EXERCISE SHORT QUESTION ANSWERS

Q.1 Why do atoms react?

Ans: Atoms react to form chemical bonds in order to get stability. Atoms achieve stability by attaining electronic configuration of inert gases by losing, gaining or sharing of electron.

Q.2 Why is the bond between an electropositive and an electronegative atom ionic in nature?

Ans: The bond between an electropositive and an electronegative atom is ionic in nature because electropositive atom due to low I.E. can lose electron easily and forms a positive ion whereas electronegative atom due to high electron affinity will accept that electron easily and forms a negative ion. In this way positive and negative ions are attracted by electrostatic force of attraction to form ionic bond.

Q.3 Ionic compounds are solids. Justify.

Ans: Ionic compounds are solids because they have strong electrostatic forces of attraction between positively and negatively charged ions which hold them in a three dimensional crystalline or solid form.

Example:

Potassium chloride (KCl) is a crystalline solid.

Q.4 More electronegative elements can form bonds between themselves. Justify.

Ans: More electronegative elements have high values of ionization energy and do not lose electrons. They share electrons between their own atoms to complete their valence shells and form covalent bond.

Q.5 Metals are good conductor of electricity. Why?

Ans: Metals are good conductors of electricity due to presence of mobile or free electrons.

Q.6 Ionic compounds conduct electricity in solution or molten form. Why?

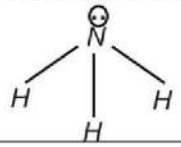
Ans: Ionic compounds conduct electricity in solution or molten form because in these two states ionic compounds have free ions in them. When these free ions move in solution or molten state they become conductor of electricity.

Q.7 What type of covalent bond is formed in nitrogen molecule?

Ans: Triple covalent bond is formed in nitrogen molecule. In nitrogen molecule three bond pairs are involved in bond formation.

Q.8 Differentiate between lone pair and bond pair of electron.

Ans.

Bonded pair	Lone pair
i. Bond pair of electrons is involve in bond formation	**i.** Lone pair of electron is not involved in bond formation.
ii. Electrons of bond pair are contributed by two atoms.	**ii.** Electrons of lone pair are contributed by one atom only.
iii. It is under the influence of two nuclei (atoms)	**iii.** It is under the influence of only one nucleus.
In a ammonia molecule there are three bond pairs of electrons 	

Q.9 Describe at least two necessary conditions for the formation of a covalent bond.

Ans: Necessary conditions:

a. Elements should be electronegative in nature.

b. Electronegativity difference between bonding atoms should be very small or zero.

c. The elements should share the electrons mutually.

d. There should be 4 or more valance electrons.

e. The ionization energies of the elements must be high.

Example: HCl, Cl_2, C_6H_6 and C_2H_2

Q.10 Why HCl has dipole-dipole forces of attraction?

Ans: HCl forms a polar covalent bond atoms due to difference of electro negativity between bonded atoms. There exists a dipole in the molecule. The positive end of one molecule attracts the negative end of there molecule. Hence dipole force. (Intermolecular forces) exist between HCl molecules.

Example:

$$H^{\delta+} — Cl^{\delta-} \text{------} H^{\delta+} — Cl^{\delta-}$$

Q.11 What is a triple covalent bond, explain with an example?

Ans: When each bonded atom contributes three electrons, three bond pairs are involved in bond formation. This type of bond is called triple covalent bond.

Representation:

It is represented by $(\equiv)$.

Example:

Triple covalent bond is formed in nitrogen molecule. In nitrogen molecule three bond pairs are involved in bond formation.

$$:\dot{N}\overset{\times}{\underset{\times}{\dot{M}}}\dot{N}\overset{\times}{\underset{\times}{:}} \longrightarrow :N\overset{\times}{\underset{\times}{\dot{M}}}\dot{N}\overset{\times}{\underset{\times}{:}} \longrightarrow N \equiv N \text{ or } N_2$$

Q.12 What is difference between polar and non-polar covalent bonds, explain with one example of each?

Ans: Difference between polar and non polar covalent

Polar Covalent Bond	Non Polar Covalent Bond
i. *It is a bond formed between two different types of atoms (hetero atoms).*	***i.*** *It is a bond formed between two similar atoms (homo atoms).*
ii. The shared pair of electrons is attracted by both the atoms un equally.	**ii.** The shared pair of electrons is attracted by both the atoms equally.
Examples. H_2, Cl_2, N_2O_2 etc	Examples. HCl, HBr, HF, H_2O etc

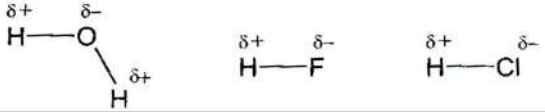
Q.13 Why a covalent bond becomes polar?

Ans: When there is a difference of electronegativity between two covalently bonded atoms, there will be unequal attraction for the bond pair of electrons between such atoms. It will result in the formation of polar covalent bond.

Examples: HCl, H_2O etc.

Q.14 What is relationship between electronegativity and polarity?

Ans: The polarity of a covalent bond depends upon the electronegativity difference between the bonded atoms. Higher the electronegativity difference between bonded atoms,



greater will be the polarity. Thus electronegativity and polarity are directly related:

Examples:

Q.15 Why does ice float on water?

Ans: Ice floats on water because density of ice ($0.917 g/cm^3$) is less than that of liquid water ($1.00 g/cm^2$) at 0°C.

Q.16 Give the characteristic properties of ionic compounds.

Ans: Characteristics properties of ionic compounds.

i. Ionic compound are mostly crystalline solids.

ii. Ionic compounds are good conductors in solution and in molten form due to presence of free ions in them.

iii. Ionic compounds have high melting and boiling points. For example NaCl has melting point 800^0C and boiling point 1413°C.

iv. Ionic compounds dissolve in polar solvents e.g. NaCl dissolves in water.

Q.17 What characteristic properties do the covalent compounds have?

Ans: Characteristic properties of covalent compounds:

i. Melting boiling points: They have usually low melting and boiling point.

ii. Electrical conductivity: They are usually bad conductors of electricity. Polar compounds are conductors in their solutions in polar solvents.

iii. Solubility: They are usually insoluble in water but soluble in non-aqueous solvents like benzene, ether, alcohol and acetone.

iv. Crystal formation: Bigger molecules with three dimensional bonding form covalent crystals which are very stable and hard. They have high melting and boiling points.

EXERCISE LONG QUESTION ANSWERS

Q.1 What is an ionic bond? Discuss the formation of ionic bond between sodium and chlorine atoms?

Ans: See Q. No. **4** (Subjective Part, Long Questions Answers)

Q.2 How can you justify that bond strength in polar covalent compounds is comparable to that of ionic compound?

Ans: See Q. No. **7** (Subjective Part, Long Questions Answers)

Q.3 What type of covalent bonds are formed between hydrogen, oxygen and nitrogen? Explain their bonding with dot and cross model.

Ans: See Q. No. **7** (Subjective Part, Long Questions Answers)

Q.4 How a covalent bond develops ionic character in it? Explain.

Ans:

Q.5 Explain the types of covalent bonds with at least one example of each type.

Ans: See Q. No. **5** (Subjective Part, Long Questions Answers)

Q.6 How a coordinate covalent bond is formed? Explain with examples?

Ans: See Q. No. **6** (Subjective Part, Long Questions Answers)

Q.7 What is metallic bonds? Explain the metallic bonding with the help of a diagram.

Ans: See Q. No. **8** (Subjective Part, Long Questions Answers)

Q.8 **Define hydrogen bonding. Explain that how these forces affect the physical properties of compounds.**

Ans: See Q. No. **9** (Subjective Part, Long Questions Answers)

Q.9 **What are intermolecular forces? Compare these forces with chemical bond forces with reference to HCl molecule?**

Ans:

Q.10 **What is a chemical bond and why do atoms form a chemical bond?**

Ans: See Q. No. **1** (Subjective Part, Long Questions Answers)

Q.11 **What is octet rule? Why do atoms always struggle to attaint be nearest noble gas electronic configuration?**

Ans: See Q. No. **2** (Subjective Part, Long Questions Answers)