

CLASSROOM PROGRAMME

CLASS X CBSE- CHEMISTRY

SHORT NOTES

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CHAPTER-1

CHEMICAL REACTIONS AND EQUATIONS

CHEMICAL REACTION

- Chemical reaction is the process by which two or more substance react with each other to form new substance with different properties.

Eg: Rusting of iron

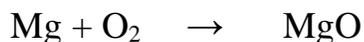
- These are the following changes to determine that the chemical reaction has take place.
 - ✓ Change in state
 - ✓ Change in color
 - ✓ Evolution of gas
 - ✓ Change in temperature

CHEMICAL EQUATION

Individual Tuition Concept

- A chemical equation is the symbolic representation of a chemical reaction in the form of symbols and formulae.

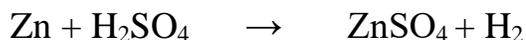
Eg: Magnesium + Oxygen → Magnesium oxide



❖ **Balanced chemical equation**

- A balance equation occurs when the number of the atoms involved in the reactants side is equal to the number of atoms in the products side.

Eg: Zinc + Sulphuric acid → Zinc sulphate + Hydrogen

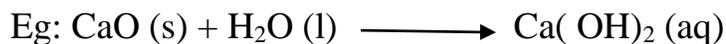


TYPES OF CHEMICAL REACTIONS

- ✓ Combination reaction
- ✓ Decomposition
- ✓ Displacement
- ✓ Double displacement
- ✓ Redox reaction

❖ Combination

- Single product is formed from two or more reactants.



- Combination reactions are exothermic in nature
- Exothermic reaction: Reactions in which heat is released along with the formation of products.
Eg: Burning of natural gases

❖ Decomposition

Individual Tuition Concept

- Single reactant break down to give simpler products on the application of heat, electricity or light.
- $AB \longrightarrow A+B$
Eg: $\text{CaCO}_3 \text{ (s)} \xrightarrow{\text{heat}} \text{CaO (s) + CO}_2 \text{ (g)}$
- Decomposition reaction carried out by the presence of heat is called thermal decomposition.
- Decomposition reaction is endothermic in nature.
- Endothermic reaction: The reaction in which the heat is absorbed and cools the surroundings.

❖ Displacement reaction

- Chemical reaction in which a more reactive element displaces a less reactive element from its compound.
- Both metals and non-metals take part in displacement reaction.



❖ Double displacement

- A chemical reaction in which two compounds react, and the positive ions and the negative ions of the two reactants switch places, forming two new compounds or products.
- Also known as double replacement reaction.



❖ Redox reaction

- An oxidation-reduction reaction or redox reaction is any chemical reaction in which the oxidation number of a molecule, atom or ion changes by gaining or losing an electron.



ZnO – Oxidising agent, C – reducing agent

- Reduction: The process involves gain of hydrogen or loss of oxygen.
- Oxidation: the process involves gain of oxygen or loss of hydrogen.
- Oxidising agent: A substance that oxidises another substance and self gets reduced.
- Reducing agent: A substance that reduces another substance and self gets oxidized.

EFFECT OF OXIDATION

❖ Corrosion

- The process of slow conversion of metal into their undesirable compounds due to the reaction with oxygen, water, acids, gases etc. present in the atmosphere.

Eg: black coating on silver

- Corrosion causes damages to all objects made of metals, especially those of iron.

❖ Rancidity

- The taste and odour of food materials containing fat and oil changes when they are left exposed to air for long time, due to the oxidation of fat and oil present in the food materials. This is called rancidity.

DO YOU KNOW ?

A few fats go rancid faster than the others, and exposure to heat and/or light accelerates the process. At the same time, saturated fat is the most stable one and can last for some months or even a year or two. The monounsaturated fat quickly goes rancid, but it is still fairly stable. For example, we can store lard (around 50–50 monounsaturated or saturated) in a non-airtight and unrefrigerated container for several months, and still, it will still be fine.

POINTS TO REMEMBER

- ✓ The process by which two or more substances react with each other to form new substances is called a chemical reaction.
- ✓ A chemical equation is the symbolic representation of a chemical reaction.
- ✓ Combination reaction: A chemical reaction where two or more elements or compounds combine to form a single product.
- ✓ Decomposition reaction: A chemical reaction in which one reactant breaks down into two or more products.
- ✓ A displacement reaction is the one wherein the atom or a set of atoms is displaced by another atom in a molecule.
- ✓ A double displacement reaction is a type of reaction where part of one reactant is replaced by part of another reactant.
- ✓ Redox reaction : A type of chemical reaction that involves a transfer of electrons between two species.
- ✓ Corrosion: The process of slow conversion of metal into their undesirable compounds due to the reaction with oxygen, water, acids, gases etc.
- ✓ Rancidity : The taste and odour of food materials containing fat and oil changes when they are left exposed to air for long time, due to the oxidation of fat and oil present in the food materials.

CHAPTER-2

ACIDS, BASES AND SALTS

ACIDS

- Acids have a sour taste.
- It turns blue litmus to red
- Acidic solution conduct electricity
- In aqueous solutions acids release H^+ ions.

❖ Chemical properties

- Reactions with metals: Acid gives hydrogen gas along with respective salt when they react with a metal.



- Reaction with metal carbonate: Acid gives carbon dioxide gas and respective salt along with water when they react with metal carbonate.



- Reaction with bicarbonate: Acid gives carbon dioxide gas, respective salt and water when they react with metal hydrogen carbonate.



- Reaction with Metal oxides: Metal oxides are basic in nature. Thus when they react with an acid both neutralize each other. Also salt and water formation occur.



DO YOU KNOW?

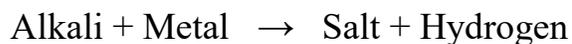
Formic acid is an irritating chemical present in the sprayed venom of some ant species and in the secretion released from some stinging nettles. It's dangerous at high concentrations, but at low concentrations it's very useful. Humans use formic acid as a food preservative, since it's an antibacterial substance. It's also used to kill pests, to produce food and cosmetic additives, and to help a variety of industrial processes to occur.

BASES

- Bases have bitter taste and soapy touch.
- It turns red litmus to blue.
- Bases conduct electricity in solution
- In aqueous solution bases releases OH^- ions.

❖ Chemical properties

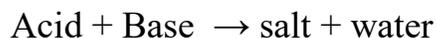
- Reaction with metals: Alkali (base) reacts with metal, it produces salt and hydrogen gas.



- Reactions with oxides of non metals: Non metal oxides are acidic in nature. When a base reacts with non metal oxide, both neutralize each other.

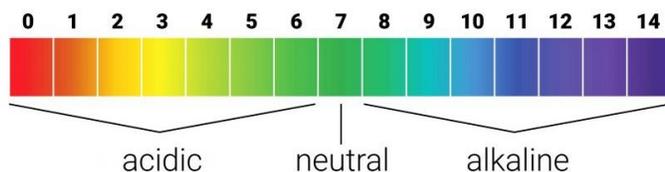


- Neutralisation reaction: An acid neutralizes a base when they reacts with each other and respective salt and water.



❖ Strength of acids and bases

- **Universal indicator:** It is a mixture of several indicators. It shows different colours at different concentrations of H^+ ions in the solution.
- **pH scale:** A scale of measuring H^+ concentration in a solution.
- For water or neutral solution $pH = 7$
- For acidic solutions $pH < 7$
- For basic solution $pH > 7$
- pH paper shows different colour over the range of pH value from 1 to 14 for a given solution.



❖ Role of pH everyday life

- **pH in our digestive system:** Dilute hydrochloric acid helps in digestion in our stomach. Excess acid in stomach causes acidity. Antacids like magnesium hydroxide also known as milk of magnesia and sodium hydrogen carbonate are used to neutralize excess acid.
- **Tooth decay caused by acids:** The bacteria present in our mouth converts the sugar into acids. When the pH of acid formed in the mouth falls below 5.5, tooth decaying starts. The excess acid has to be removed by cleaning the teeth with a good quality toothpaste because these kinds of tooth paste are alkaline in nature.

SALTS

❖ Physical properties

- Most of the salts are crystalline odourless solids

- Soluble in water
- Solution of the salts conduct electricity in their molten state also.
- The salt may be salty, sour, sweet, bitter taste.

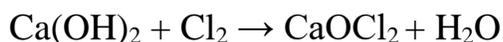
❖ Important compounds

1. Common salt/ Sodium chloride

- It is formed after the reaction between sodium hydroxide and hydrochloric acid.
- It is a neutral salt
- Important chemical from sodium chloride is sodium hydroxide (NaOH)
 - ✓ NaOH is a strong base
 - ✓ It is also known as caustic soda
 - ✓ It is obtained by the electrolytic decomposition of solution of sodium chloride.
 - ✓ Sodium chloride decomposes to form sodium hydroxide.

2. Bleaching powder (CaOCl₂)

- It is produced by the action of chlorine on dry slaked lime [Ca(OH)₂]
- Bleaching powder is also known as chloride of lime.



- Uses of bleaching powder;
 - ✓ For bleaching cotton in the textile industry and for bleaching wood pulp in paper industries.
 - ✓ As an oxidizing agent in many chemical industries.
 - ✓ Disinfectant to clean water, moss remover, weed killer

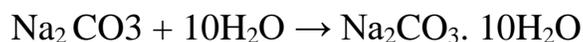
3. Baking soda (NaHCO₃)

- It is a mild non-corrosive basic salt.
- The chemical name of baking soda is sodium hydrogen carbonate or sodium bicarbonate.

- Uses of baking soda;
 - ✓ As an antacid
 - ✓ Cleansing of ornaments made of silver.
 - ✓ Making of baking powder, which is used in cooking.

4. Washing soda ($\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$)

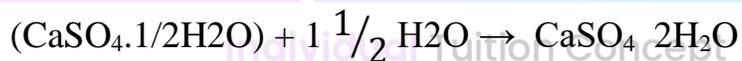
- Recrystallisation of sodium carbonate gives washing soda.



- Uses of washing soda;
 - ✓ Used in glass, paper, and soap industries.
 - ✓ Used in the manufacture of borax.
 - ✓ It is used for removing permanent hardness of water.

5. Plaster of paris ($\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$)

- On heating gypsum ($\text{CaSO}_4 \cdot \text{H}_2\text{O}$) at 373K, it loses water molecule and becomes plaster of paris.
- It is a white powder and on mixing with water it changes to gypsum.



- Uses of plaster of paris;
 - ✓ For supporting fractured bones in right positions.
 - ✓ Making toys and materials for decoration.

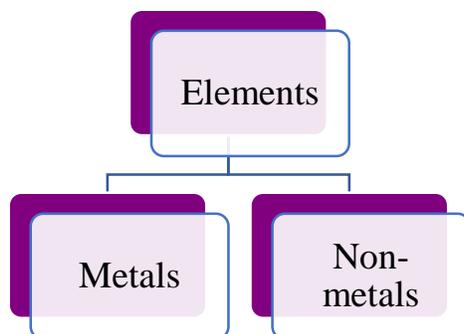
POINTS TO REMEMBER

- ✓ A substance that tastes sour in water, turns blue litmus red, and neutralises the bases is known as an acid.
- ✓ If a substance's aqueous solution tastes bitter, turns red litmus blue, or neutralises acids, it's called a base.
- ✓ Salt is a neutral material that has no effect on litmus in an aqueous solution.
- ✓ pH scale: A scale of measuring H^+ concentration in a solution.
- ✓ For water or neutral solution $pH = 7$
- ✓ For acidic solutions $pH < 7$
- ✓ For basic solution $pH > 7$
- ✓ Sodium chloride ($NaOH$) is neutral salt, formed after the reaction between sodium hydroxide and hydrochloric acid.
- ✓ Bleaching powder ($CaOCl_2$) is produced by the action of chlorine on dry slaked lime.
- ✓ Baking soda ($NaHCO_3$) is a mild non-corrosive basic salt.
- ✓ Recrystallisation of sodium carbonate gives washing soda ($Na_2CO_3 \cdot 10H_2O$)
- ✓ On heating gypsum ($CaSO_4 \cdot H_2O$) at $373K$, it loses water molecule and becomes plaster of paris ($CaSO_4 \cdot 1/2H_2O$)

CHAPTER-3

METALS AND NON METALS

- Elements can be classified as metals and non metals on the basis of their properties.



- Metals: Iron, silver etc.
- Non-metals: Nitrogen, Sulphur etc.

❖ Physical properties

Properties	Metals	Non-metals
Lustre	Have shining surface	Don't have shining surface. Exception: iodine
Hardness	They are Hard. Exception: Na, Li, K	They are Soft. Exception: Diamond
States	Exist as solid. Exception: Mercury	Exist as solids or gaseous. Except Bromine
Malleability	Can be beaten into thin sheets. Eg: Gold, silver	Non- malleable

Ductility	Metals can be drawn into thin wires.	Non-ductile
Conduction of heat & electricity	Good conductor of heat and electricity.	Poor conductors. Except Graphite.
Density & melting point	High density and melting point. Except Na and K	Low density and melting point
Sonorous	Produce a sound on strike a hard surface	They are not sonorous

■ Chemical properties

■ Reaction of metal with air

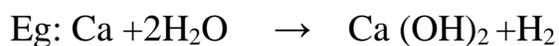
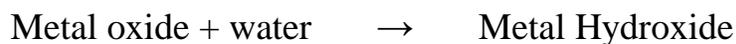
- ✓ Metal combines with oxygen to form metal oxide



- ✓ Different metals shows different reactivity towards oxygen.
- ✓ Na and K reacts vigorously that they can catch if kept open. So they are kept immersed in kerosene.

■ Reaction of metals with water

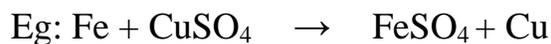
- ✓ Metal + water \rightarrow Metal oxide+ hydrogen



■ Reaction of metals with acids

- ✓ Metals + dilute Acid \rightarrow salt + H₂
- ✓ Eg: $\text{Fe} + 2\text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2$

- Reaction with solution of metal salt
 - ✓ Reactive metals can displace less reactive metals from their compounds in solution form.



DO YOU KNOW?

Aqua regia is a Latin word for royal water. It is a special liquid which can dissolve noble metals like gold, platinum, palladium. Gold usually does not react with other chemicals. Aqua regia is a mixture of two acids and it does not have a chemical formula. However it can be represented by $\text{HNO}_3 + \text{HCl}$ which indicates hydrochloric acid and nitric acid. Aqua regia is used for purification purpose of gold and platinum.

❖ Reactivity series

Individual Tuition Concept

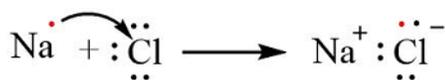
- A list of metals arranged in the order of their decreasing activities.

Reactivity series of metals		
K	Potassium	<p>Most reactive</p> <p>↑</p> <p>Increasingly reactive</p> <p>↓</p> <p>Least reactive</p>
Na	Sodium	
Ca	Calcium	
Mg	Magnesium	
Al	Aluminium	
Zn	Zinc	
Fe	Iron	
Sn	Tin	
Pb	Lead	
Cu	Copper	
Hg	Mercury	
Ag	Silver	
Au	Gold	

▪ Reactions of metals with non-metals

- ✓ Reactivity of the element is the tendency to attain a completely filled valence shell.
- ✓ Atoms of the metals loses electron from their valence shell to form cations.
- ✓ Atoms of the non metals gains electron from their valence shell to form anions.

Eg: Formation of NaCl



IONIC COMPOUNDS

The compound formed by the transfer of electron from a metal to non metal are called ionic compounds

❖ Properties

- They are solid and hard, generally brittle
- They have high melting and boiling points
- Conduct electricity in molten or solution state but not in solid state.
- They are soluble in water and insoluble in petrol, kerosene etc.

OCCURRENCE OF METALS

- **Minerals:** Elements or compounds which occur naturally in the earth crust.

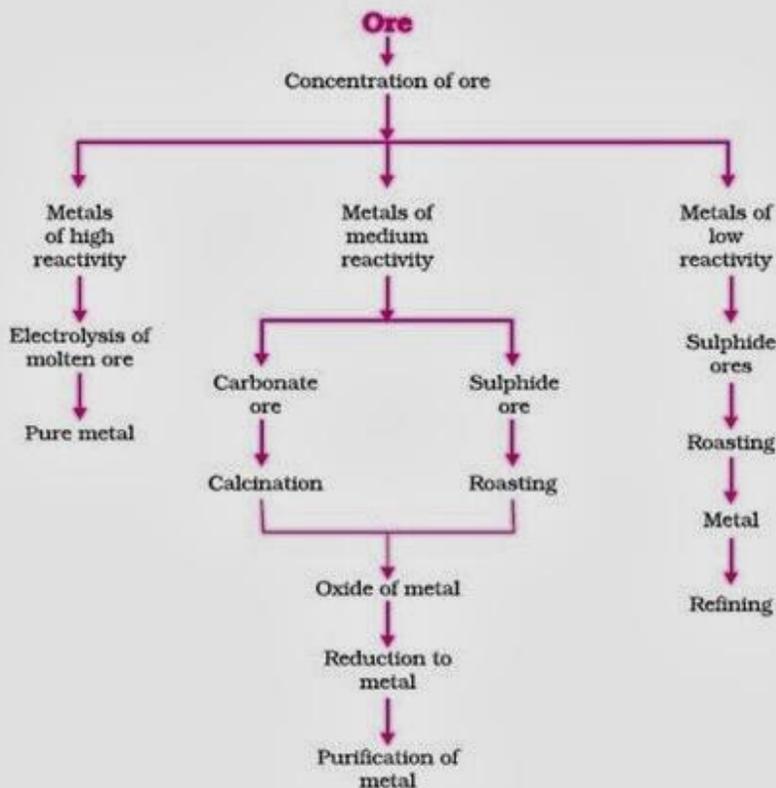
- **Ores:** Minerals that contains high percentage of particular metals. The metals can be extracted from it.

❖ Extraction of metals

1. Enrichment of ores

- Ore mined from the earth contain large amount of impurities such as sand, soil etc. It is called gangue.
- Prior to the extraction of metal, based on the difference between the physical or chemical properties of the gangue and the ore.

2. Extraction of metal from ores



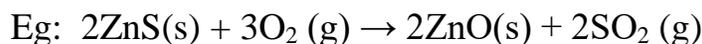
▪ **Extraction of the metals low in reactivity series;**

- ✓ These metals are generally very unreactive.
- ✓ Oxides of these can be reduced to metals by heating alone.

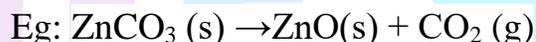


▪ **Extraction of the metals in the middle of the reactivity series;**

- ✓ Its easy to obtain a metal from its oxide compared to its sulphide and carbonate.
- ✓ Roasting is a process of converting sulphide ores into oxides by heating strongly in the presence of excess air.

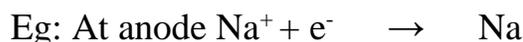


- ✓ Calcination is a process of converting carbonate ores into oxides by heating strongly in limited air.



▪ **Extraction of metals high in the reactivity series;**

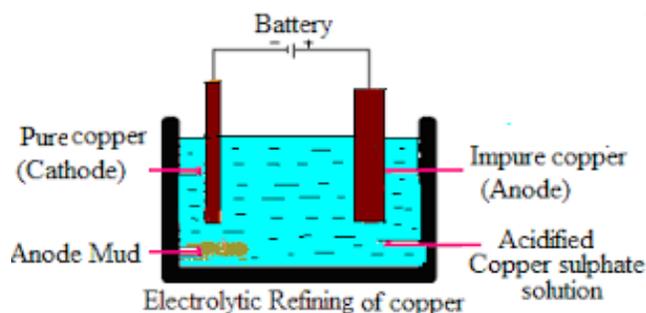
- ✓ Since these are very reactive metals and thus cannot be obtained by displacement reaction. These metals are obtained by electrolytic refining.
- ✓ They are generally obtained by electrolysis of their molten chlorides. Metals are deposited at cathode, while chlorine is liberated at anode.



3. Refining of metals

- Removing impurities from a metal and purifying is called refining of metals

Electrolytic refining;



- ✓ Anode – impure copper
- ✓ Cathode – strip of pure copper
- ✓ Electrolyte- acidified copper sulphate solution
- ✓ On passing the current through electrolyte, the impure metal from anode dissolves into the electrolyte.
- ✓ An equivalent amount of pure metal from the electrolyte is deposited at the cathode.
- ✓ The insoluble impurities settle down at the bottom of the anode, which is known as anode mud.

Individual Tuition Concept

CORROSION

- It is the process of formation of a layer on the surface of some metals, when they are exposed to moist air for long time.

Eg: Silver turns to black colour when exposed to air.

❖ Prevention of corrosion

- The rusting of iron can be prevented by painting, oiling, greasing, galvanizing etc.
- Galvanization is the method of protecting steel and iron from rusting by coating them with a thin layer of zinc.

POINTS TO REMEMBER

- ✓ Elements are classified into metals and non- metals.
- ✓ Most of the metals, in their pure state, have a shining surface. This property is called metallic lustre.
- ✓ Malleability is the property of metals by which they can be beaten into thin sheets.
- ✓ Ductility is the Capacity of a material to deform permanently (e.g., stretch, bend, or spread) in response to stress.
- ✓ Metals make a ringing sound when we strike them. The property by virtue of which metals make a ringing sound is called sonority.
- ✓ Non-metals will not have this properties.
- ✓ Reactivity series is a list of metals arranged in the order of their decreasing activities.
- ✓ Ionic compounds: The compound formed by the transfer of electron from a metal to non metal.
- ✓ Elements or compounds which occur naturally in the earth crust are called minerals.
- ✓ Minerals that contains high percentage of particular metals are called ores.
- ✓ Extraction of metals:
 - Enrichment of ores
 - Extraction of metals from ores
 - Refining of metals
- ✓ Corrosion is the process of formation of a layer on the surface of some metals, when they are exposed to moist air for long time.
- ✓ The rusting of iron can be prevented by painting, oiling, greasing, galvanizing.

CHAPTER-4

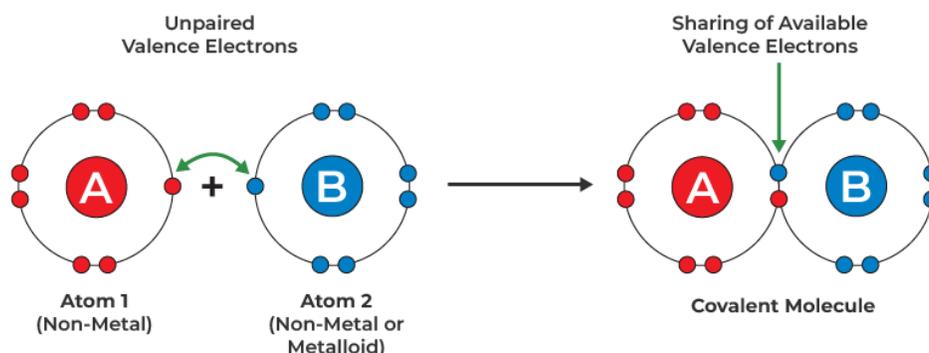
CARBON AND ITS COMPOUNDS

BONDING IN CARBON

- If the carbon atom loses 4 of its valence electrons to achieve the nearest inert gas electronic configuration (He), a huge amount of energy is involved.
- C^{4+} ion hence formed will be highly unstable, due to the presence of 6 protons and 2 electrons.
- If the carbon atom gains 4 electrons to achieve the nearest inert gas electronic configuration (Ne), C^{4-} ion will be formed. But again a huge amount of energy is required.
- And in C^{4+} ion it is difficult for 6 proton to hold 10 electrons. Hence to satisfy its tetra valency, carbon shares all 4 of its valence electrons and forms covalent bonds.

❖ Covalent bond

- The bond formed by mutual sharing of electron pairs between two atoms in a molecule is known as covalent bond.



- Single covalent bond: When a single pair of electrons are shared between two atoms in a molecule.
Eg: F₂, Cl₂ etc.
- Double covalent bond: When a pair of electrons are shared between two atoms in a molecule.
Eg: O₂, CO₂, etc.
- Triple covalent bond: When three pairs of electrons are shared between two atoms in a molecule.
Eg: N₂
- Covalent compounds have low melting and boiling points as they have weak intermolecular force.
- They are poor conductor of electricity.

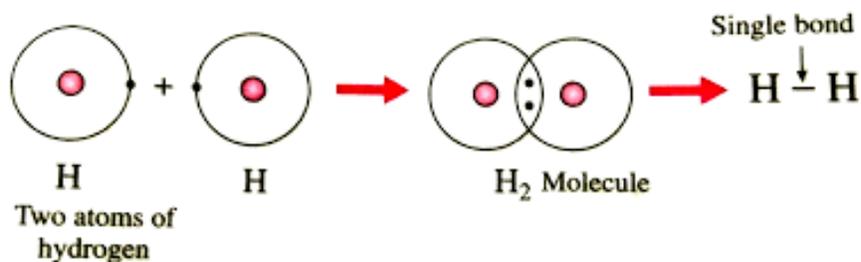
ELECTRON DOT STRUCTURE

- It provides a picture of bonding in molecules in terms of shared pair of electrons.
- These are basically diagrams with the element's symbol in the centre and dots around it represents the valence electrons.

❖ Formation of H₂ molecule

Atomic number of hydrogen = 1

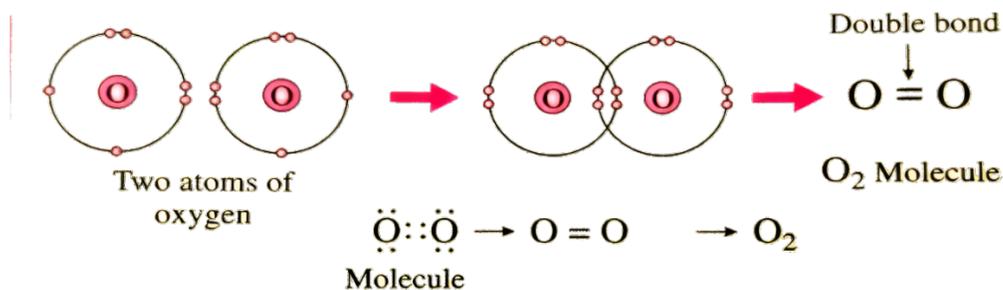
Number of valence electron = 1



❖ Formation of O₂ molecule

Atomic number of oxygen = 8 [2,6]

Number of valence electron = 6



VERSATILE NATURE OF CARBON

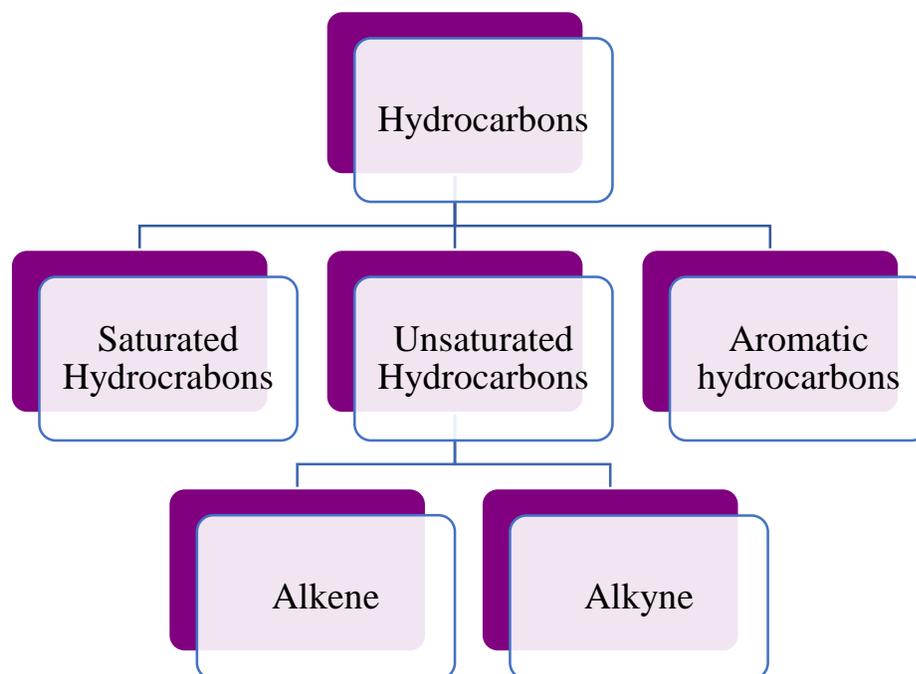
The two characteristic properties of carbon elements which leads to the formation of large number of compounds:

- **Catenation:** The property of carbon element due to which its atom can join one another to form long carbon chain
- **Tetravalency:** Carbon has a valency of 4. So it is capable of bonding with 4 other atoms of carbon or atoms of some other heteroatoms with single as well as double covalent bonds.

HYDROCARBONS

- Compounds of carbon and hydrogen are known as hydrocarbons.

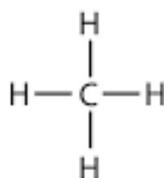
Eg: Methane, Ethene, Ethyne etc.



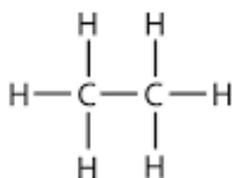
❖ Saturated hydrocarbons (Alkane)

- General Formula is C_nH_{2n+2}
n- Number of carbon atoms
- In saturated hydrocarbons, the a carbon atoms are connected by only a single bond.
- Also known as alkanes.

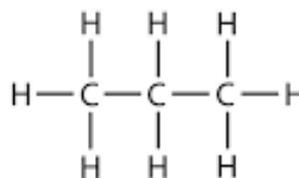
Eg: Methane (CH_4), Ethane (C_2H_6) etc.



Methane



Ethane



Propane

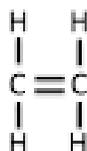
❖ Unsaturated hydrocarbons

- These hydrocarbons have at least one carbon-carbon double or triple bond.

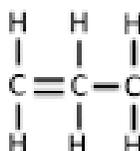
- Hydrocarbons with at least one carbon-carbon double bonds are called alkenes.
- General formula of alkene is C_nH_{2n}

Eg:

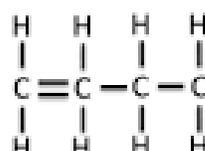
ethene
 C_2H_4



propene
 C_3H_6

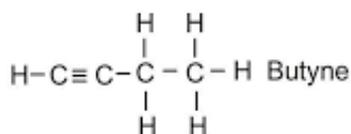
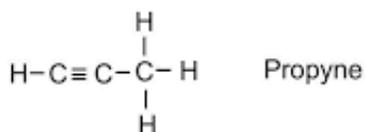


butene
 C_4H_8



- Hydrocarbons with at least one carbon-carbon triple bond are called alkynes
- General formula of alkyne is C_nH_{2n-2}

Eg:

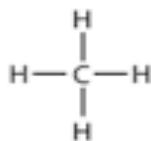


INTERVAL

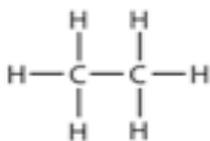
Revision Concept

STRUCTURE OF HYDROCARBONS

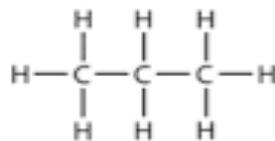
▪ Straight chain:



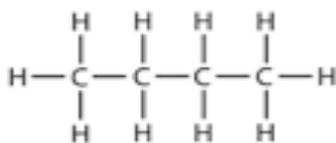
Methane - CH_4



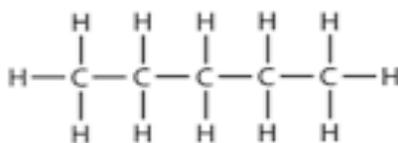
Ethane - C_2H_6



Propane - C_3H_8

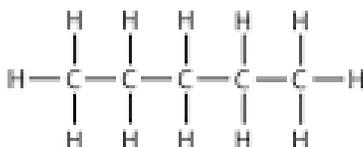


Butane - C_4H_{10}

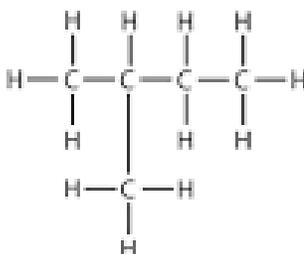


Pentane - C_5H_{12}

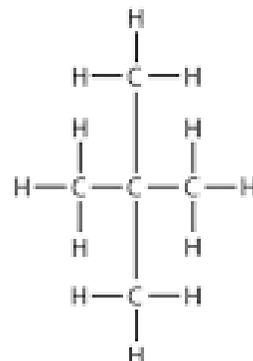
▪ Branched:



Pentane

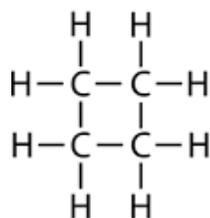


Isopentane

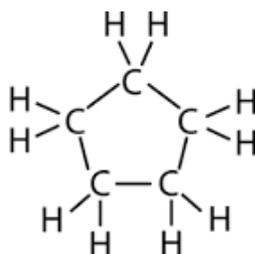


Neopentane

- Ring or cyclic



cyclobutane



cyclopentane

- Functional group: An atom or group of atom present in a molecule which largely determines its chemical properties are called Functional group.

❖ Homologous series

- Series of organic compounds in which some functional groups substitute for the hydrogen in a carbon chain.

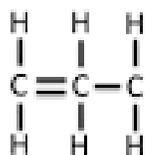
Eg: alcohols

- They have same general formula
- They have same chemical properties but different physical properties.
- Any two homologous differ by CH_2 group and difference in molecular mass is 14μ

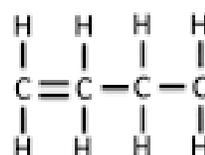
ethene
 C_2H_4



propene
 C_3H_6



butene
 C_4H_8



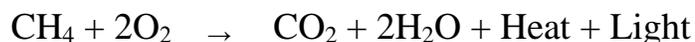
NOMENCLATURE OF CARBON COMPOUNDS

- ✓ Identify the number of carbon atoms in compounds.
- ✓ Functional group id indicated by suffix or prefix.

Functional group	Prefix/Suffix	Example
1. Halogen	Prefix-chloro, bromo, etc.	$ \begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{Cl} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array} $ Chloropropane
		$ \begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{Br} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array} $ Bromopropane
2. Alcohol	Suffix - ol	$ \begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{OH} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array} $ Propanol
3. Aldehyde	Suffix - al	$ \begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}=\text{O} \\ \quad \\ \text{H} \quad \text{H} \end{array} $ Propanal
4. Ketone	Suffix - one	$ \begin{array}{c} \text{H} \quad \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{O} \quad \text{H} \end{array} $ Propanone
5. Carboxylic acid	Suffix - oic acid	$ \begin{array}{c} \text{H} \quad \text{H} \quad \text{O} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{OH} \\ \quad \\ \text{H} \quad \text{H} \end{array} $ Propanoic acid
6. Double bond (alkenes)	Suffix - ene	$ \begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad / \\ \text{H}-\text{C}-\text{C}=\text{C} \\ \quad \quad \backslash \\ \text{H} \quad \quad \quad \text{H} \end{array} $ Propene
7. Triple bond (alkynes)	Suffix - yne	$ \begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{C}\equiv\text{C}-\text{H} \\ \\ \text{H} \end{array} $ Propyne

CHEMICAL PROPERTIES OF CARBON COMPOUNDS

❖ Combustion



- Carbon and its compounds are used as fuel because they burn in air releasing lot of heat energy.
- Saturated hydrocarbon generally burn in air with blue and non- sooty flame.
- Unsaturated hydrocarbon burns in air with yellow sooty flame because percentage of carbon is higher than saturated hydrocarbon which does not get completely oxidized in air.

❖ Oxidation

- Oxidation is chemical reaction that occurs in an atom or compound and results in the loss of one or more electrons.
- Alcohols can be converted to carboxylic acid in presence of oxidizing agent alkaline KMnO_4 or acidic Potassium dichromate.

❖ Addition Reaction

- Unsaturated hydrocarbon add hydrogen in the presence of palladium catalyst or nickel. Vegetable oils are converted into ghee using this process.

❖ Substitution reaction



ETHANOL/ ETHYL ALCOHOL

❖ Physical properties:

- Colourless, pleasant smell and burning taste.
- Soluble in water

- Volatile liquid with low boiling point
- Neutral compound

❖ Chemical properties:

- Reaction with Na



- Reaction with concentrated H₂SO₄



DO YOU KNOW?

Sugarcane plants are one of the most efficient convertors of sunlight into chemical energy. Sugarcane juice can be used to prepare molasses which is fermented to give alcohol (ethanol). Some countries now use alcohol as an additive in petrol since it is a cleaner fuel which gives rise to only carbon dioxide and water on burning in sufficient air (oxygen).

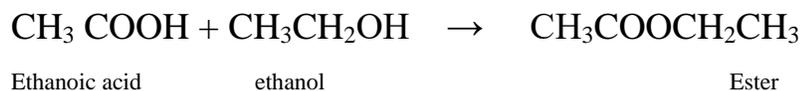
ETHANOIC ACID

❖ Physical properties

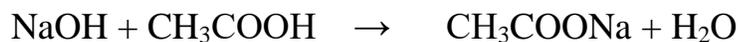
- Colourless liquid having sour taste and have smell of vinegar.
- When pure ethanoic acid freezed, it forms a colourless solid like ice. So it is called glacial acetic acid.

❖ Chemical properties

- Esterification

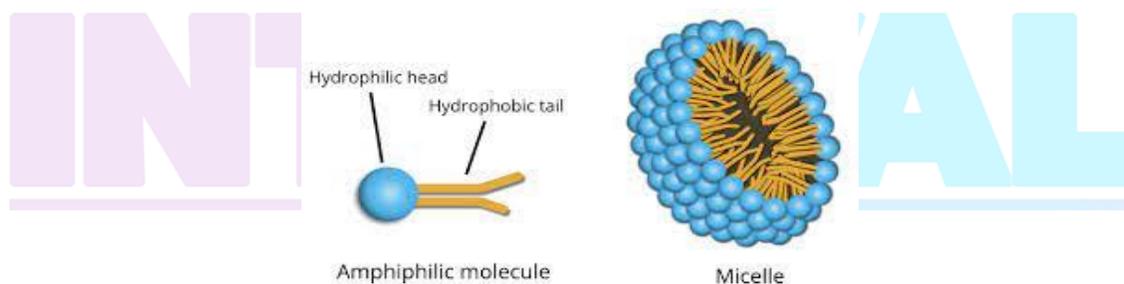


- Reaction with base



SOAPS AND DETERGENTS

- Soap is sodium or potassium salt of long chain carboxylic acid.
- Soap molecule has hydrophilic ionic part and hydrophobic long hydrocarbon part.
- The ionic end of soap interacts with water while the carbon chain interact with oil.
- Thus the soap molecule forms a structure called micelles.



❖ Cleansing action of soap

- Most of the dirt is oily in nature.
- Hydrophobic end of the soap molecule attaches itself with dirt or oil droplet and the ionic end is surrounded with water. It forms an emulsion in water.
- This micelle thus helps in pulling out the dirt in water and we can wash clothes clean.

POINTS TO REMEMBER

- ✓ The bond formed by mutual sharing of electron pairs between two atoms in a molecule is known as covalent bond.
- ✓ Single covalent bond: When a single pair of electrons are shared between two atoms in a molecule. Eg: F_2 , Cl_2
- ✓ Double covalent bond: When a pair of electrons are shared between two atoms in a molecule. Eg: O_2 , CO_2 , etc.
- ✓ Electron dot structure provides a picture of bonding in molecules in terms of shared pairs of electrons.
- ✓ The property of carbon element due to which its atom can join one another to form long carbon chain is called catenation.
- ✓ Carbon has a valency of 4. So it is capable of bonding with 4 other atoms of carbon or atoms of some other heteroatoms with single as well as double covalent bonds. This is called tetravalency.
- ✓ Compounds of carbon and hydrogen are known as hydrocarbons.
- ✓ Hydrocarbons are classified into saturated, unsaturated, Aromatic hydrocarbons.
- ✓ In saturated hydrocarbons, the a carbon atoms are connected by only a single bond. Also known as alkanes
- ✓ Hydrocarbons have at least one carbon-carbon double or triple bond are known as unsaturated hydrocarbons.
- ✓ Unsaturated hydrocarbons are two types: Alkenes and alkynes.
- ✓ Structure of hydrocarbons: Straight chain, branched, ring or cyclic
- ✓ An atom or group of atom present in a molecule which largely determines its chemical properties are called Functional group.
- ✓ Series of organic compounds in which some functional groups substitute for the hydrogen in a carbon chain.

- ✓ Carbon and its compounds are used as fuel because they burn in air releasing lot of heat energy.
- ✓ Oxidation is chemical reaction that occurs in an atom or compound and results in the loss of one or more electrons.
- ✓ Unsaturated hydrocarbon add hydrogen in the presence of palladium catalyst or nickel. Vegetable oils are converted into ghee using this process.
- ✓ Ethanol or ethyl alcohol, ethanoic acid are important compounds of carbon.
- ✓ Soap is sodium or potassium salt of long chain carboxylic acid.
- ✓ Hydrophobic end of the soap molecule attaches itself with dirt or oil droplet and the ionic end is surrounded with water. It forms an emulsion in water. This micelle thus helps in pulling out the dirt in water and we can wash clothes clean.

Individual Tuition Concept