HAZMAT CLASSES

LEARNING OBJECTIVE

- List the major hazard classes and the most common material associated with each class.
- Describe the general hazards associated with each class.

SCOPE

- Introduction
- Able to identify the different & classification types of Hazmat classes
- Understand the hazards posed by each hazmat classes substances
- Conclusion

INTRODUCTION

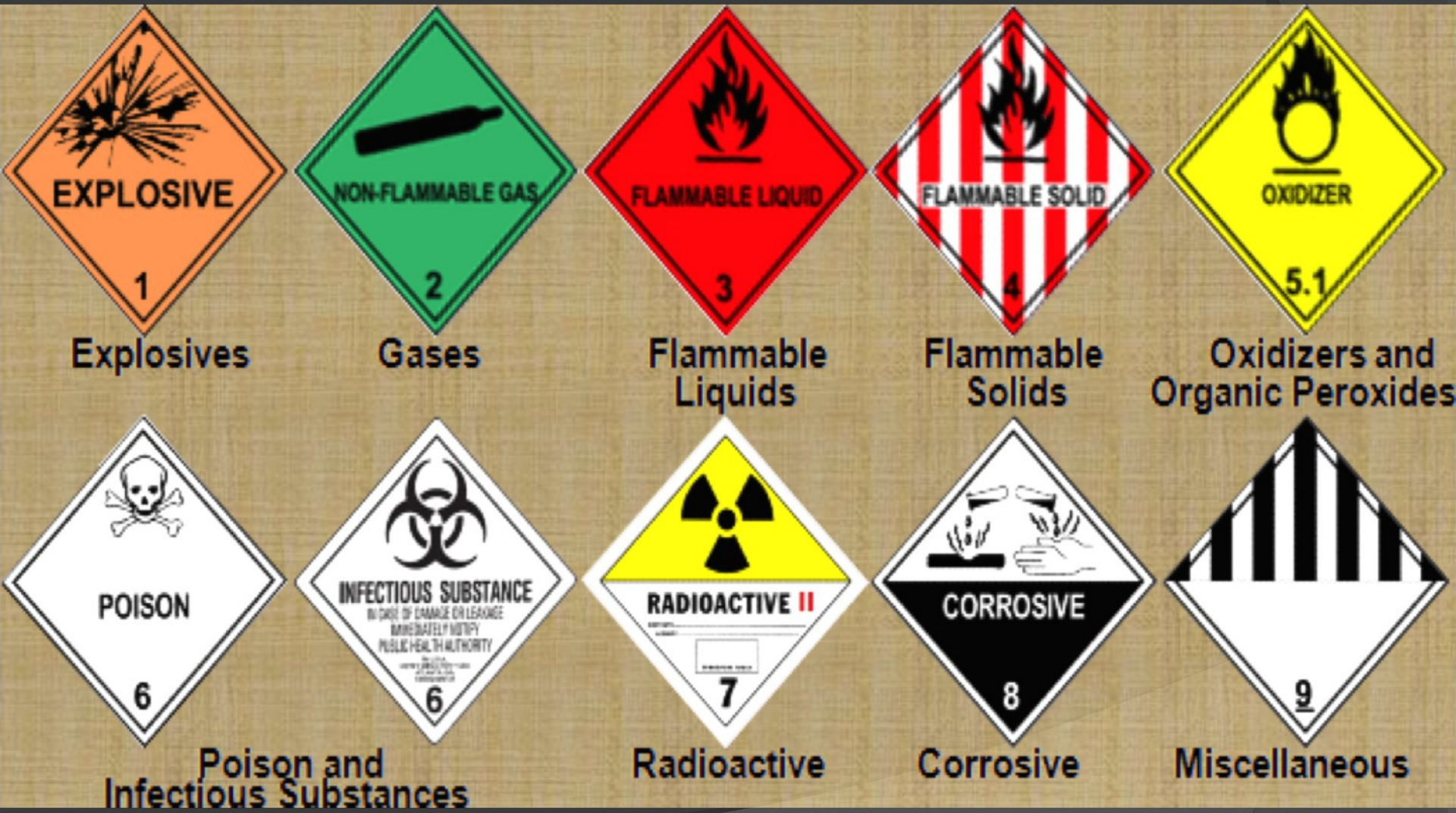
- What is **HAZMAT**?

HAZ – hazardous

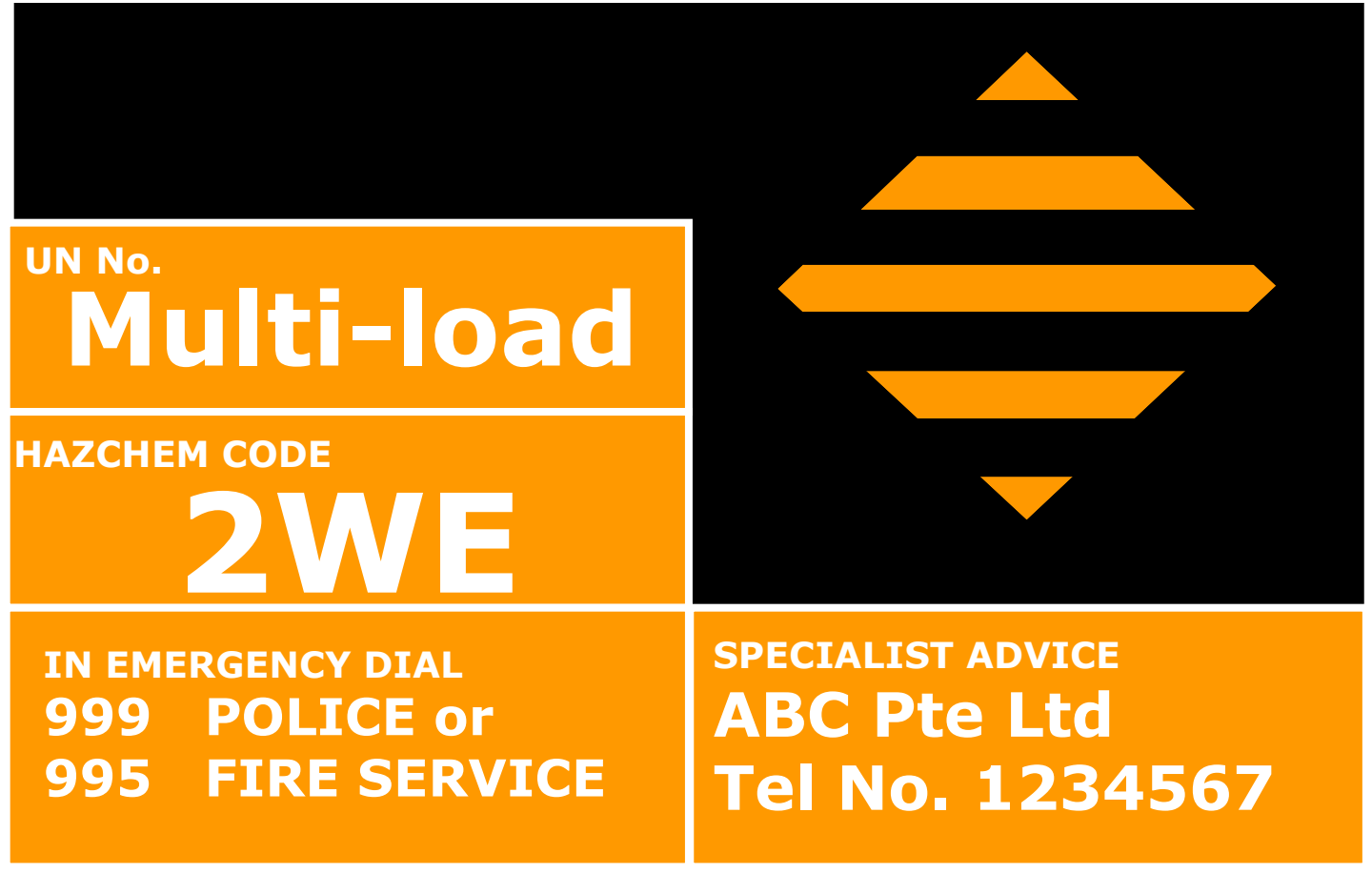
MAT – materials

- Substances that have the potential to harm living tissues, damage property and pollute the environment

UN CLASSIFICATION OF HAZMAT



Emergency Information Panel



Emergency Information Panel

Technical Name of Subst

Identification No.

Emergency Action Code

Tel no. & name of Emergency Service

Appropriate DG class label & Sub-risk label if any

Tel no. & name of coy or org (manufacturer/local agent/consignor) domiciled in S'pore where specialised advice can be obtained at all times

UN Identification Number

- Uniformity in recognizing hazmat in international transport
- Assists responder in identification and establishing initial protective actions
- Four digit number assigned to each hazmat
- May appear on placards, EIP, labels

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THE 9 HAZARD CLASSES

- Class 1 : Explosives
- Class 2 : Gases
- Class 3 : Flammable Liquids
- Class 4 : Flammable Solids
- Class 5 : Oxidizing Agents
- Class 6 : Toxic & Infectious Substances
- Class 7 : Radioactive Substances
- Class 8 : Corrosive Substances
- Class 9 : Miscellaneous

CLASS 1 EXPLOSIVES

General

- A chemical substance that in itself can react to produce a gas at a relatively high temperature and pressure and at such a speed as to damage the surroundings.

Class 1 is sub-divided into 6 classes:

1.1 – Explosives with a mass explosion hazard.

1.2 – Explosives with a blast/projection hazard.

1.3 – Explosives with a minor blast hazard. (rocket propellant, display fireworks)

1.4 – Explosives with a major fire hazard. (consumer fireworks, ammunition

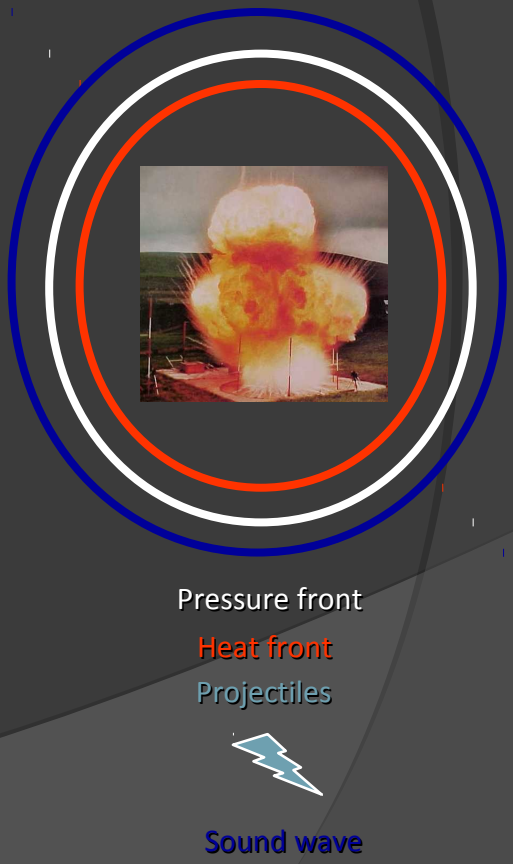
1.5 – Blasting agents.

1.6 – Extremely insensitive explosives.

CLASS 1 EXPLOSIVES

Hazards

- Most explosives pose a big fire hazard due to the very nature of explosives.
- Danger of injuries via projectiles (E.g. shrapnel, debris etc.).
- Some explosives can cause mass explosion hazard. (E.g. Black powder, Dynamite, TNT etc.).
- Ear rupture is caused by the sound waves.



CLASS 2 GASES

General

- A gas is a material in a state of matter that at normal temperature and pressure tends to fill the space available (diffusion).

Class 2 is sub-divided into 3 classes:

2.1 Flammable Gases
- ✓ *E.g. Hydrogen, Propane, Butane*

2.2 Non-flammable Gases
- ✓ *E.g. Nitrogen, Oxygen, Fluorine*

2.3 Poisonous Gases
- ✓ *E.g. Chlorine, Arsine, Carbon Monoxide*

CLASS 2 GASES

Hazards

- Physical storage
  - Gasses are difficult to store and the methods of storing these gases pose a great hazard if not handled properly or not stored properly

Compressed

General
Pressurised
Gas phase
Eg. air, acetylene

Hazards
Projectile

Liquified

General
Pressurised
Gas/liquid phase
Eg. Liquid Petroleum Gas (LPG)

Hazards
Prone to ignition
Projectile

Cryogenic

General
Very low temperatures
Liquid phase
Eg. ammonia, nitrogen, oxygen

Hazards
Frost bite
High expansion ratio

CLASS 3 LIQUIDS

General

- Physical properties
  - ✓ Vapour pressure and density affects behavior of gas when the liquid evaporates.
  - ✓ Wider flammability range → greater danger.

Hazards

- Flammable/explosive situation
  - ✓ Due to its tendency to generate flammable vapour when released, an explosive situation will always arise in the event of a leak → Projectiles
- Flowing fire
  - ✓ Due to the physical nature of liquid to flow, any release will affect a large area causing fire to spread along drains, low-lying areas, etc.
- Toxic, corrosive, carcinogenic
  - ✓ Some liquids can be toxic if consumed, corrosive to the skin and even cancer-causing.

CLASS 4 SOLIDS

General

4.1 Solids that easily ignited and difficult to extinguish eg. Magnesium

4.2 Air-reactive substances (Spontaneously combusts in air) eg. White phosphorus

4.3 Water-reactive substances

CLASS 4 SOLIDS

Hazards

- Explosive or toxic situation
  - ✓ Generation of flammable or toxic gas/vapour

- Difficult to extinguish
  - ✓ Once a fire has been initiated, it is difficult to extinguish metal fires due to the high temperatures involved. Some metals can be so hot that application of water can result in a steam explosion due to the rapid expansion of water.

- Metal dust
  - ✓ Can cause serious complications to health if inhaled.

CLASS 5 OXIDIZER

General

- Substances that releases oxygen
  - ✓ Generally, oxidizers are compounds which release oxygen when they react with other substances intensifying the fire.
  - ✓ Examples of oxidizers are aluminium nitrate, fluorine, hydrogen peroxides, etc.

CLASS 5 OXIDIZER

Hazards

- Oxidizers are very reactive compounds & Spontaneously combustible that will burn fiercely when combining with combustible materials or intimate with ordinary combustible .

CLASS 6 POISONS

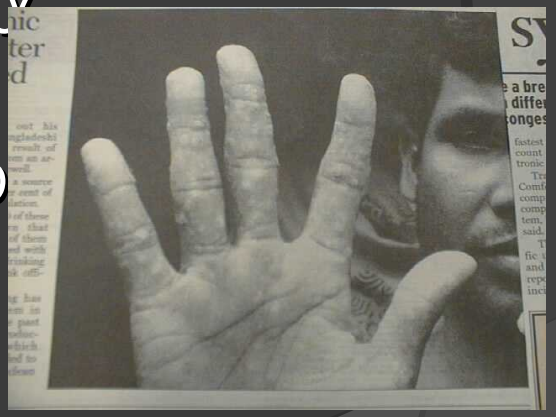
General

- Substances that cause death or serious health effects upon exposure through:
  - Inhalation
  - Ingestion
  - Absorption

CLASS 6 POISONS

Hazards

- Interferes with bodily functions
  - Carbon Monoxide – binds to red blood cells, deprives body of oxygen
  - Hydrogen Fluoride - binds to calcium in bones
  - Cyanides – interferes with respiration



Effects of Arsenic

CLASS 7 RADIOACTIVES

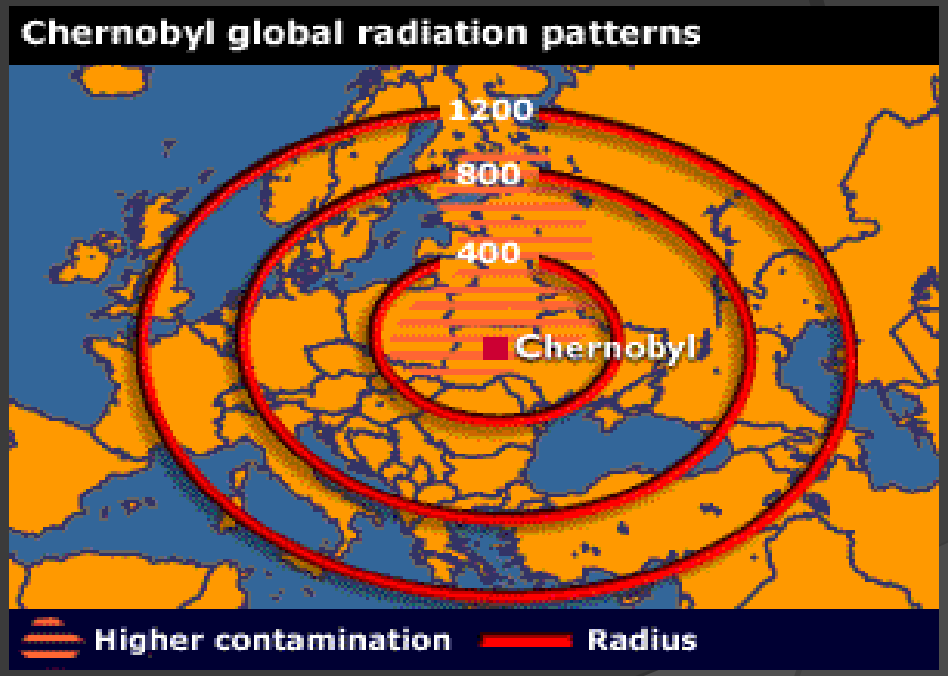
General

- Radioactive substances emits radiation
  - Non-ionizing radiation - radio waves, UV, infrared
  - Ionizing radiation
    - E.g. Alpha par
      Beta particles
      Gamma rays

CLASS 7 RADIOACTIVES

Hazards

- Radiation sickness
  - Nausea
  - Vomiting
  - Diarrhea
  - Exhaustion
  - Haemorrhage
- Radiation injury
  - Burns
- Radiation poisoning
  - Cancer



CLASS 8 CORRISIVES

General

- Substances that can cause visible destruction to tissue
  - Acids
  - Bases
- Most widely used in industry
  - E.g. Sulfuric acid , Hydrochloric acid, Sodium Hydroxide

CLASS 8 CORRISIVES

Hazards

- Skin and tissue destruction
- Reacts with metals - liberate hydrogen
- May be absorbed into skin
- React with chemicals - liberate heat

Chemical burns

CLASS 9 MISCELLANEOUS

- Class 9 encompasses all hazardous materials that do not fit into one of the definitions listed in Class 1 through Class 8.
- Example – Dry ice, pollutants

Conclusion

- Different classes of HazMat have different properties and pose different threats.
- Knowledge of properties and hazards for different HazMat classes allows us to take the appropriate protective measures during an encounter, enabling us to protect and save lives!