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Sustainable Human Resource Development in logistics services for ASEAN Member States



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Dangerous Goods Handling Principle Concept to Chemical Management

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Principle Concept to Chemical Management

Objectives:

- ❖ This chapter will cover the basic knowledge on hazard identification, basic terms and definition, basic classification, relevant principle methods of basic classifications.
- ❖ It also elaborates how people are exposed by chemicals through several routes of exposure. Relevant basic concepts of dose response relationship, effects of chemicals to human and factors determining the effects and flammability concept shall also be explained at a basic level.
- ❖ In general this chapter provides a **quick snapshot of basic principle in chemical management.**



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Principle Concept to Chemical Management

Presentation Outline

- ❖ Hazard Identification
- ❖ Basic Terms & Definition
- ❖ Basic Classification
- ❖ Principle Methods of Basic Classification
- ❖ Routes of Exposure
- ❖ Dose Response Relationship
- ❖ Effects of Chemicals to Human (Causes & Effects)
- ❖ Factors determining the Effects
- ❖ Flammability: Fire Triangle
- ❖ Flammability: Flash Point

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Hazard Identification

All substances are poisons; there is none which is not a poison. The right dose differentiates a poison and a remedy.

Paracelsus
(1493 - 1541)



**THE CONCEPT:
“THE DOSE MAKES POISON”**



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Basic Terms & Definition

- ❖ **Dangerous Goods** : Commonly used globally for dangers caused by the goods during transport (by United Nations)
- ❖ **Hazardous Chemicals** : Commonly used to refer as hazardous to human health and environment
- ❖ **Hazardous Materials (HazMat)**: Specifically used in North America (USA & Canada)
- ❖ **Hazardous Substances** : Regulated substances for import, possession, production and export in particular countries



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Basic Classification

Goods or Chemicals can be in principle easily classified as :-

1) **Non-Dangerous Goods:** Non-Hazardous / Non-Classified / Non-Restricted / Non-Regulated)

- ❖ Can be handled (for transport and storage) as general cargo.
- ❖ Should not be stored with “food products or products for human intakes”
- ❖ It does not mean that the chemicals are totally non-hazardous.



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Basic Classification

Goods or Chemicals can be in principle easily classified as :-

1) Non-Dangerous Goods: Non-Hazardous / Non-Classified / Non-Restricted / Non-Regulated)

- ❖ Such chemicals may be considered as “hazardous” but not upto the extent to be called as “dangerous”.
- ❖ The thorough understanding is important considering the safety, health and environment as key priorities.

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Basic Classification

Goods or Chemicals can be in principle easily classified as :-

2) Dangerous Goods: Hazardous / Classified / Restricted / Regulated)

Dangerous Goods can cause adverse impacts during the spillage/leakage out of packaging. Types of dangers can be one of the followings:-

❖ **Flammability** / **Toxicity** / **Reactivity** / Physical hazards as a state of being compressed



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Principle Methods of Basic Classification

There are various ways of classifying chemicals.

Sometimes it is convenient to classify them according to:

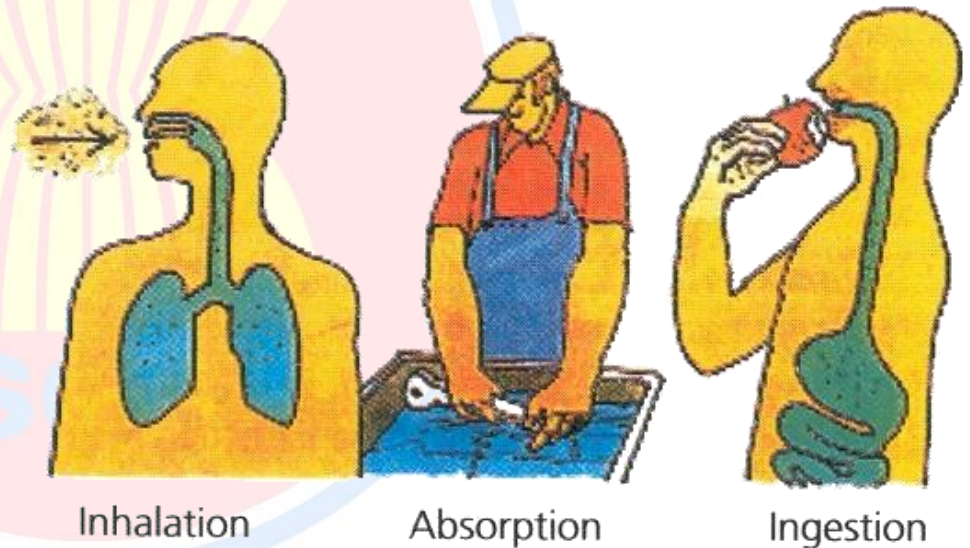
- 1) **Physical State:** Its state (Solid/Liquid/Gas)
- 2) **Chemistry** (Organic and Inorganic Chemicals)
- 3) **Hazardous Properties** in accordance with specific criteria
(**Flammability**/**Toxicity**/**Reactivity**)

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Routes of Exposure

It is important to learn how we are exposed to the chemical substances:-

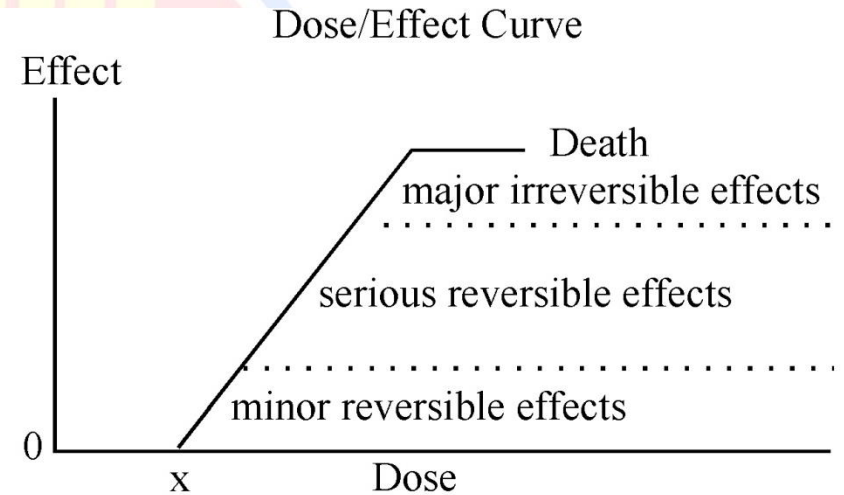
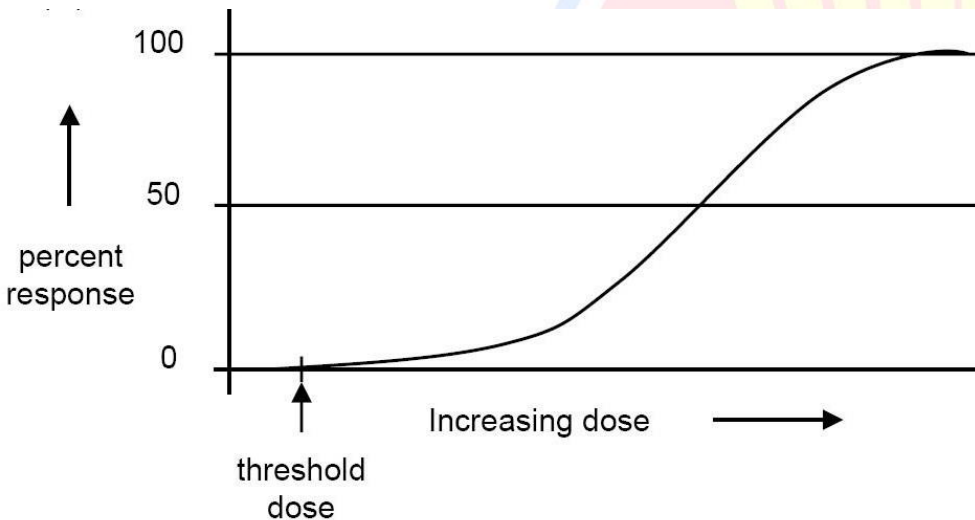
- 1. Inhalation** : Breathing in through mouth or nose into the lungs
- 2. Absorption / Dermal:** Passing through the skin or eyes
- 3. Ingestion / Oral:** Eating, Drinking and Swallowing
- 4. Transfer across the placenta of a pregnant woman to the unborn baby**



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Dose Response Relationship (Causes & Effects)

❖ Dose Response Curve



At dose x the first measurable effect occurs. As the dose increases the effects become more serious, and possibly irreversible. The most serious effect is death.



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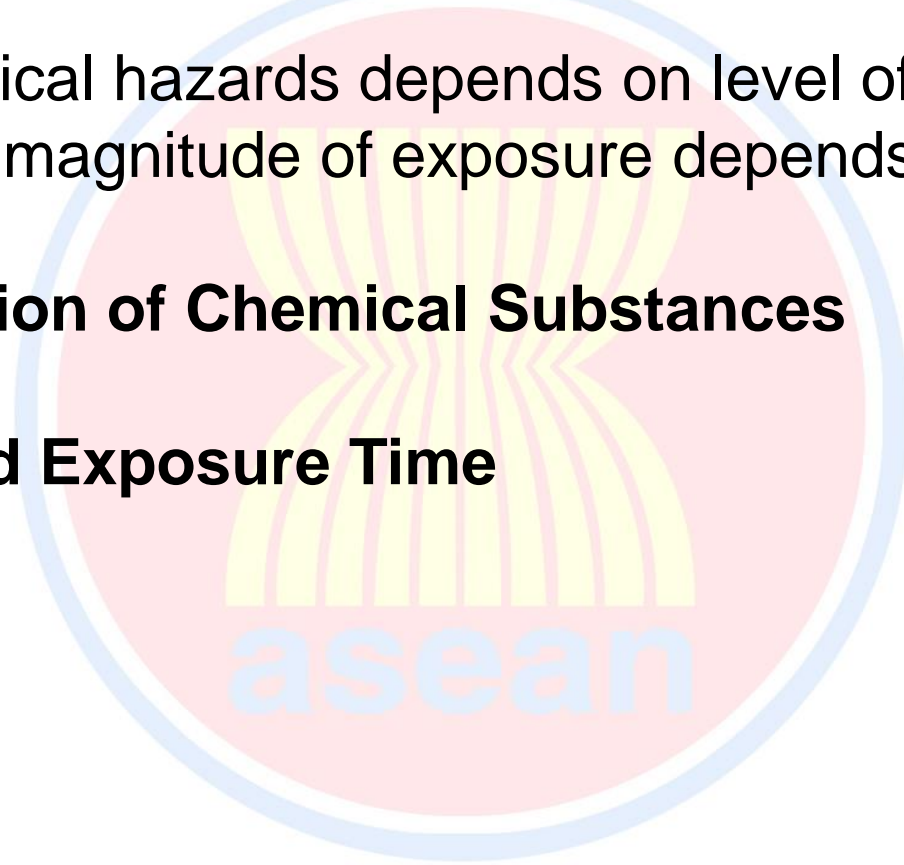


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Effects of Chemicals to Human

Effects of chemical hazards depends on level of toxicity and exposure. The magnitude of exposure depends on:-

- 1) **Concentration of Chemical Substances**
- 2) **Contact and Exposure Time**



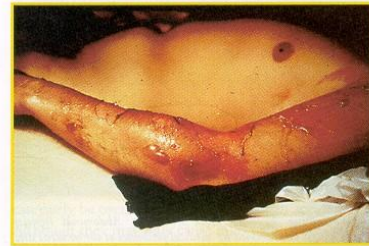
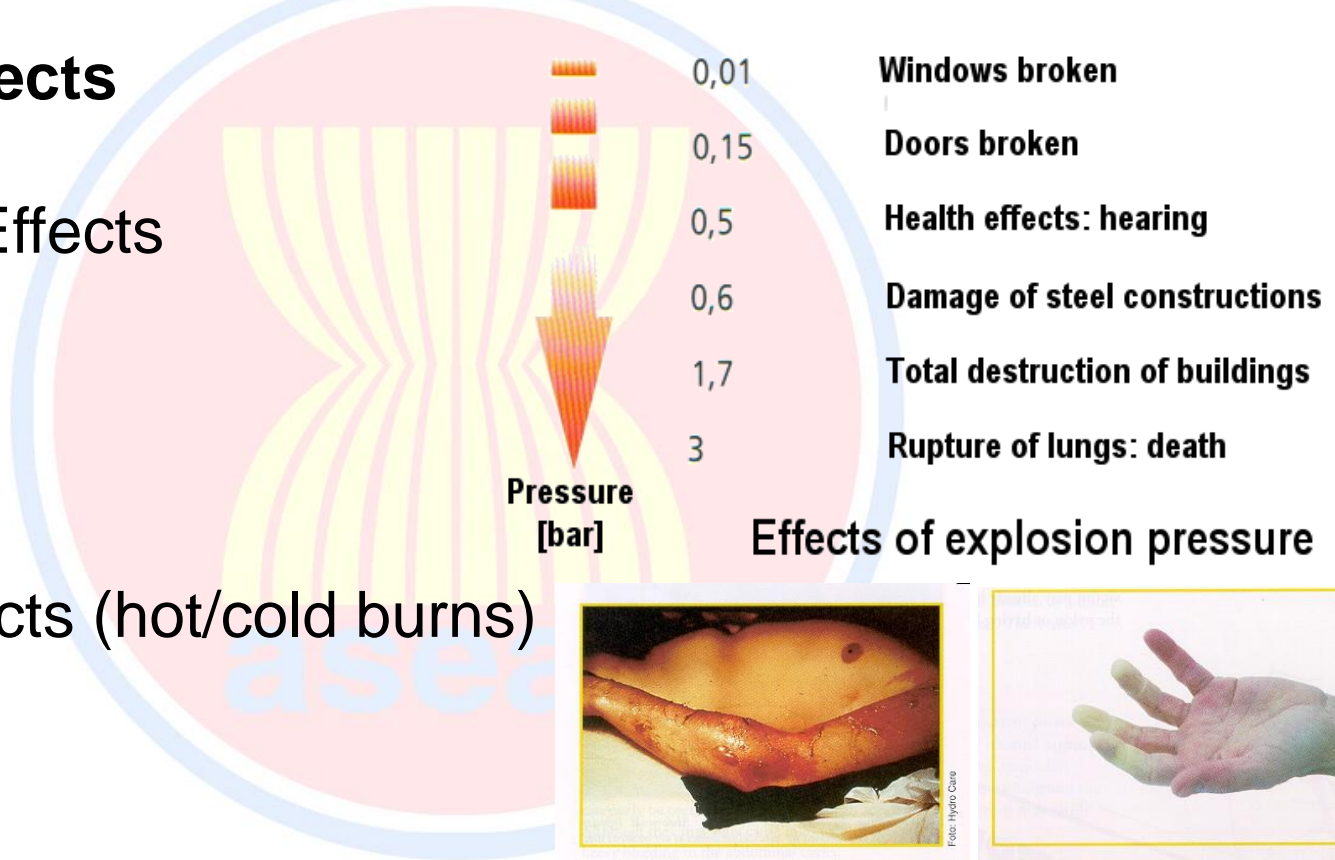
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Effects of Chemicals to Human

1. Physical Effects

- ❖ Radiation
- ❖ Mechanical Effects

- ❖ Thermal Effects (hot/cold burns)



Exposure to chemically corrosive substances can cause injury to the skin, eyes and airways.



Frostbite can occur when the ambient temperature is below freezing.

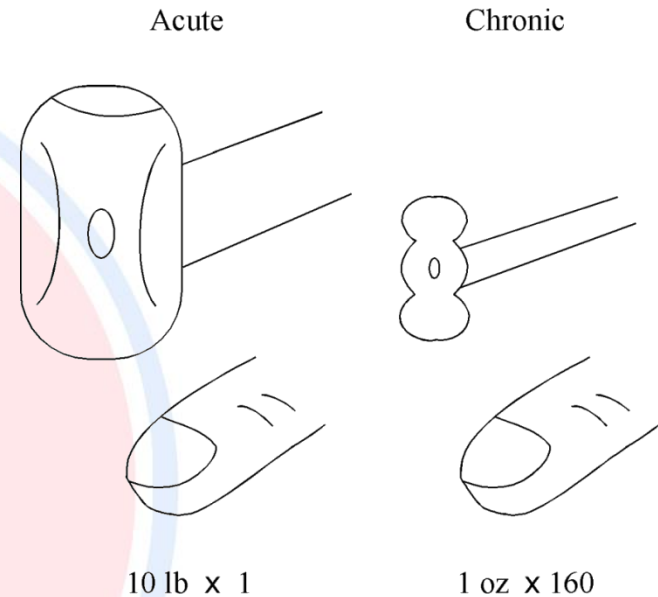
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Effects of Chemicals to Human

2. Health Effects

- ❖ Acute effects : Short-term exposure of single dose which can cause the adverse effects)
- ❖ Chronic effects : Long-term exposure of repeated dose which can cause the adverse effects
- ❖ Reproductive effects

3. Psychological Effects





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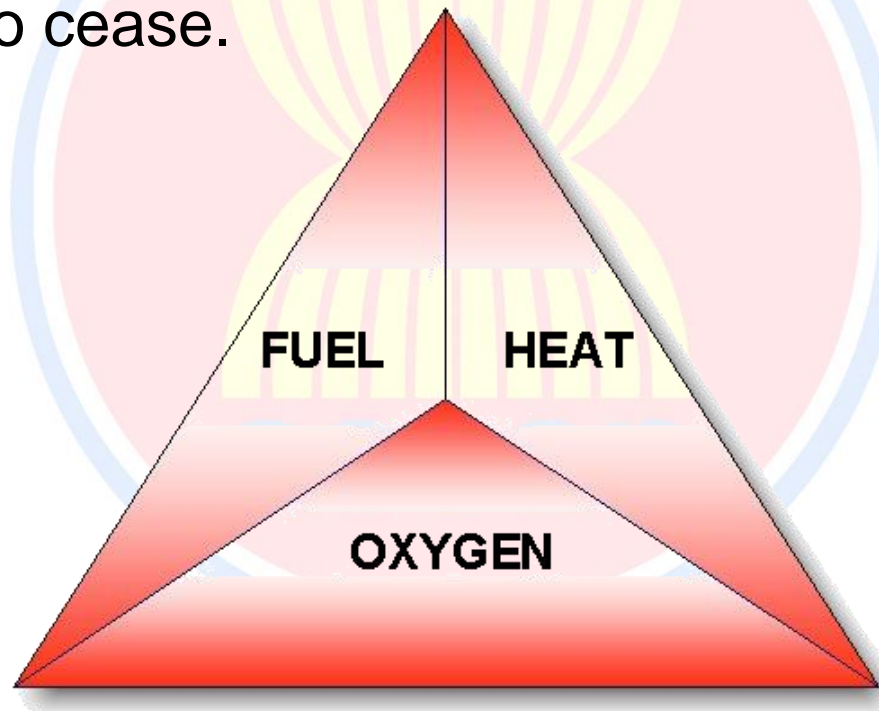
Factors determining the Effects

- ❖ Duration and Frequency of Exposure
- ❖ Route of Exposure (Inhalation/Absorption/Ingestion)
- ❖ Interspecies Variation
- ❖ Intra species Variation
 - ❖ Age and Maturity
 - ❖ Gender and Hormonal Status
 - ❖ Genetic Make-ups
 - ❖ State of Healths
- ❖ Environmental Factors (Surrounding Pollution, Working Environment, Personal Behavior, etc.)
- ❖ Chemical Combinations

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Flammability: Fire Triangle

3 components of fire must exist in appropriate proportion in order to generate fire. In contrast, lacking of any component can cause fire to cease.



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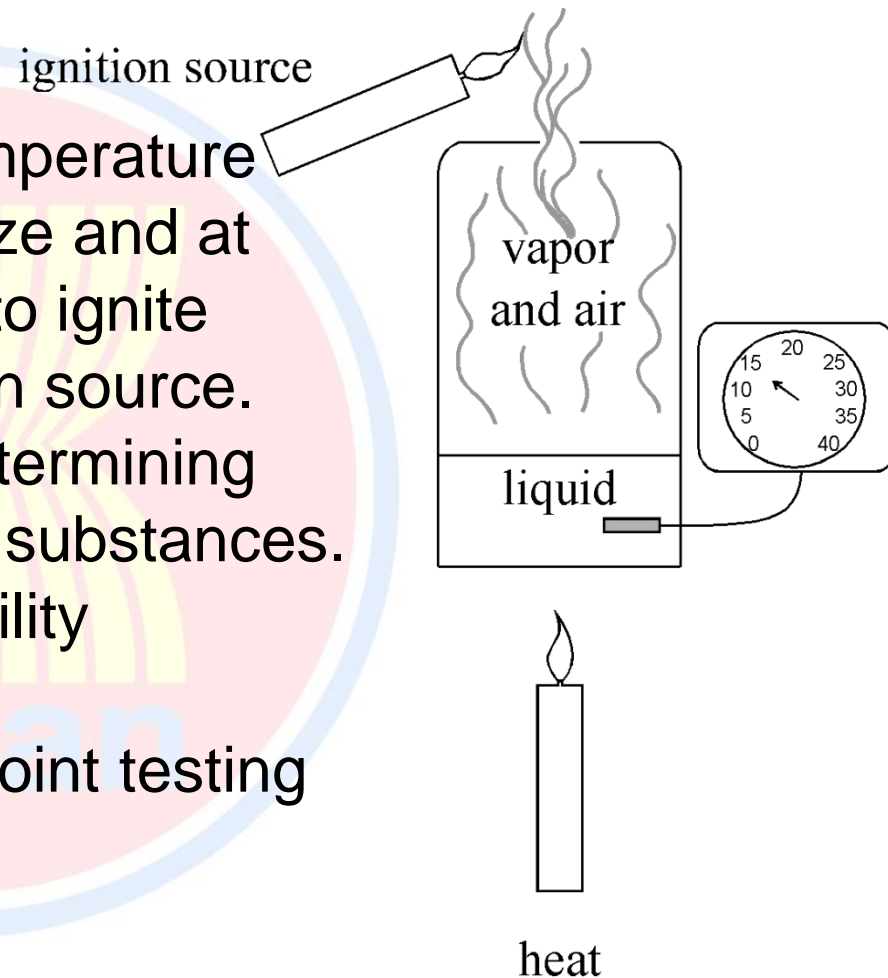
Flammability: Fire Triangle

Components of Fire Triangle	Examples
<i>Fuels – Solids</i>	Wood dust, polymer dust, flour, metal particles Acetone, isopropyl alcohol, hexane, gasoline Acetylene, propane, butane, hydrogen
<i>Fuels – Liquids</i>	
<i>Fuels – Gases</i>	
<i>Oxidizers</i>	Oxygen, hydrogen peroxide, metal peroxide
<i>Ignition sources</i>	Sparks, flames, static electricity, heat

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Flammability: Flashpoint

- ❖ **Flashpoint** is the minimum temperature that causes the liquid to vaporize and at that state it is sufficient for fire to ignite when there is a spark or ignition source.
- ❖ **Flashpoint** is very useful in determining the level of flammability for the substances.
 - ❖ Flammability / Combustibility
 - ❖ Non-combustibility
- ❖ There are 2 methods of Flashpoint testing (Closed -cup and Open-cup)





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