



# Alkyl Halide

## Structure & Uses of Haloalkanes

- ✓ Ethyl Chloride
- ✓ Chloroform
- ✓ Trichloroethylene
- ✓ Tetrachloroethylene
- ✓ Dichloromethane
- ✓ Tetrachloromethane and
- ✓ Iodoform

# Structure and Uses of Haloalkane



## 1. Ethyl Chloride- $C_2H_5Cl$ , Chloro ethane



### Uses

- ✓ **Local anesthetic:** Used in medicine to treat pain and facilitate early mobilization and muscle function restoration
- ✓ **Diagnostic tool:** Used to detect dead teeth with nonviable pulp
- ✓ **Chemical reagent:** Used in the production of cellulose, dyes, medicinal drugs, and other commercial products
- ✓ **Solvent and refrigerant:** Used in aerosols, as a blowing agent in foamed plastics, and in sports injury sprays

### ✓ Physical properties

- ✓ colourless flammable gas at ordinary temperature and pressure..
- ✓ Boiling Point: **12.3°C**
- ✓ Melting Point: **-138.7°C**
- ✓ Vapour Density: **2.22**
- ✓ Specific Gravity: **0.9214 at 0°C**
- ✓ Vapour Pressure: **1000 mm Hg at 20°C**



## 2. Chloroform $\text{CHCl}_3$ , Trichloro metane (TCM)

### Properties



Colorless, dense, volatile liquid with a sweet smell and ether-like odor

Density **1.49 g/cm<sup>3</sup>**

Molecular Weight **119.38 g/mol**

BP **61.2 °C**

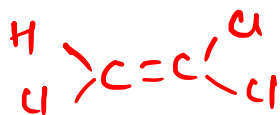
MP **-63.5 °C**

### Uses

- ✓ **anesthetic:** Chloroform was used as an inhaled anesthetic in surgery and dentistry between the 19th century and the first half of the 20th century. It is a powerful general anesthetic, euphoriant, anxiolytic, and sedative when inhaled or ingested. However, it is now part of the FDA drug products withdrawn or removed from the market for reasons of safety or effectiveness.
- ✓ **Solvent:** Chloroform is used as an extraction solvent for fats, oils, greases, rubber, waxes, gutta-percha, resins, lacquers, floor polishes, artificial silk manufacture, gums, and adhesives. It is also used as an industrial solvent in the extraction and purification of some antibiotics, alkaloids, vitamins, and flavors.
- ✓ **Other uses:** Chloroform is also used as a precursor to refrigerants and PTFE



## 3. Trichloroethylene $\text{ClCH}=\text{CCl}_2$ , 1,1,2-Trichloro ethene (TCE)



### Uses

- ✓ **Anesthesia:** Used in anaesthesia for its analgesic properties, which are effective at low concentrations of the drug. Used as a supplementary agent during "nitrous oxide" and oxygen anaesthesia.
- ✓ **Solvent:** Used as a solvent to remove grease from fabricated metal parts and some textiles.
- ✓ It is also used as an ingredient in adhesives, paint removers, typewriter correction fluids and spot removers.
- ✓ As a Fumigents

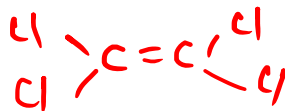
### Properties

colorless, non-flammable, volatile liquid

Density	<b>1.46 g/cm<sup>3</sup></b>
Molecular Weight	<b>131.4 g/mol</b>
BP	<b>87.2 °C</b>
MP	<b>-73 °C</b>



## 4. Tetrachloroethylene $\text{Cl}_2\text{C}=\text{CCl}_2$ , 1,1,2,2-Tetrachloro ethene perchloroethylene (PCE)



### Uses

- ✓ Tetrachloroethylene, introduced in 1925, replaced the more toxic carbon tetrachloride as the standard drug for the treatment of infection with chlorine
- ✓ Used in Hookworm infection
- ✓ Dry cleaning ✓
- ✓ Metal degreasing ✓
- ✓ Textile industry ✓
- ✓ Printing industry ✓
- ✓ Coal industry ✓
- ✓ Anthelmintic agent
- ✓ Insulating fluid and cooling gas in aerosol formulations

### Properties

Colorless liquid

Density **1.62 g/cm<sup>3</sup>**

Molecular Weight **165.83 g/mol**

BP **121.1 °C**

MP **-19 °C**



## 5. Dichloromethane $\text{CH}_2\text{Cl}_2$ , (DCM), Methylene Chloride

### Uses

- ✓ Dichloromethane is used as a solvent in food technology.
- ✓ It is used in aerosol formulations.
- ✓ It is an ethane foam blowing agent.
- ✓ Used as a solvent in the manufacturing of pharmaceutical products.
- ✓  $\text{CH}_2\text{Cl}_2$  is used as a degreasing agent.
- ✓ Used in the manufacturing of electronics.

### Properties

Colorless liquid

Molecular Weight      **84.93 g/mol**

Density      **1.3266 g/cm<sup>3</sup>**

Melting Point      **-96.7 °C**

Boiling Point      **39.6 °C**



## 6. Tetrachloromethane $\text{CCl}_4$ , Carbon Tetrachloride

### Uses

- ✓ For Research- Inducing Hepatotoxicity
- ✓ Carbon tetrachloride is used as a chlorine source in a named reaction known as the "Appel reaction".
- ✓ It is also used to reveal the watermarks that are placed on stamps without causing any damage to the stamp in the process.
- ✓ Carbon tetrachloride was also used as a component in the manufacture of lava lamps.
- ✓ Historically,  $\text{CCl}_4$  has been used in proton NMR spectroscopy. And formation of chlorofluorocarbons for refrigeration

### Properties

Colourless, non-flammable liquid

Molecular Weight      **153.8 g/mol**

Density      **1.5867 g/cm<sup>3</sup>**

Melting Point      **-22.93 °C**

Boiling Point      **76.72 °C**