

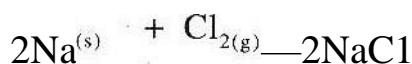
## Long Answer Questions

Q1. Define Ionic bond. How Ionic bond is formed in sodium chloride?

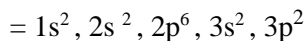
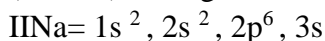
Ans: Definition

"A bond formed due to transfer of electron from one atom to another atom, is called ionic bond".

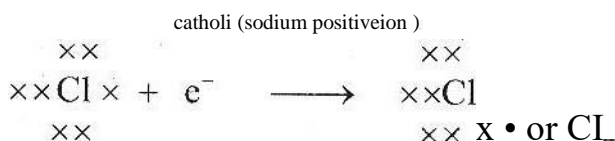
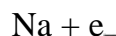
Formation of sodium chloride



Sodium chloride is a simple compound formed from sodium (Z 1) and chlorine (Z = 17). The ground state electronic configuration of these elements is shown below:



This shows that sodium has only one valence electron while chlorine has seven electrons in their valence shells. Sodium has the tendency to lose valence shell electron and form a positive ion, while chlorine has the tendency to gain an electron in its valence shell to form a negative



anion (chloride negative 1 on)

When sodium loses one electron it forms a  $\text{Na}^+$  ion, while  $\text{Cl}^-$  is formed when chlorine gains that electron. Both these atoms are now oppositely charged ions. They stabilize themselves by combining with each other due to electrostatic force of attraction between them and a low energy state. ( $\text{Na}^+ + \text{Cl}^- \longrightarrow \text{NaCl}$ )

Q2. What is Covalent Bond? Explain its different types with examples.

Ans. Covalent Bond:

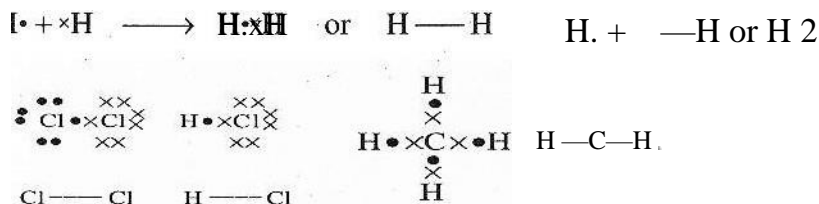
"A bond which is formed due to mutual sharing of electrons is called covalent bond".

Types of covalent bonds

i. Single Covalent bond (-)

When one electron is contributed by each bonded atom, one bond pair is formed and forms a single covalent bond. It is indicated by (-).

Examples of molecules with single covalent bonds are hydrogen (H<sub>2</sub>), chlorine (Cl<sub>2</sub>), methane (CH<sub>4</sub>) etc.

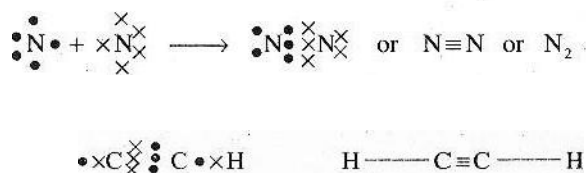


ii. Double Covalent bond (=)

iii. Triple Covalent Bond (≡)

When each bonded atom contributes three electrons, three bond pairs are shared and a triple bond is formed. It is indicated by (≡).

Example of molecules with triple covalent bonds are nitrogen (N<sub>2</sub>) and ethyne (C<sub>2</sub>H<sub>2</sub>).



Q3. Write a note on coordinate covalent bond.

Ans: Definition

"Coordinate covalent or dative covalent bonding is a type of covalent bonding in which the bond pair of electrons is donated by one bonded atom only". It is also known as Dative covalent bond?



Example: The bond formation in  $\text{H}_2$ ,  $\text{C}_2$ ,  $\text{O}_2$ ,  $\text{N}_2$  etc.

Example: The bond formation in  $\text{CO}_2$ ,  $\text{HCl}$ ,  $\text{HF}$ ,  $\text{H}_2\text{O}$  etc.

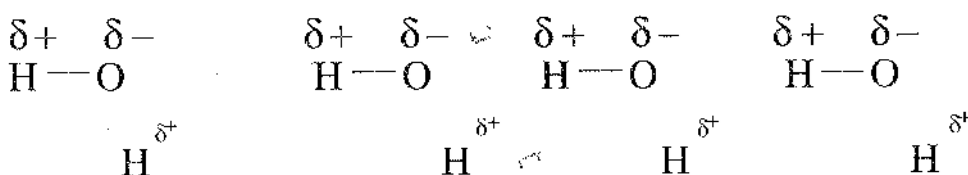
Q5. Write a note on hydrogen bonding.

Ans. Definition

"The force of attraction between partially positive hydrogen atom of one molecule and highly electronegative atom of another molecule is called hydrogen bonding". Explanation

Hydrogen bonding is a special type of intermolecular forces present in the permanently polar molecules. This bonding can be considered unique dipole- dipole attraction. This force of attraction develops between molecules that have a hydrogen atom bonded to a small, highly electronegative atom with lone pairs of electrons such as nitrogen, oxygen and fluorine, The covalent bond between hydrogen atom and other atom becomes polar enough to create a partial positive charge on hydrogen atom and a partial negative charge on the other atom. The small size and high partial positive charge on the hydrogen atom enables it to attract the partially negative lone pair on the N, O or F atom of the other molecule.

Hydrogen bonding is the force of attraction which is represented by a dotted line between the molecules as shown below:



Q6. Different between ionic and covalent compounds.

Ans. Ionic Compound

Covalent bond

They consist of positive and negative Ions	They are neutral
i. The exist in solid state.	ii. The exist in solids <u>liquids and gases</u> .
iii. They have high melting and boiling points.	iii. They have comparatively low melting and boiling points.
iv. Strong forces of attractions are present between their particles.	iv. Weak forces are present between their particles.
v. <u>They have definite shape</u> .	v. <u>They have no definite shape</u> .
vi. They are formed usually when metal react with non-metals.	vi. They are formed usually when nonmetal reacts with <u>non-metals</u> .
vii. Examples are: Sodium chloride, potassium chloride etc	vii. Examples are: glucose, benzene etc

Q.7. Write a note on Metallic Bond.

Ans. Metallic Bond

The metallic bond is defined as a bond formed between metal atoms (positively charged ions) due to mobile or free electrons.

## Explanation

In case of metals, the hold of nucleus over the outermost electrons is weak because of large sized atoms and greater number of shells in between nucleus and valence electrons. Furthermore, because of low ionization potentials, metals have the tendency to lose their outer electrons easily. Resultantly, these loose or free electrons of all metal atoms move freely in the spaces between atoms of a metal. None of these electrons is attached to any particular atom. Either they belong to a common pool, or belong to all the atoms of that metal. Nuclei of metal atoms appear submerged in sea of these free mobile electrons. These mobile electrons are responsible for holding the atoms of metals together forming a metallic bond. A simple metallic bond is shown in figure.

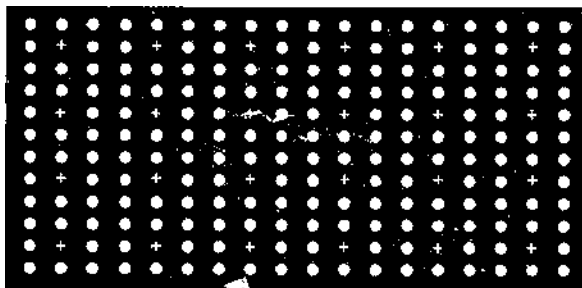


Fig. A schematic diagram of copper wire showing its positive nuclei (+) embedded in sea of free electrons (o) making Metallic bonding.

## Short Answer Questions

Q.1. Why atoms form a chemical bond?

Ans. Atoms form a chemical bond to achieve stability by acquiring inert gas electron configuration.

Q.2. Why noble gases are non-reactive in nature'?

Ans. The noble gases do have 2 or 8 electrons in their valence shells. It means that all the noble gases have their valence shell completely filled. Their atoms do not have vacant space in their valence shell to accommodate extra electrons. Therefore, noble gases do not gain, lose or share electrons. That is why they are non-reactive, at ordinary conditions. Q.3. How an atom can accommodate eight electrons in its valence shell?

Ans. An atom can accommodate eight electrons in Its valence shell in three ways

i. By giving valence shell electrons (if they are less four) to other atoms ii. By gaining electrons from other atoms (if the valence shell has five or more electrons in it) iii. By sharing valence electrons with other atoms Q.4. When atoms are considered to be unstable?

Ans. The atoms having less than 2 or 8 electrons in their valence shells are unstable.

Q.5. What is the mode of reaction of an atom with reference to their group?

Ans. Mode of reaction of an atom depends upon its number of valence shell electrons. For example, group I has only 1 electron in its valence shell and group 17 has 7 electrons in its valence shell.

Q.6. What is meant by a chemical bond?

Ans. A force of attraction between atoms that holds them together in a molecule is called a chemical bond.

Q.7. What is meant by duplet rule?

Ans. The attaining of two electrons in the outermost shell by sharing, by losing or by gaining electrons is called duplet rule. Q.8. What is meant by octet rule? Ans. The attaining of eight electrons in the outermost shell by sharing, by losing or by gaining electrons is called octet rule.

Q.9. What would be the effect, when two approaching atoms come closer to each other?

Ans. When two approaching atoms come closer, the attractive as well as repulsive forces become operative.

Q.10. What is the effect of attractive and repulsive forces in the formation of a chemical bond?

Ans. If attractive forces become dominant, the decrease in the energy of the system takes place, due to which chemical bond is formed. While, if repulsive forces become dominant, the increase in the energy of the system takes place, due to which no chemical bond is formed.

QA I. What is meant by bonding electrons?

Ans. The valence electrons, which are involved in chemical bonding, are termed as bonding electrons.

Q.12. Name different types of chemical bonds

Ans.

(i) Ionic bond

(ii) Covalent bond

(iii) Co-ordinate covalent bond (iv) Metallic bond

Q.13. Define ionic bond

Ans. The bond formed by the complete transfer of electrons from one atom to another is called ionic bond.

Q.14. What is meant by covalent bond?

Ans. The bond formed by the mutual sharing of pairs of electrons is called covalent bond. Q.

15. What is meant by single covalent bond? Give example.



Ans. When one electron is contributed by each bonded atoms, one bond pair is formed and it forms a single covalent bond. It is represented by (—) . A few examples of molecules with single covalent bonds are hydrogen, chlorine, hydrochloric acid, methane etc.

(2.16. What is meant by double covalent bond? Give example.

Ans. When each bonded atom contributes two electrons, two bond pairs are shared and a double covalent bond is formed. It is represented by A few examples of molecules with double covalent bonds are oxygen, ethene etc.

(2.17. What is meant by triple covalent bond? Give example.

Ans. When each bonded atom contributes three electrons, three bond pairs are involved in bond formation. This type is called triple covalent bond. It is represented by (9. A few examples of molecules with triple covalent bonds arc nitrogen, ethyne etc.

(2.18. What is meant by bond pair?

Ans. The electrons that pair up to form a chemical bond is called bond pair electrons.

(2.19. What is meant by lone pair?

Ans. A non-bonded electron pair available on an atom is termed as lone pair of electrons. Q.

20. Describe Lewis structure diagram.

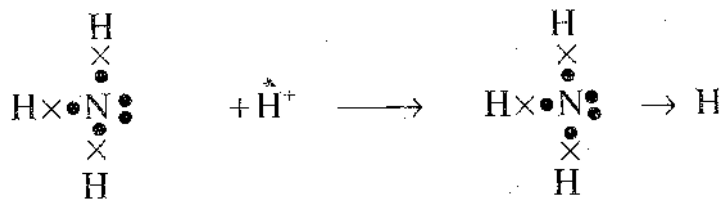
Ans. The electronic configuration of the valence shells of atoms is shown in small 'dots' or 'crosses' around the symbol of the element. Each dot or cross represents an electron. This is a standard method of Lewis to describe the electronic configuration of valence shell of an atom.

It is called Lewis structure diagram.

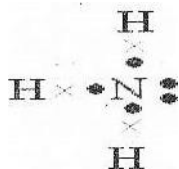
Q.21. Define coordinate covalent bond.

Ans. A type of covalent bond in which the bond pair of electrons is donated by one bonded atom only is called coordinate covalent or dative bond. Q.22. How coordinate covalent bond is formed in  $\text{NH}_4^+$ ?

Ans.



Q.23. Draw Lewis dot structure of ammonia.



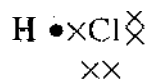


(2.31. What is meant by electronegative atom?

Ans. The atom will attract the bond pair of electrons more strongly than the other one during polar covalent bond formation. This atom will be called as more electronegative atom as compared to the other bonded atom. For example, in HCl molecule Cl is more electronegative atom as compared to H atom.

Q.32. Give the formation of polar covalent bond in HCl molecule.

Ans. The difference between electronegativities of hydrogen and chlorine is 1.0. As the electronegativity of chlorine is more, it attracts the shared pair of electron towards itself with a greater force. A partial negative charge is therefore created on chlorine and in turn a partial positive charge on hydrogen due to electronegativity difference. It creates polarity in the bond and is called a polar covalent bond.



Q.33. What do you mean by delta sign and why it develops?

Ans. The delta (δ) sign indicates partial positive or partial negative charge that is developed due to unequal sharing pair or bonded pair of electrons,

Q.34. What is the effect of electronegativity in the formation of an ionic bond?

Ans. By using electronegativity values, it is possible to predict whether a chemical bond will be ionic or a covalent in nature. A bond formed between elements of high electronegativity (halogen group) and elements of low electronegativity (alkali metals) are ionic in nature.

Q.35. How electronegativity values help us to predict the formation of a chemical bond? Ans. If the difference of electronegativities between two elements is more than 1.7 the bond between them will be predominately ionic bond and if it is less than 1.7, the bond between two atoms will be predominately covalent.

Q.36. What is meant by metallic bond?

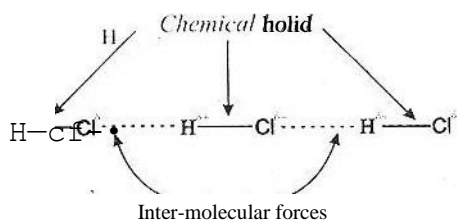
Ans. A bond formed between metal atoms (positively charged ions) due to mobile or free electrons is called metallic bond.

Q.37. What is meant by intermolecular forces?

Ans. A weak force of attractions formed between two molecules is called intermolecular forces

Q.38. Show the bonding and intermolecular forces in HCl molecule.

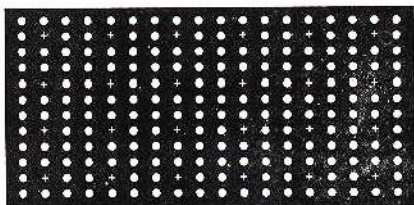
Ans.



Q.39. What is meant by Van der Waals forces?

Ans. All intermolecular forces, which are collectively called Van der Waals forces, are electrical in nature. They result from the attractions of opposite charges which may be temporary or permanent.

Q.40. Draw a schematic diagram of copper wire showing metallic bonding.



Ans.

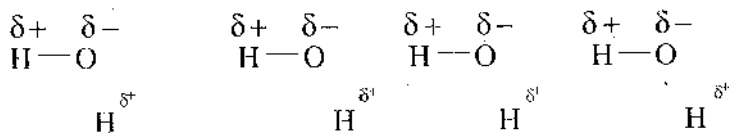
Q.41. How dipole-dipole interactions are found in I-ICI molecule?

Ans. When partial positive and partial negative charges exist at different positions in molecule, the adjacent molecules will arrange themselves in such a way that negative portion of that molecule come near to positive portion of other molecule. It results in net forces of attraction between oppositely charged portions of two adjacent molecules. These attractive forces are called dipole-dipole interactions as represented in HCl

Q.42. What is meant by hydrogen bonding?

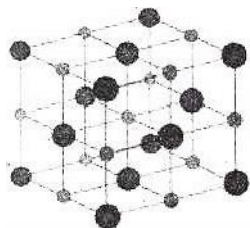
Ans. A bond formed between partially positive hydrogen atom of one molecule with partially negative atom of the other molecule is called hydrogen bonding. Q.43. Draw a structure of water molecules showing hydrogen bonding.

Ans



Q.44. Why ice floats on the surface of water? Ans. At 0°C ice has a lesser density (0.0917 g/cm<sup>3</sup>), than water (0.100 g/cm<sup>3</sup>), due to which ice floats on the surface of water.

Q.45. Describe the regular arrangement of  $\text{Na}^+$  and  $\text{Cl}^-$  ions in solid crystal of  $\text{NaCl}$ .  
Ans.



Q.46. What are ionic compounds? Give example.

Ans. Those compounds which contain ionic bond in them are known as ionic compounds. e.g. , NaCl, KCl etc.

Q.47. Write any two properties of ionic compounds.

Ans. (i) They are made up of positively and negatively charged ions. (ii)

They are consist of ions not the molecules.

Q.48. Ionic solids are good conductors of electricity. Why?

Ans. ionic solids are good conductors of electricity only in solution and in the molten form due to the presence of free ions in them.

(2.49. When covalent compounds are considered to be a good conductor of electricity? Ans. They are considered to be good conductors of electricity due to having polar character in their bonding when they are dissolve in polar solutions.

Q.50. Why coordinate covalent compounds do not form ions in water?

Ans. They do not form ions in water because the nuclei in these compounds are held shared electrons.

(2.51. What is meant by malleability and ductility?

Ans. Malleability is the property by virtue of which a metal can be drawn into sheets, while ductility is the property by vicae of which a metal can be drawn into wires.

Q.52. Name polymers or resins used in synthetic adhesives. Ans. i. Thermoplastics ii. Thermosets

Q.53. Give composition of epoxy.

Ans. Epoxy is polymer that is formed from two different chemicals

1. Resin \_\_\_\_\_ ii. Hardener

(2.54. Give uses of adhesives.

Ans. These highly performance adhesives are used in the construction of

i, Aircrafts ii. Automobiles iii. Bicycles iv. Boats v. Golf clubs etc

(2.55. What are the applications of epoxy adhesives?

Ans. They can be made flexible or rigid, transparent or opaque, colored as well as fast or slow setting.

Q.56. What properties show presence of different types of chemical bond between atoms of metals?

Ans. The different propeltics shown by metals such as high melting and boiling points, good conductions of heat and electricity, hard and heavy nature, suggest existence of different type of chemical bond between atoms of metals, Q.57. How metallic bond is formed?

Ans. In metals, the hold of nucleus over the outermost electrons is weak because of large sized atoms and greater number of shells in between nucleus and valance electrons. Because of low ionization potentials, metals have the tendency to lose their outer electrons easily. Due to which, these loose or free electrons of all metal atoms move freely in the spaces between atoms

of a metal. The nuclei of metal atoms appear submerged in sea of free mobile electrons. These mobile electrons are responsible for holding the atoms of metals together forming a metallic bond.

<p><u>Polar compounds</u></p>	<p>(2.58. Differentiate between polar and non-polar compounds</p>
<p>They are soluble in water.</p>	<p>Ans.</p>
<p>They are insoluble in non-polar solvents</p>	<p>They in Non-polar compounds are insoluble</p>
<p>like benzene, petrol etc</p>	<p>They like in water are soluble in non-polar</p>
<p>They can conduct electricity in the form of aqueous solution</p>	<p>solvents benzene, petrol etc do not</p>
<p>v. Examples are: HCl, I-IF</p>	<p>i. They conduct electricity</p>
<p></p>	<p>v. Examples are: CH<sub>4</sub>, C<sub>2</sub>H<sub>2</sub></p>

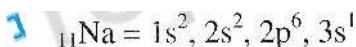
Q.59. Why does sodium form a chemical bond with chlorine?

Ans. Sodium forms a chemical bond with chlorine due to the following reasons

- i) Sodium has the tendency to lose one electron and chlorine has the tendency to gain one electron. This favors the transference of electrons and hence ionic bond is formed.
- ii) Sodium is electropositive and is at high energy state whereas chlorine is electronegative and is at low energy state. This energy difference favors the formation of ionic bond between them.

Q.60. Why sodium does lose an electron and attains +1 charge?

Ans. Sodium has the electronic configuration as follows



Hence, it is better and easier for sodium to lose one electron and complete its valence shell rather than gaining seven electrons to complete the octet. Q.61. How do atoms follow octet rule?

Ans. Most of the atoms or elements in the periodic table gain stability by having eight electrons in their valence shell. They do so by gaining, sharing or losing electrons. This is how they follow octet rule. They attain the electronic configuration of nearest noble gas (2.62. Which electrons are involved in chemical bonding?)

Ans. Only the electrons present in the valence shell of an atom are involved in chemical bonding. All the other electrons do not take part in chemical bonding.

(2.63. Why does group 1 elements prefer to combine with group 17 elements?)

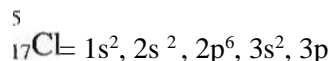
Ans. Group I elements are good losers of electrons and have low ionization energies. Group 17 elements are good gainers of electrons and have high electron affinities. Therefore, as



these parameters favor the formation of bond between the two a strong ionic bond is formed between group I and group 17 elements

Q.64. Why chlorine can accept only one electron?

Ans. The electronic configuration of chlorine is



It can gain a maximum of one electron because it follows octet rule and can have a maximum of eight electrons in its valence shell.

(2.65. Give the electronic configuration of carbon atom

Ans.  ${}_{6}\text{C} = 1s^2, 2s^2, 2p^2$

Q.66. What type of elements have tendency of sharing of electrons?

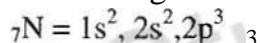
Ans. The elements with electronegativity values less than 1.7 show tendency of sharing electrons between them.

Q.67. If repulsive forces dominate to attractive forces, will a covalent bond form?

Ans. When the repulsive forces dominate the attractive forces, a bond will not be formed.

This is due to the fact that repulsive forces account for increase in energy. Bond is formed when the atoms are at a state of minimum energy. As repulsive force will increase energy, so a covalent bond will not be formed.

Q.68. Considering the electronic configuration of nitrogen atom, how many electrons are involved in bond formation and what type of covalent bond is formed? Ans. The electronic configuration of nitrogen is



The valence shell of nitrogen is deficient of three electrons. These two nitrogen atoms share their three valence electrons each to form a triple covalent bond with three pairs of electrons and six electrons as a total shared.

Q.69. Point out the type of covalent bonds in the following molecules

CH<sub>4</sub>, C<sub>2</sub>H<sub>4</sub>, H<sub>2</sub>, N<sub>2</sub> and O<sub>2</sub> Ans.

i) CH<sub>4</sub> Single covalent bond ii)

C<sub>2</sub>H<sub>4</sub> Double covalent bond iii) H<sub>2</sub>

Single covalent bond iv) N<sub>2</sub> Triple covalent bond

v) O<sub>2</sub> Double covalent bond

(2.70. What is lone pair? How many lone pairs of electrons are present in nitrogen and ammonia?

Ans. The pair of electrons in the valence shell of an atom which does not take part in chemical bonding is called lone pair electrons.

In nitrogen there are two lone pairs and on each -atom a lone pair is present. In ammonia, there is only one lone pair present on nitrogen atom while hydrogen does not have any lone pair.

Q.71. Why is the BF<sub>3</sub> electron deficient?

Ans. Boron has the electronic configuration as  $1s^2 2s^2 2p^1$ . This means that it needs five more electrons to be stabilized. In BF<sub>3</sub> it shares three electrons, each with one fluorine atom and thus attains six electrons in its valence shell. It still retains the tendency to gain two more electrons and therefore remains electron deficient.

Q.72. What types of electron pairs make a molecule a good donor?

Ans. Lone pair of electrons makes a molecule a good donor. Since, they are not involved in bonding, so they can be used to form further bonds e.g., In ammonia, there is one lone pair on nitrogen which forms a coordinate covalent bond with another hydrogen forming ammonium ion.

Q.73. What is the difference between bonded and lone pair of electron and how many bonded pair of electrons is present in NH<sub>3</sub> molecule?

Ans. Valence shell electron pair involved in chemical bonding is a bond pair and one not involved is the lone pair of electrons and can form further bonds in certain cases. Three pairs of bonded electrons are present in NH<sub>3</sub> as there are three single covalent bonds in ammonia molecule between one nitrogen and three hydrogen atoms.

Q.74. Why does oxygen molecule not form a polar covalent bond? —

Ans. In oxygen molecule (O<sub>2</sub>) two oxygen atoms are covalently bonded to each other. As the atoms are similar, the electronegativity difference is zero, and the electron pairs are equally shared between them. Hence, there is no polarity in the bond.

Q.75. Why does water molecule form a polar covalent bond?  
Ans. Oxygen is a highly electronegative atom as compared to hydrogen. So, during the mutual sharing, the electron pair is attracted more towards oxygen and it acquires a partial negative charge and a partial positive charge develops on hydrogen. Hence, poles are created and the covalent bond becomes polar.

Q.76. What type of elements form metallic bonds?

Ans. Metallic bonds consist of a sea of mobile electrons with positive ions. They are present in elements which have loosely bound electrons that do not remain in the valence shell and leave the atom to form a sea of electrons. Such a structure is observed usually in metals e.g., sodium, iron in metals.

Q.77. Why in metals the hold of nucleus over the outermost electrons is weak? Give reason.

Ans. The hold of nucleus on the outermost electrons in metals is very weak because of the increased screening effect or shielding effect between the intervening electrons which tend to decrease the force of attraction between nucleus and the electrons. Distance also plays the same role. As the electrons are at a greater distance from nucleus, the force of attraction becomes weak.

Q78. Why the electrons move freely in metals?

Ans. Because, the hold of nucleus over the outermost electrons is weak because of large sized atoms and greater number of shells in between nucleus and valence electrons. Furthermore, because of low ionization potentials, metals have the tendency to lose their outer electrons easily. Resultantly, these loose or free electrons of all metal atoms move freely in free space between atoms of a metal.

Q79. Which types of electrons are responsible for holding the atom together in metals? Ans. The mobile electrons are responsible for holding the atoms of metals together forming a metallic bond.

Q80. Why a dipole develops in a molecule?

Ans. The unequal sharing of electrons between two different types of atoms make one end of molecule slightly positive and other end slightly negatively charged. Hence a dipole develops in a molecule.

(281. What do you mean by dipole induced forces?

Ans. The positive end of polar molecule attracts the mobile electrons of the nearby non-polar molecule. In this way polarity is introduced in non-polar molecule and both become dipoles. These forces are called dipole induced forces.

Q82. Why dipole forces of attraction are not found in halogen molecules?

Ans. Halogen molecules form a non-polar covalent bond between them. In order to make non-polar bonds, no electronegative difference of elements is required, due to which dipole forces do not form in halogen molecules.

Q83. What types of attraction forces exist between HCl molecules?

Ans. Weak intermolecular forces exist between HCl molecules.

1 Q84. Why ionic compounds have high melting and boiling points?

Ans. As ionic compounds are made up of positive and negative ions, there exist strong electrostatic forces of attraction between oppositely charged ions. So, a great amount of energy is required to break these forces, therefore ionic compounds have high melting and boiling points.

(285. Why ionic compounds are easily soluble in water?

Ans. Water has high dielectric constant that weakens the attraction between the ions of ionic compounds due to which they are easily soluble in water.

Q86. What type of attractive forces exists in ionic compounds?

Ans. Ionic bond exists in ionic compounds.

Q87. Why the covalent compounds of bigger size molecules have high melting points? Ans. Bigger molecules with three dimensional bonding forms covalent crystals which are very stable and hard due to which they have high melting and boiling points.

(b)

(c)

(288. How much there is electronegativity difference between the following pair of elements (atoms)? Predict the nature of the bond between them

- a) H and Cl                      b) H and Na                      c) Na and I                      d) K and Cl

Ans.

- a) H and Cl

Covalent bond  $1-1=2.2$   $Cl=3.2$

- b) H and Na

Ionic bond  $F-1=2.1$   $Na=0.9$

- c) Na and I

Ionic bond  $Na=0.9$   $I=2.5$

- d) K and Cl

Ionic bond  $K=0.8$   
 $Cl=3.2$

## Multiple Choice Questions

Difference  $-3.2-2.2= -5.4$  — 1.0

1. Which of the following is a building block of matter?

- (a) Atom (b) Molecule  
(b) Element (d) Compound

2. The forces responsible for binding the atoms together in a molecule are

called

- (a) Hydrogen bond  
(b) Ionic bond  
(c) Chemical bond  
(d) Covalent bond

3. Atoms achieve stability by attaining electronic configuration of

- (a) Alkali metals  
(b) Inert gases  
(c) Alkaline earth metals  
(d) Coinage metals

4. Attaining two electrons in the

valence shell is called

- (a) Duplet rule (b) Triplet rule  
(c) Octet rule (d) All of them

5. All the noble gases have their valence

- (a) Partially filled  
(b) Completely filled  
(c) Less than 2  
(d) More than 2

6. Noble gases are non-reactive, because they do not

- (a) Gain electrons  
(b) Lose electrons  
(c) Share electrons  
(d) All of them

7. Every atom has a natural tendency to achieve electrons in its valence shell

7. Ex

achie

(a) 2 or 6 (b) 2 or 4

(c) 2 or 8 (d) 2 or 10

8. The position of an atom in the

periodic table indicates its

(a) Period number Group  
number

Number of neutrons

(b)

(c)

(d) Number of electrons 9. How many valence shell electrons are there in group I elements?

- (a) One (b) Two  
(c) Three (d) Four

10. Mode of reaction depends upon its

- (a) Number of valence shell  
(b) Number of shells  
(c) Number of neutrons  
(d) Atomic size

II. Hydrogen and helium follows

- (a) Octet rule (b) Duplet rule

(c) Triplet rule (d) none of them 12.

The formation of ionic bond between two ions is due to (a) Hydrogen bonding

- (b) Metallic forces (c) Electrostatic forces

(d) All of them 13. Which force becomes when two atoms come closer to other?

- (a) Attractive forces  
(b) Repulsive forces  
(c) Both a and b

(d) None of them 14. The formation of a chemical bond is a result of dominant net

- (a) Attractive forces  
(b) Repulsive forces  
(c) Both of them  
(d) None of them

15. A molecule is formed, energy of a system

- (a) Remains same. (b) Decreased  
(c) Increased  
(d) Shows variability

16. The valence electrons, which are involved in chemical bonding, are termed as

- (a) Lone pair electrons  
(b) Bonding electrons  
(c) High energy electrons  
(d) Low energy electrons 17.

Which group of the periodic table have the tendency to gain electrons

- (a) Group I (b) Group 18  
(c) Group 2 (d) Group 17  
electronegative elements have

- (a) High electron affinities  
(b) Low electron affinities  
(c) Large atomic sizes  
(d) High melting points

A bond formed due to complete transfer of electrons from one atom to another is called

- (a) Covalent bond  
(b) Hydrogen bond  
(c) Ionic bond  
(d) Metallic bond

The electronic configuration of sodium atom is

- (a)  $1s^2 2s^2 2p^6$   
(b)  $1s^2 2s^2 2p^5$   
(c)  $1s^2 2s^2 2p^6 3s^2$   
(d)  $2s^2 2p^6 3s^1$

21. How many electrons are there in valence shell of sodium atom?

- (a) One (b) Two

- (b)  
(c)

(c) Three (d) Four

The electropositive elements have  
the tendency to

Gain electrons

Lose electrons

(b)

(c)



(c) Share electron  
(d) All of them  
23. How many valence shell electrons are there in  $\text{Na}^+$  ion?

(c) 10  
24. During the formation of ionic bond, heat

(a) Absorbed (b) Released  
(c) Remains same (d) Both a or b  
25. Which type of attractive forces are present in ionic compounds?

(a) Covalent bonds  
(b) Coordinate covalent bonds  
(c) Metallic bonds  
(d) None of them

26. Covalent bond is most commonly found between the elements of group

(a) 13 to 17 (b) I to 13  
(c) 16-18 (d) 15-18  
27. A bond formed by the mutual sharing of an electron pair is called

(a) Ionic bond  
(b) Covalent bond  
(c) Coordinate covalent bond  
(d) Metallic bond

28. The electrons that pair up to form a chemical bond are called (a) Lone pair electrons

(b) Bond pair electrons  
(c) High energy electrons  
(d) Low energy electrons  
29. A covalent bond formed by the mutual sharing of two pairs of electrons between bonded atoms is called

(a) Single covalent bond  
(b) Double covalent bond

(c) Triple covalent bond  
(d) Polar covalent bond

30. Which molecule contains a single covalent bond?

(a)  $\text{CH}_4$  (b)  $\text{C}_2\text{H}_4$   
(c)  $\text{C}_2\text{H}_2$  (d)  $\text{O}_2$

31. Nitrogen molecule contain

(a) Polar covalent bond  
(b) Single covalent bond  
(c) Double covalent bond  
(d) Triple covalent bond

32. How many electrons are involved in the formation of single covalent bond?

(a) One (b) Two  
(c) Three (d) Four

33. Dative covalent bond is also known

(a) Coordinate covalent bond  
(b) Covalent bond (c) Ionic bond  
(d) Metallic bond

How many lone pairs are present on nitrogen in ammonia molecule?

(a) One (b) Two

(c) Three (d) Four  
35. "Which type of bond is present between  $\text{NH}_3$  and  $\text{BF}_3$ ?

(a) Covalent bond  
(b) Coordinate covalent bond  
(c) Ionic bond  
(d) Metallic bond

36. A covalent bond formed by two similar atoms is known as

(a) Polar covalent bond  
(b) Non-polar covalent bond  
(b)  
(c)

Metallic bond

Double covalent bond

(b)

(c)

37. Which of the following is an example of polar covalent compound?

- (a) I-Cl
- (c) O<sub>2</sub>

38. The difference between electronegativities of hydrogen and chlorine

- (a) 1.0
- (b) 2.0
- (c) 3.0
- (d) 0.9

39. The electronegativity of hydrogen atom is

- (a) 2.0
- (b) 2.2
- (c) 3.0
- (d) 2.1

40. Which sign indicates positive and partial charge?

- (a) Sigma
- (b) Pi
- (c) Delta

41. The nature of a chemical bond can be predicted by using

- (a) Electron affinity values
- (b) Electronegative values
- (c) Ionization energy values

(d) All of them

42. A covalent bond is formed by the elements having

- (a) Low electronegative values
- (b) High electronegative values
- (c) Comparable electronegative values
- (d) High electron affinity values

43. If the difference of electronegativities between two elements is more than 1.7, the bond will be

- (a) Ionic bond
- (b) Single Covalent bond
- (c) Double Covalent bond
- (d) Metallic bond

If the difference of electronegativities between two elements is less than 1.7, the bond will

- (a) Ionic bond
- (b) Covalent bond
- (c) Metallic bond
- (d) All of them

45. In metals, the hold of nucleus over the valence shell electrons is weak due

- (a) Large sized atoms
- (b) High ionization energies
- (c) High electron affinities
- (d) All of them

46. Metals have the tendency to lose electrons due to

- (a) High ionization energy
- (b) Low electron affinity
- (c) Low ionization energy
- (d) None of them

The mobile electrons are responsible for holding the atoms of metals together, forming a

- (a) Ionic bond
- (b) Covalent bond
- (c) Hydrogen bond
- (d) Metallic bond

48. Which of the following is the weakest bond amongst them? (a) Covalent bonding

- (b) Intermolecular forces

- (c) Ionic bonding  
(d) Metallic bond
49. The energy required to break the intermolecular forces between one mole of liquid hydrogen (b) High vapour pressure convert it into gas is (c) Low density  
(a) 22 kJ (b) 32  
(c) 132 kJ (d) 17 50. The energy required to break chemical bond between hydrogen chlorine atoms in 1 mole chloride is  
(a) 320  
(c) 365 k
51. Intermolecular collectively known as  
(a) Vander Waals forces  
(b) Electrostatic forces  
(c) Adhesive forces  
(d) Dipole-dipole forces
52. Hydrogen bonding is found in  
(a) Non-polar molecules  
(b) Polar molecules  
(c) homoatomic molecules  
(d) All of them
53. The force of attraction between water molecules is  
(a) Ionic bonding  
(b) Covalent bonding  
(c) Hydrogen bonding  
(d) Coordinate covalent
54. The boiling point of water is  
(C) 100 °c
55. The boiling point of alcohol is  
(a) 44 °c  
(C) 53 °c
56. Water has high boiling points as  
57. The density of ice at 0°C is  
(a) 0.917 g/cm<sup>3</sup> (b) 1.24 g/cm<sup>3</sup>  
(d) High surface tension  
(c) 1.7 g/cm<sup>3</sup> (d) 2.17 g/cm<sup>3</sup>
58. The density of water at 0°C is  
<sub>3</sub> (a) g/cm (b) 1.00 g/cm  
<sub>3</sub> (b) 0.70 g/cm (d) 1.17 g/cm<sup>3</sup>
59. The compounds formed by oppositely charges are known as  
(a) Non-polar Covalent compounds  
(b) Ionic compounds  
(c) Metallic solids  
(d) None of them
60. Ionic compounds are good conductors of electricity in  
(a) Solid state (b) Molten state  
(c) Solution (d) Both b or c
61. Ionic compounds have  
↗ (a) High melting and boiling points  
(b) High melting and low boiling Points (c) Low melting and high boiling points  
(d) Low melting and boiling points
62. The melting point of NaCl is  
(a) 318 °c (b) 1000 °c  
(C) 510 °c (d) 800 °c
63. The boiling point of NaCl is  
(a) 2000 °c (b) 1413 °c  
(c) 1215 °c (d) 1510 °c

64. Which of the following is an example of a covalent compound?

compared to alcohol due to

(a) Hydrogen bonding

(a)  $C_6H_{12}O_6$  (b)  $CH_4$

(c)  $H_2SO_4$  (d) All of them

65. At room temperature, higher molecular mass covalent compounds are

- (a) Solids (b) Liquids  
(c) Gases (d) All of them

Non-polar compounds insoluble in

- (a) Synthetic (b) Natural

- (a) Water (b) Benzene  
(c) Ether (d) Alcohol  
(c) Bond pair electrons

- (d) All of them

73. Which type of adhesives is less expensive to produce?

- (c) Both a and b (d) none of them

74. Epoxy adhesives can be made

- (a) Flexible or rigid (b) Transparent or opaque

fluorine is (c) Coloured

- (a) 1.0 (b) 2.0 (d) All of them

- (c) 3.0 (d) 4.075. Epoxy adhesives are

68. The electronegativity value of fluorine is given by which scale?  
(a) Good heat resistant atoms is given by which scale?  
(b) Good chemical resistant

- (a) PH (b) Pauling (c) Both a and b  
(c) POH (d) None of them (d) None of them

69. Which of the following do not show ions in water?

- (a) Polar Covalent compounds  
(b) Ionic compounds  
(c) Coordinate covalent compounds

— (d) All of them

70. Malleability is the property by virtue of which a metal can be drawn into

- (a) Sheets (b) Wires  
(c) Rods (d) Plates

71. Metals usually have

- (a) High ionization energy
- (b) Low ionization energy
- (c) High electron affinity
- (d) High electronegativity

72. Metals are good conductors of heat and electricity in solid and liquid

up to a temperature of

(a) 1

7

7

0

c

(

b

)

2

2

5

0

C

(C) 320 °c (d) 135 °c

77. Epoxy adhesives are also known as

- (a) Medical adhesives
- (b) Engineering adhesives
- (c) Surgical adhesives
- (d) All of them

78. An atom having six electrons in its valence shell will achieve noble gas electronic configuration by

- (a) Gaining one electron
- (b) Losing all electrons
- (c) Gaining two electrons
- (d) Losing two electrons

79. Considering the electronic

configuration of atoms which atom with

state due to the given atomic number will be the

- (a) Mobile electrons most stable one?
- (b) Lone pair electrons
- (c) 10 (d) 12

80. Octet rule is

- (a) Description of eight electrons
- (b) Picture of electronic configuration
- (c) Pattern of electronic configuration
- (d) Attaining of eight electrons

81. Transfer of electrons between elements result in

- (a) Metallic bonding
- (b) Ionic bonding
- (c) Covalent bonding
- (d) Coordinate covalent bonding

82. When an electronegative element combine with electropositive element the type of bonding is

- (a) Covalent
- (c) Polar covalent
- (d) Coordinate covalent

83. A bond formed between two non metals is expected to be

- (a) Covalent
- (c) Coordinate covalent
- (d) Metallic

84. A bond pair in covalent molecules usually has

- (a) One electron
  - (b) Two electrons
  - (c) Three electrons
  - (d) Four electrons
85. Which of compounds is bonding?
- (a) CH<sub>4</sub> (b) KBr

(c) CO<sub>2</sub> (d) H<sub>2</sub>O

86. Ice floats on water because

- (a) Ice is denser than water
- (b) Ice is crystalline in nature
- (c) Water is denser than ice
- (d) Water molecules move randomly

Covalent bond involves the

- (a) Donation of electrons
- (b) Acceptance of electrons
- (c) Sharing of electrons
- (d) Repulsion of electrons

88. How many covalent bonds does C<sub>2</sub>H<sub>2</sub> molecule have?

- (a) Two (b) Three
- (c) Four (d) Five

89. Triple covalent bond involves how many numbers of electrons?

- (a) Eight (b) Six
- (c) Four (d) only three

same type

- (a) O<sub>2</sub> and HCl
- (b) O<sub>2</sub> and N<sub>2</sub>
- (c) O<sub>2</sub> and C<sub>2</sub>H<sub>4</sub>
- (d) O<sub>2</sub> and C<sub>2</sub>H<sub>2</sub>

Identify the compound which is not soluble in water

- (a) C<sub>6</sub>H<sub>6</sub> (b) NaCl



(c) KBr (d) MgC12 92. Which of the following is an electron deficient molecule?

(a) NHR

(b) BF3

(d) O2 93. Identify

which pair has polar covalent bonds

(a) O2 and C12

(b) H2O and N2

(c) H2O and C2H2

(d) H2O and I-ICI

94. Which of the following is the weakest force among the atoms?

(a) Ionic forces

(b) Metallic forces

(c) Intermolecular forces

(d) Covalent forces

95. Atoms react with each other because

(a) They are attracted to each other

(b) They are short of electrons

(c) They want to attain stability

(d) They want to disperse

# Answer Key

								10.	
11.		12.		13.				15.	
16.		17.		18.		19.		20.	
21.		22.		23.		24.		25.	
26.		27.		28.		29.		30.	
31.		32.		33.				35.	
36.		37.		38.		39.		40.	
41.		42.		43.				45.	
46.		47.		48.		49.		50.	
51.		52.		53.		54.		55.	
56.		57.		58.		59.		60.	
61.		62.		63.		64.		65.	
76.		77.		78.		79.		80.	
81.		82.		83.		84.		85.	
86.		87.		88.		89.		90.	

91.		92.	93.		94.		95.	
-----	--	-----	-----	--	-----	--	-----	--