.
Biohazardous infectious materials	These materials are microorganisms, nucleic acids or proteins that cause or is a probably cause of infection, with or without toxicity, in humans or animals.

Chemical Labels

- **Labels** are an appropriate group of written, printed or graphic informational elements concerning a hazardous chemical that are affixed to, printed on, or attached to the immediate container of a hazardous chemical, or to the outside packaging.
- Labels contain information on the identity and proportions of the hazardous chemical and its constituents or ingredients. They also contain information on the hazards of the chemical, precautions to be followed during its use, handling and storage, and instructions for the safe disposal of the chemical.

Types of Chemical Labels

- Hazardous Materials Identification System (HMIS)
- National Fire Protection Association (NFPA)
- Globally Harmonized System of Classification and Labelling of Chemicals (GHS)



Exploding bomb

(for explosion or reactivity hazards)

Flame

(for fire hazards)

Flame over circle

(for oxidizing hazards)

Gas cylinder

(for gases under pressure)

Corrosion

(for corrosive damage to metals as well as skin, eyes)

Skull and crossbones

(can cause death or toxicity with short exposure to small amounts)

Health hazard

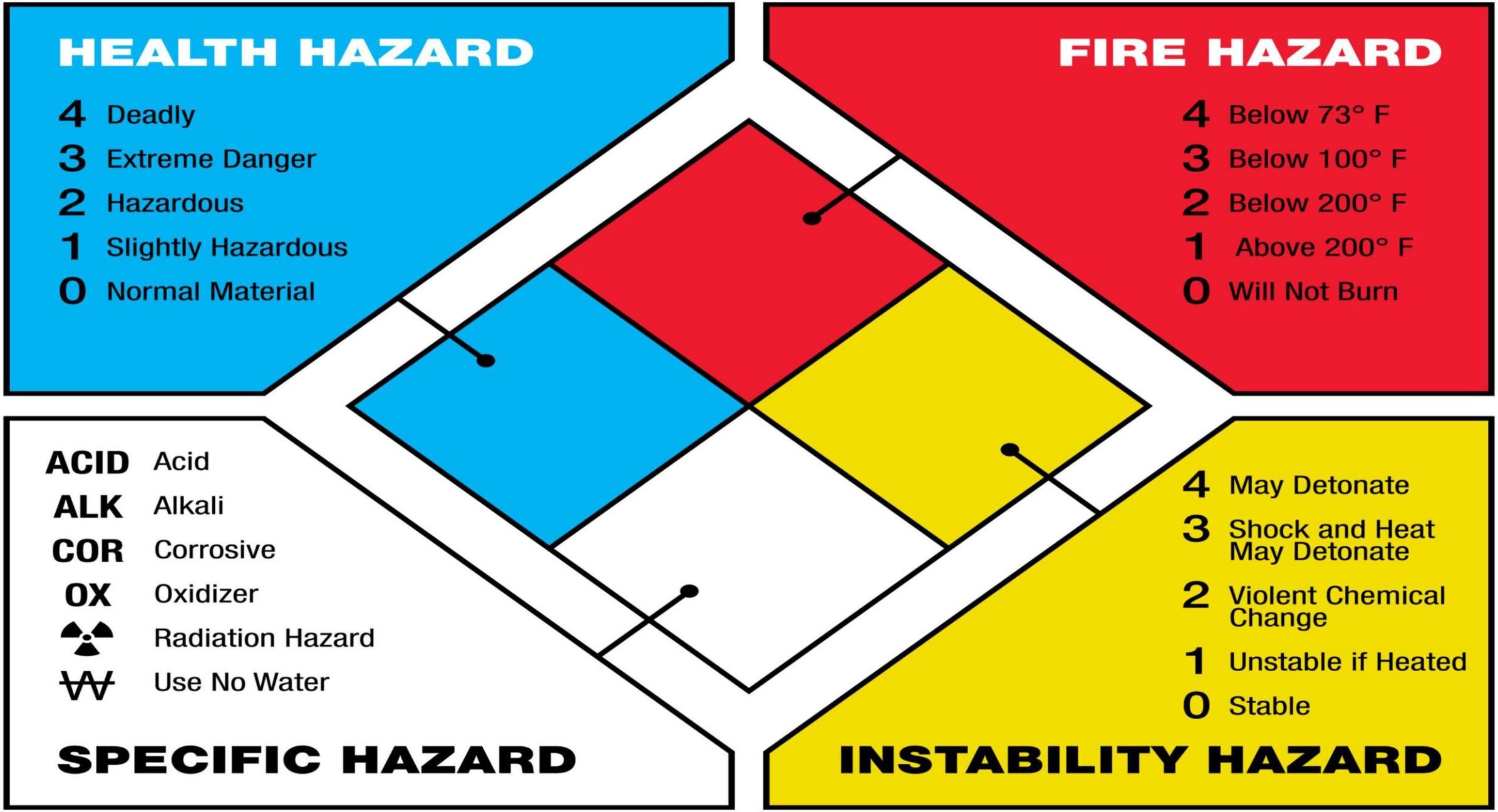
(may cause or suspected of causing serious health effects)

Exclamation mark

(may cause less serious health effects or damage the ozone layer)*

Environment*

(may cause damage to the aquatic environment)


HEALTH HAZARD
4 Deadly
3 Extreme Danger
2 Hazardous
1 Slightly Hazardous
0 Normal Material
FIRE HAZARD
4 Below 73° F
3 Below 100° F
2 Below 200° F
1 Above 200° F
0 Will Not Burn
ACID Acid
ALK Alkali
COR Corrosive
OX Oxidizer
Radiation Hazard
Use No Water
SPECIFIC HAZARD
4 May Detonate
3 Shock and Heat May Detonate
2 Violent Chemical Change
1 Unstable if Heated
0 Stable
INSTABILITY HAZARD

References

Sveinbjornsson, B. R., & Gizurarson, S. (2022). Handbook for Laboratory Safety. 1st. Elsevier.