



## CHEMICAL CLASSIFICATION

Chemicals are classified into various hazard classifications in accordance with their physiochemical properties and health hazards. Each class of chemical has a pictorial symbol called a danger symbol. Addressing the risks posed by a chemicals classification is key to its safe use.

### PHYSIOCHEMICAL

#### Explosive Chemicals (E)



These are chemicals or mixtures capable of producing an explosive or pyrotechnic effect with substantial release of heat and gases under the right conditions. Explosions can be initiated by heat, shock, friction etc. Explosives which are shock sensitive are particularly dangerous as they can be detonated merely by touching their container – functional groups such as azides, acetylides, diazo, nitroso, haloamine, ozonides are sensitive to shock and heat and can explode violently.

#### Oxidising Chemicals (O)



These are substances that can readily release oxygen thus intensifying a fire. Fire or explosions can occur when strong oxidising substances come into contact with easily oxidisable substances such as metals, metal hydrides or organics. Examples of oxidising chemicals include Hydrogen Peroxide, Hypochlorites (bleach) and concentrated Nitric Acid.

#### Flammable Chemicals (F = Highly flammable and F+ = Extremely Flammable)



Flammable chemicals ignite easily. They are divided into extremely flammable, highly flammable and flammable and this classification depends mainly on their “flashpoint”. *Flashpoint* is defined as the lowest temperature at which the vapour on the surface of the liquid will ignite. The lower the flashpoint, the easier it is to ignite a material.

**Extremely flammable:** Flashpoint < 08C and boiling point of [ 358C

**Highly flammable:** Flashpoint < 218C

**Flammable liquid:** Flashpoint between 218C and 558C. There is no flammability danger symbol on the label of a flammable liquid.



## HEALTH

### Toxic Chemicals (T+ = Very toxic and T= Toxic)



Toxic agents can cause serious damage to health if they are allowed to enter the body. The classification of toxic agents is based on their LD50 values (medial lethal dose). **The LD50 is the average exposure to a single dose of a chemical agent which causes at least 50% of test subjects (rats, mice etc.) to die.** There are LD50 values for ingestion, skin exposure and inhalation of chemicals. Very toxic agents can cause damage to health at very low levels. Toxic chemicals also cause damage at low levels. Examples include phosgene, hydrogen cyanide and nicotine.

### Harmful Chemicals (Xn)



These chemical agents can cause damage to the health of persons exposed to them but do not present as serious a health risk as toxic chemicals.

### Irritant Chemicals (Xi)



These chemical agents can cause inflammation of the skin and mucous membranes.

### Sensitising Chemicals (Xn or Xi)



**Respiratory sensitiser:** is a substance which when breathed in can trigger an irreversible allergic reaction in the respiratory system. Once this sensitisation has taken place, further exposure to the substance, even to the tiniest trace, will produce symptoms.

**Skin sensitiser:** is a substance capable of causing an allergic reaction in the skin. Once this sensitisation has taken place, further exposure to the substance, even to the tiniest trace, will produce symptoms of dermatitis.

**Note:** Sensitisation does not necessarily take place right away, it may happen after several months or even years of contact with the sensitiser.

### Corrosive Chemicals (C)



These chemical agents destroy living tissue on contact. Where exposure is through inhalation or ingestion, then the damage can occur within the respiratory or alimentary tracts. Examples include acids and caustic soda.



## Carcinogens

- **Category 1:** substances known to cause cancer in humans, Classified as Toxic



- **Category 2:** substances that should be regarded as if they are carcinogenic to humans – sufficient evidence based on long-term animal studies and other information that human exposure may result in cancer. Classified as toxic.



- **Category 3:** substances that cause concern owing to possible carcinogenic effects. Classified as harmful



## Teratogens/Reproductive toxins

- **Category 1:** substances that produce or increase the incidence of non-heritable effects. Classified as Toxic



- **Category 2:** substances that should be regarded as if they are reproductive toxins to humans – sufficient evidence that human exposure may result in development of genetic mutations. Classified as Toxic.



- **Category 3:** substances that cause concern owing to possible reproductive toxin effects. Classified as Harmful.



## Mutagens

- **Category 1:** substances known to produce heritable genetic defects. Classified as Toxic.



- **Category 2:** substances that should be regarded as if they are mutagenic to humans – sufficient evidence that human exposure may result in development of genetic mutations. Classified as Toxic.



- **Category 3:** substances that cause concern owing to possible mutagenic effects. Classified as Harmful.





UNIVERSITY *of* LIMERICK  
OLLSCOIL LUIMNIGH