



# Chemical safety Chemical Hazard Management

Haider Rasheed Alrafas  
University of Basrah  
Veterinary College

## ❖ Objective:

**at the end of this lecture the attendance will be able to.**

- ❖ What is chemical safety and why is it important?
- ❖ What is MSDS safety?
- ❖ Interpret the chemical labels
- ❖ Laboratory chemical handling
- ❖ Laboratory chemical storage
- ❖ Understand and implement methods of self protective while dealing with chemical in the lab

**All Chemicals should be regraded as dangerous  
and  
Safety is every one responsibility**

**Chemical safety** is the practice of using occupational chemical substances in a manner that ensures the safety and health of humans and prevents damage to the environment. It covers all aspects of chemical use, including the manufacture, transport, use, and disposal of chemicals.

**The safe use of chemicals has a variety of components, including**

- scientific knowledge of potential hazardous effects,
- technical knowledge of safe-handling and use procedures
- effective communication of the chemical identity and safety profile of all substances.



**A hazardous chemical** is a chemical that has properties with the potential to do harm to human or animal health, the environment, or capable of damaging property.

The term covers, among other things:

Chemical dusts, Chemical vapors, Chemical smoke, Chemical fumes, Chemical mixtures, Solvents, Detergents, Acids, Alkali, Petroleum and Paints



# *Majority of problems, incidents and violations in the laboratory are the result of haste*

Awareness of the following will avert the major problems:

- Past happenings in laboratories
- Basic chemical knowledge
- The properties of individual chemicals *and*
- Common sense

*Primary responsibility for safety rests with the individual*

# Physical States of Hazardous Materials

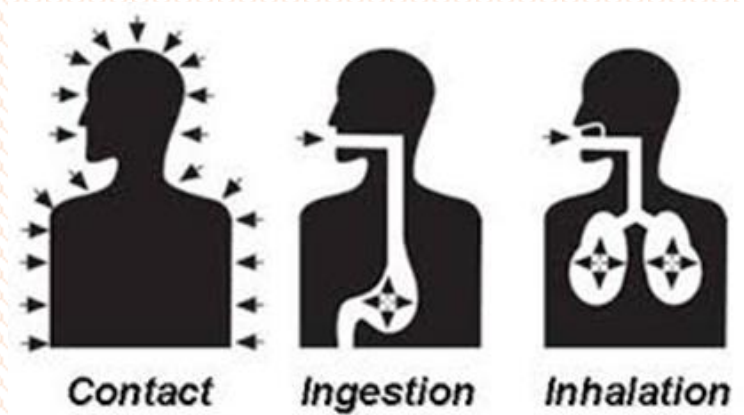
- Liquid
- Solid
- Gas
- Vapor

# Categories of Hazardous Chemicals

- Corrosive
- Flammable
- Toxic
- Reactive
- Biological (infectious)
- Carcinogen (cancer-causing)
- Radioactive

# Routes of Exposure

- Inhalation
- Ingestion
- Absorption
- Injection



# Symptoms of Possible Overexposure

- Eye discomfort
- Breathing difficulty
- Dizziness
- Headache
- Nausea
- Vomiting
- Skin irritation



# MSDS (OSHA and ANSI)



**Material Safety Data Sheets (MSDSs) provide pertinent information to employees about hazardous materials and chemicals in the workplace**

**MSDSs are important sources of chemical information in areas such as:**

- Manufacturer information
- Chemical synonyms
- Physical and/or Chemical Health Hazards
- Spill Response
- Personal Protective Equipment (PPE)

*MSDSs be readily available in the work areas chemicals are used*

**Isopropyl alcohol** Other names

2-Propanol

Isopropanol

Rubbing alcohol

sec-Propyl alcohol

s-Propanol

iPrOH

Dimethyl carbinol

IPA

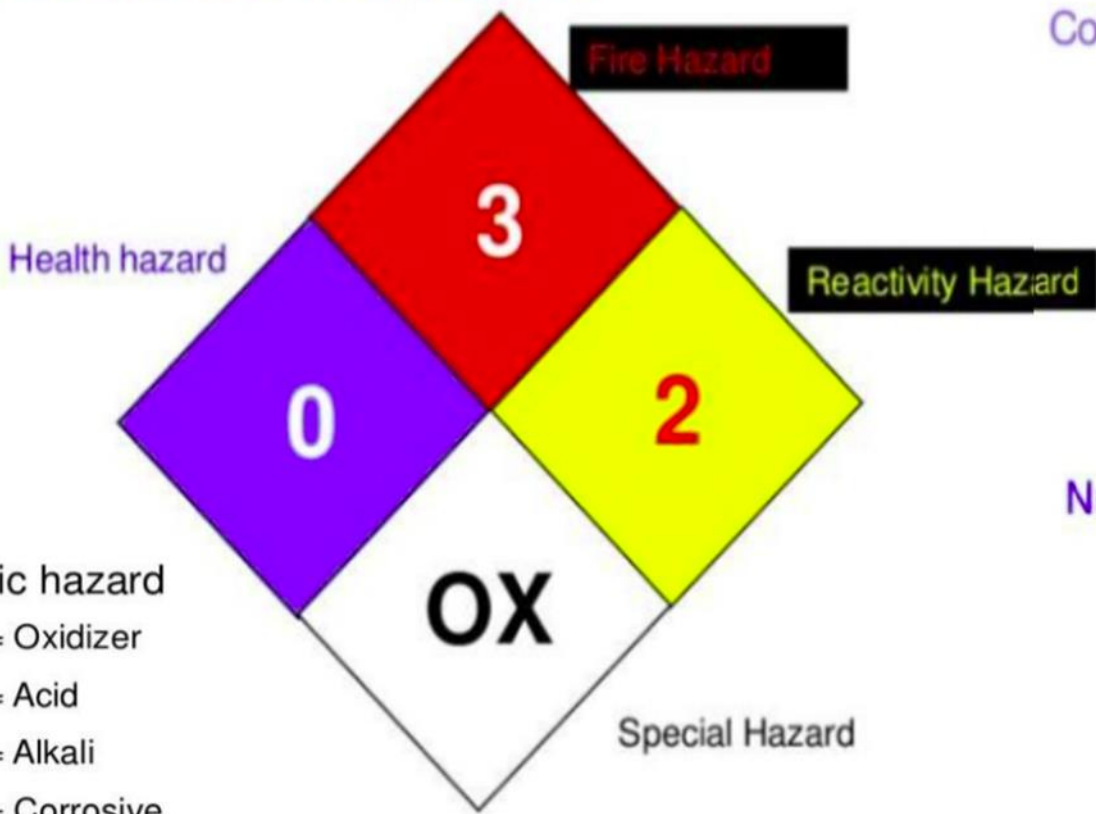
Note: MSDS is analogous to the manual of an instrument/equipment

<https://www.msds-online.com/sds-search/>





**National Fire Protection Association (NFPA)** has developed a system for indicating the health, flammability and reactivity hazards of chemical in a diamond shaped object called **NFPA hazard rating diamond**.



**Colors** represent kind of hazard

- **Red** = fire
- **Yellow** = instability
- **Blue** = health
- **White** = specific hazard & personal protection

**Numbers** show degree of hazard

- 0 = Minimal
- 1 = Slight
- 2 = Moderate
- 3 = Serious
- 4 = Severe

**White** = specific hazard

- **OX** = Oxidizer
- **ACID** = Acid
- **ALK** = Alkali
- **COR** = Corrosive
- **W** = Use no water

**Other symbols:**

**NFPA Hazard Rating Diamond**

# LABELS FOR INDICATING PHYSICAL HAZARDS



Flammables



Oxidizers



Explosives



Compressed gas

Health Hazard



# GHS Pictograms



FLAMMABLE



CORROSIVE



EXPLOSIVE



COMPRESSED  
GAS



OXIDIZING



TOXIC



globally Harmonized  
System of Classification and  
Labeling of Chemicals (GHS)



HEALTH  
HAZARD



HARMFUL/  
IRRITANT



DANGEROUS FOR  
THE ENVIRONMENT

# Handling laboratory Chemicals

- Keep containers closed when not in use
- Keep away from ignition sources
- Avoid contact with incompatible materials
- Only transfer to approved containers
- Bond all receiving containers
- Clean up spills and dispose of waste properly in proper way according to the lab protocol



# Proper Storage of laboratory Chemicals

- Ensure that storage areas meet regulatory requirements
- Replace all bung caps with drum vents after receiving containers
- Ground all drums properly
- Store quantities in approved storage rooms and cabinets
- Store only in small quantities



# Proper Storage of Flammable Chemicals

- Ensure that storage areas meet regulatory requirements
- Replace all bung caps with drum vents after receiving containers
- Ground all drums properly
- Store quantities in approved storage rooms and cabinets
- Store only in small quantities
- Label all storage area properly
- Keep all chemical container in properly label condition
- Label all chemical container when you received and when you opened

**Reagent:**

**Date received:**

**Sign.:**

**Date opened:**

**Opened by:**

**Sign.:**

**Store loc.:**

**Expiry date:**

**Remarks:**

Dr. Haider Rasheed Daham

# hazardous waste

A **chemical hazardous waste** is a solid, liquid, or gaseous material that displays either a “**Hazardous Characteristic**” or is specifically “**listed**” by name as a **hazardous waste**. There are four characteristics **chemical wastes** may have to be considered as **hazardous**.

The four characteristics of **hazardous waste** are:

- ignitability ( flammable)
- corrosively
- reactivity
- toxicity.

In the laboratory, chemical wastes are usually segregated on-site into appropriate waste carboys, and disposed by a specialist contractor in order to meet safety, health, and legislative requirements.

<b>HAZARDOUS WASTE</b>										
Weill Cornell Medicine										
Contact Name:			Contact Number:							
Principal Investigator:										
Hazard Characteristics (check all that apply):										
<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
	Flammable		Corrosive		Toxic		Reactive		Health Hazard	Other
Chemical Name(s):										
For assistance, contact Environmental Health and Safety										
646-962-7233		ehs@med.cornell.edu		https://ehs.weill.cornell.edu						

## Personal Safety

- Always use extracted wet benches for chemical work
- Always **wear safety glasses** or goggles at all times in the lab
- Always **wear laboratory coat/apron** in the laboratory
- Appropriate **gloves** should be worn as needed
- Appropriate **shoes** should be worn in the laboratory
- Wear breathing **mask** as and when appropriate

# Personal Protective Equipment (PPE)

Eye Protection



Head Protection

Hearing Protection



Respiratory Protection

Hand Protection

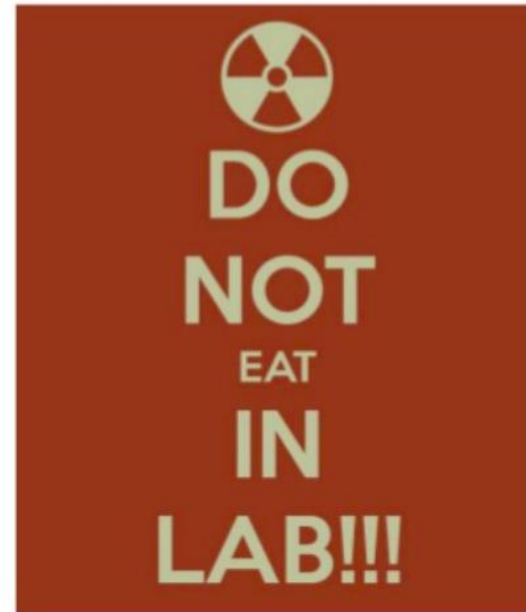


Body Protection

Foot Protection







# Incompatible Chemicals

- Flammables and oxidizers
- Flammables and any ignition source
- Acids and cyanides
- Strong acids and strong alkalines
- Concentrated acids and water
- Organic solvents and corrosives
- Corrosives and other reactive materials