CHEMICAL BONDS AND ITS TYPES

SUBMITTED BY-

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CHEMICAL BONDS AND ITS TYPES

SYNOPSIS

- INTRODUCTION
- DEFINITION
- TYPES
- COVALENT BOND
  - 1)COORDINATE COVALENT BOND
  - 2)ELECTROSTATIC BOND
- NON COVALENT
  - 1)HYDROGEN BOND
  - 2)HYDROPHOBIC BOND
  - 3)HYDROPHILIC BOND
  - 4)VANDERWALL BOND
- OCCURANCE OF BOND IN BIOLOGICAL BONDS
- SUMMARY
- CONCLUSION
- REFERENCES

CHEMICAL BOND AND ITS TYPES

INTRODUCTION

WHAT IS CHEMICAL BOND?

Any of several forces especially ionic bond covalent bond, metallic bond by which atoms or ions are bound in a molecules or crystal.

WHAT IS BOND?

force which holds two atoms together, formed by the electrostatic force of attraction between opposite charges either between electrons and nuclei.

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INTRODUCTION

WHAT IS INTERACTION?

It is a kind of action that occurs as two or more objects have an effect upon One another

CHEMICAL BOND AND ITS TYPES

TYPES

There are two types of bonds

Strong bonds

COVALENT BONDS

ELECTROSTATIC BONDS

Weak bonds

HYDROGEN BONDS

HYDROPHOBIC BONDS

HYDROPHILIC BONDS

VANDERWALL FORCES

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DEFINITION

COVALENT BONDS

- Bonds formed by equal sharing and equal contribution between two combining atoms
- This theory was given by LEWIS

It is the strongest bond among all chemical bonds found

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DIAGRAM OF COVLENT BOND

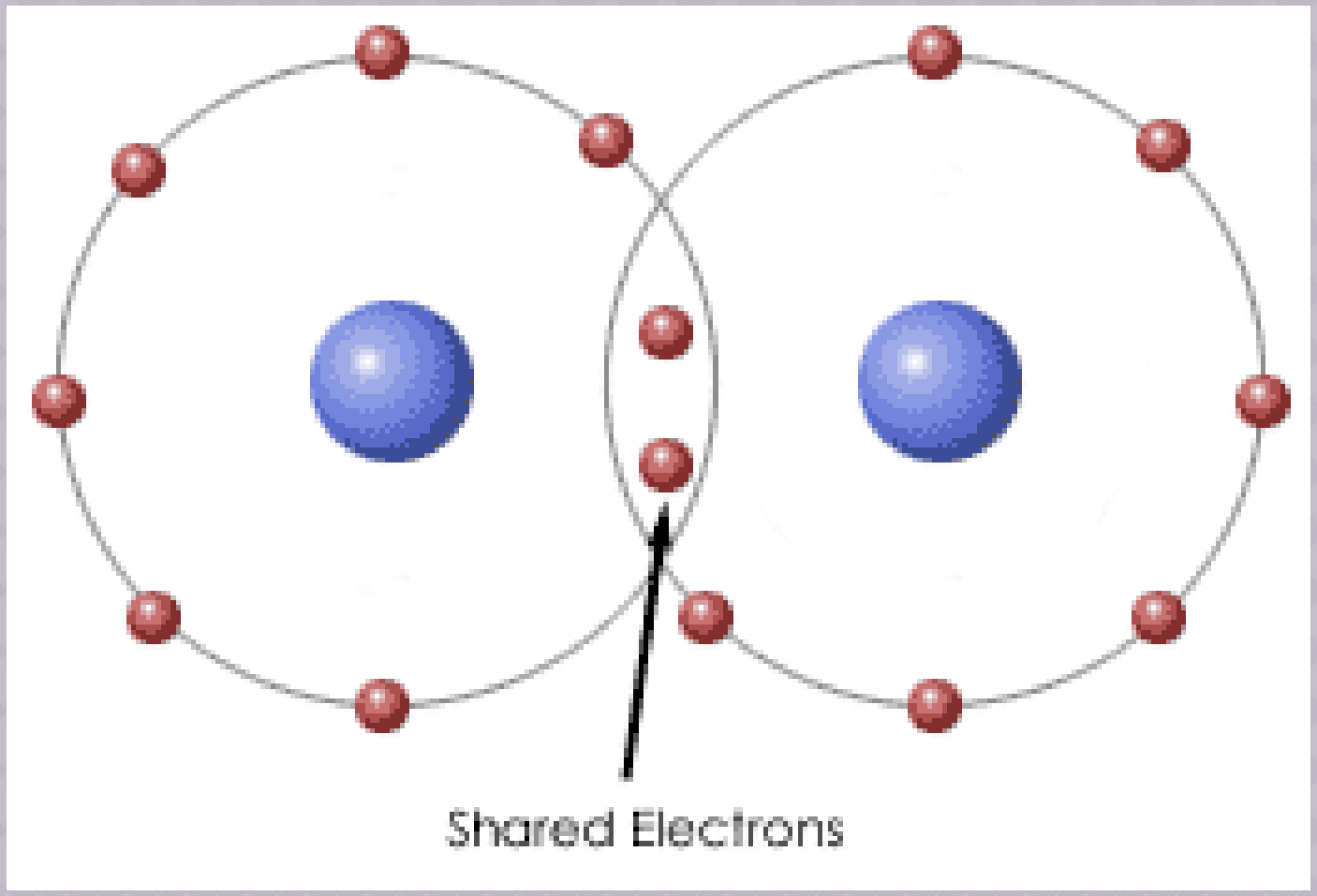
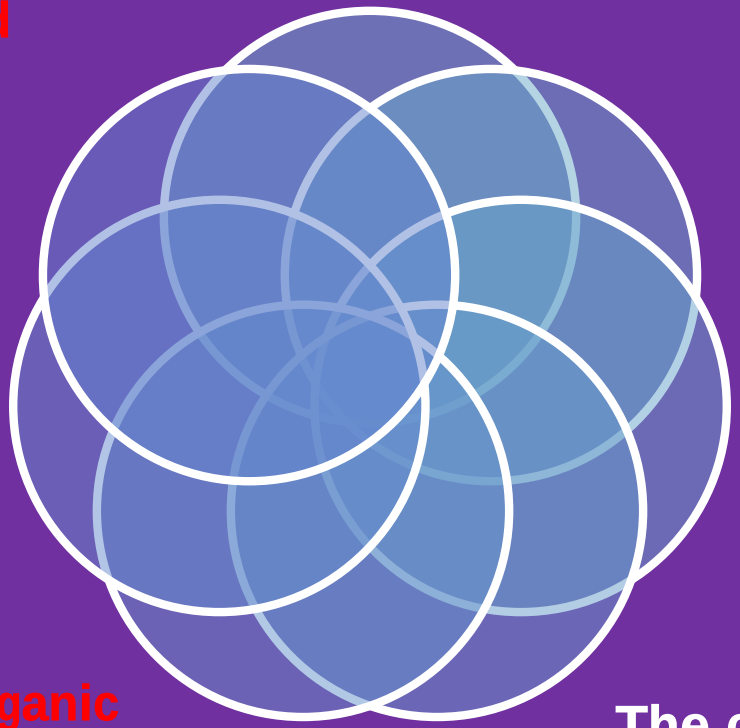


Fig -: 1 covalent bond.

PROPERTIES OF COVALENT BOND

They are usually liquid or gases and are generally soft, easily-fusible and volatile

They are always exist in molecular form and are non electrolytes or non ion sable.



have low melting and boiling points because of weaker nature of bond

They are non conducting.

soluble in organic solvents such as benzene ,ether ,pyrimidine etc

The covalent bond is rigid in structure and directional

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COORDINATE COVALENT

DEFINITION

- Formed by mutual sharing of electrons in same atom
- It is also called as semi polar bond.
- Do not ionize in water

PROPERTIES

- Sparingly soluble in water but dissolve in organic solvents
- Coordinate linkage is very rigid and directional
- Coordinate linkage is semi polar but melting and boiling point are higher than pure covalent and less than ionic bonds
- Coordinate linkage forms independent existence

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EXAMPLES

- Commonly found in heme group and chlorophyll of plants

- In vitamin **B12** it is linked with covalent bonds and nitrogen

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ELETROSTATIC BOND

DEFINITION

- Formed between the atoms by transfer of one or more valence electrons.
- It is also called as ionic bond

PROPERTIES

- High boiling and melting point
- Good conductor of electricity
- Bonds are non directional
- Soluble in polar and inorganic solvents
- Crystalline solid and have rigid shape

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EXAMPLES OF IONIC BOND

- They are found in crystal that are dissolve in water
- **NaCl is a perfect example of ionic bond**
- ***This type of interaction even permits the bonding between two different molecules in heteroproteins***

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DIAGRAM

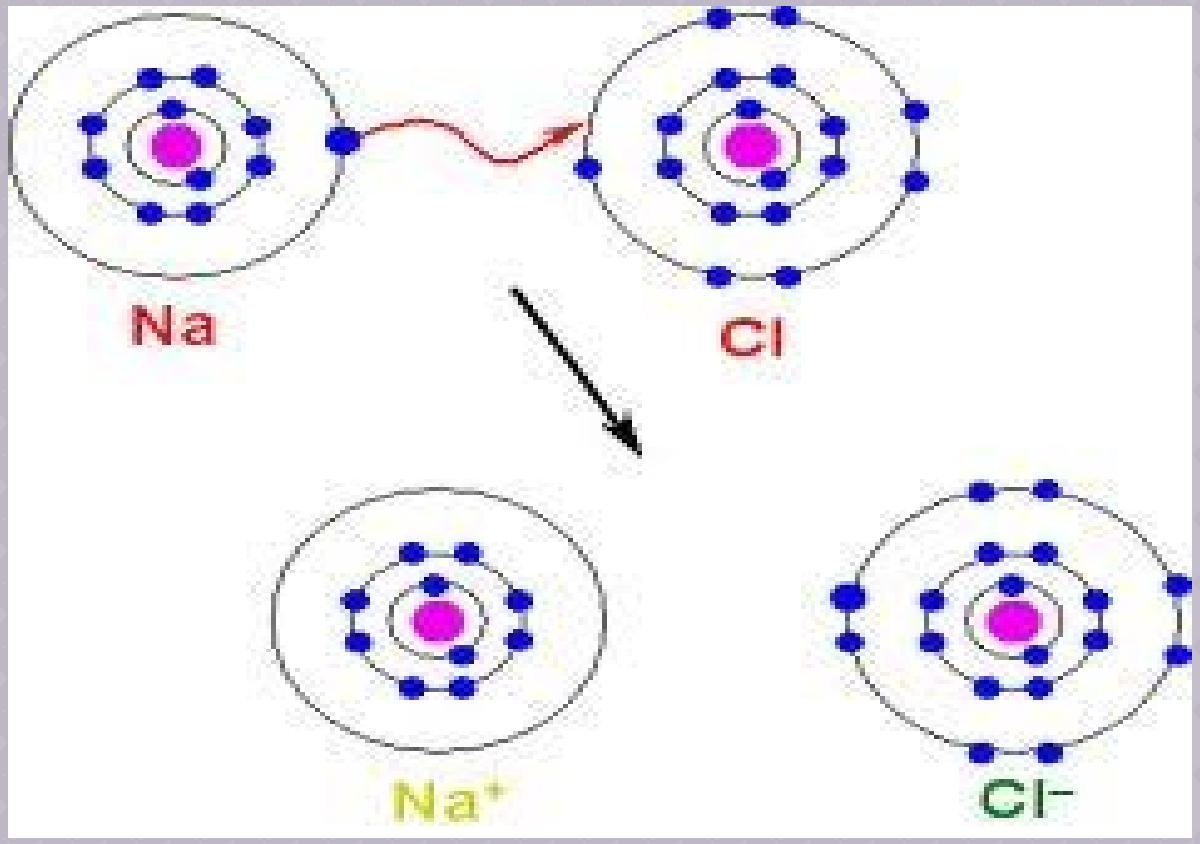

Fig :2 chemical bond

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WEAK BONDS

- *These are those forces of attraction that in biological situation doesn't take a large amount of energy to break.*
- *Some bonds are as hydrogen bonds, vanderwall forces, hydrophobic and hydrophilic interactions.*

1) ***HYDROGEN BONDS:-*** *It is defined as a weak bond which is an intermediate in the transfer of a proton from an acid to a base*

- *a hydrogen atom is shared by two other atoms.*

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HYDROGEN BOND

- *The bond energies of hydrogen bonds range between 2 and 7 Kcal/mol.*
- *Hydrogen bonds in biomolecules such as water are also more specific than other weak bonds because they require particular that group that donate or accept hydrogen.*
- *They are highly directional*
- *They are more specific in water molecules*

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Hydrogen bond is of two types:-

TYPES

INTERMOLECULAR HYDROGEN BONDING

Those bonds which are present in the molecules

- Mainly present in DNA

- Lowers the dielectric constant and increase
- the viscosity

- ## INTRAMOLECULAR HYDROGEN BONDING

They form chelation i.e. 5,6,7- membered rings

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DIAGRAM

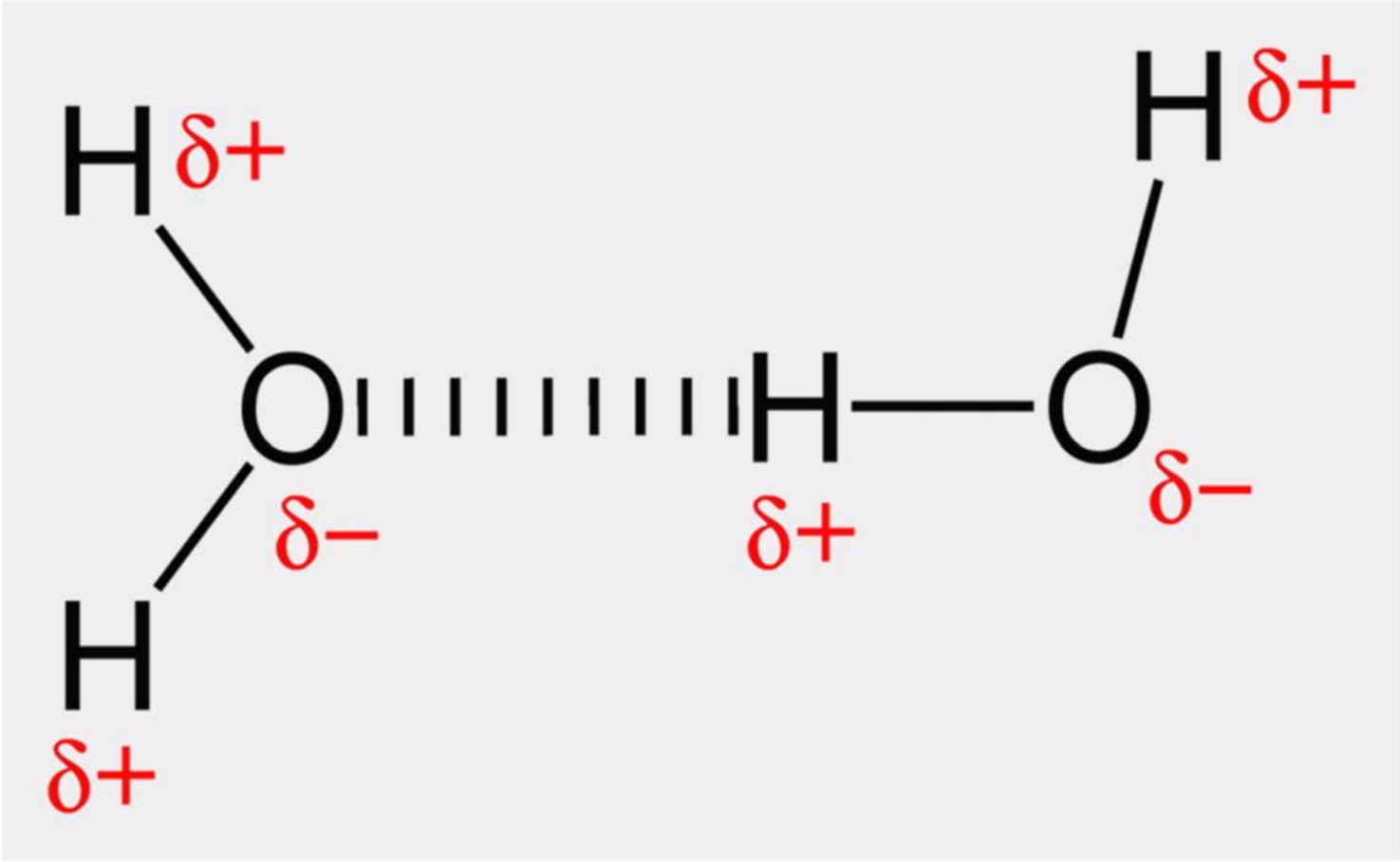

Fig : 3 hydrogen bond

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WEAK BONDS

2)HYDROPHOBIC INTERACTIONS

- Relation between water and lower soluble molecules
- These lower soluble molecules is called hydrophobes
- They are the major driving force in folding of macromolecules and binding of substrates and phosphates
- Hydrophobic bonds are stronger than weak intermolecular bonds and vanderwall forces
- For example proteins they do not react with water so as to follow hydrophobic interactions for as to survive in body

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WEAK BONDS

3)HYDROPHILIC INTERACTIONS

- ***water loving groups or that groups which were easily dissolved in water or any polar substances***
- ***Some hydrophilic substances do not dissolve; this type of mixture is called colloid.***
- ***They attract water out of the air, as in salts and sugars do the same***
- *As in cell membrane there is hydrophilic groups were there outside the plasma membrane such as ribose sugar and phosphate*

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WEAK BONDS

4)VANDERWALL FORCES

- *They are those forces of attraction which is act between dipoles because of rapid movement of electrons on all neutral atoms*

OR

They are the sum of repulsive forces between molecules due to covalent bonds, hydrogen bonds, ionic bonds with each other or with neutral molecules

- *They act when molecules have very short distance between them i.e. 2-4 A^0*
- *They are weaker but are numerous.*
- *It decreases by one-sixth portion to the separated atoms*

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OCCURRENCE OF BONDS IN BIOLOGICAL SYSTEM

- *It includes Hydrocarbons, carbohydrates, proteins and peptide bonds, fatty acid and important double bonds, nitrogenous base*

1)HYDROCARBONS: *-It consists mainly of carbon and hydrogen. Aromatic hydrocarbons (arenes) alkenes, cycloalkanes and alkyne-based compounds are different types of hydrocarbons*

- *The majority of hydrocarbons found naturally occur in crude oil, where decomposed organic matter provides a large amount of carbon and hydrogen which when bonded can form large limitless chains*

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2)CARBOHYDRATES

- ***- It is an organic compound that mainly consists of carbon, hydrogen and oxygen with a ratio of 2:1***

OR

It is called as polyhdyroxy aldehydes and ketones

sucrose,mannose,galactose,starch,glycogen,aldose
And glucose is the main carbohydrate used

- ***Glucose used as a storage of energy***
- **Ribose sugar used as a coenzyme in various components and backbone of genetic material RNA**
- Saccharides and their derivatives include many other important biomolecules that play key roles in the immune system, fertilization, preventing pathogenesis, blood clotting, and development

CHEMICAL BONDING AND ITS TYPES

3)PROTEINS

- **A Proteins is a biochemical compounds consist of polypeptide chains folded in globular or in fibrous form**

- **A polypeptide is a single linear polymer chain of amino acids bonded together by peptide bonds between the carboxyl and amino groups of adjacent amino acid residues**

- Ot***her proteins are important in cell signaling, immune responses, cell adhesion, and the cell cycle.***

- ***Proteins also have structural or mechanical functions, such as actin and myosin in muscle***

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4) LIPIDS

- **lipids are simply another separate group. Lipids are things like fats/acid, triglycerides, cell membrane, sex hormones, and cholesterol. They are made of carbon, hydrogen, and oxygen**

- In lipids there is covalent bond formation takes place

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5)NUCLEIC ACID

- **Each monomer of nucleic acid is a nucleotide and consists of 3 portions:**
- ***a pentose sugar***
- ***one or more phosphate groups***
- ***one of five cyclic nitrogenous base***

- Hydrogen bonds form between specific bases of two nucleic acid chains, forming a stable, double-stranded DNA molecule. Hydrogen bonding twists the phosphate-deoxyribose backbones into a helix, thus typical DNA is a double helix.

CHEMICAL BONDING AND ITS TYPES

SUMMARY

As we know that in ionic bonding electrons are perfectly localized on one of the two atoms in the bond.

WAs we study above that the chemical bonding is a property of a bond to hold atoms, ions and molecules in a chemical species

covalent bonds which are strongest bond of chemical bonds. We discussed its properties that it is non electrolytes and non ionizable, easily fusible and volatile and are very rigid.

Electrostatic bond is discussed later which include transfer of ions between electrons and nuclei are non directional.

Example of ionic bond is there i.e. NaCl.

weak bond which included hydrogen bonds, hydrophobic bond, hydrophilic bonds and vanderwall forces and use of them in biological manner

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CONCLUSION

We found that all the chemical bonds play a vital role in manufacturing our body; in every aspects of life these chemical bonds play an essential role such as in cell membrane, in DNA structure, RNA structure, in lipids and nucleic acids

CHEMICAL BONDING AND ITS TYPES

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THANK YOU