

# QB365 Question Bank Software Study Materials

## Chemical Bonding Important 3 & 5 Marks Questions With Answers (Book Back and Creative)

9th Standard

Science

Total Marks : 78

### 3 Marks

16 x 3 = 48

- 1) How do atoms attain Noble gas electronic configuration

**Answer :** Atoms of all elements, other than inert gases, combine to form molecules because they have incomplete valence shell and tend to attain a stable electronic configuration similar to noble gases. Atoms can combine either by transfer of valence electrons from one atom to another or by sharing of valence electrons in order to achieve the stable outer shell of eight electrons.

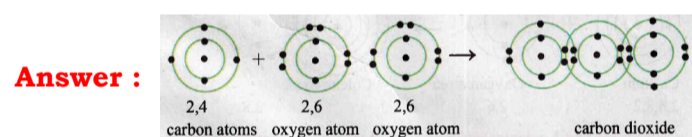
- 2)  $\text{NaCl}_4$  is insoluble in carbon tetrachloride but soluble in water. Give reason.

**Answer :** Sodium chloride formed by ionic bonding, so sodium chloride is a ionic compound, Ionic compounds are soluble in polar solvents like water. But ionic compounds are insoluble in non polar solvent like carbon tetrachloride. Sodium chloride is a ionic compound so it is insoluble in carbon tetrachloride.

- 3) Write a note on different types on bonds?

**Answer :** Chemical bonds are divided into two. One is strong bond and another one is weak bond. The strong bond is further divided into ionic bond, covalent bond, coordinate bond and metallic bond. Weak bond is divided into Hydrogen bond and Van der walls interaction.

- 4) Draw the electron distribution diagram for the formation of Carbon di oxide ( $\text{CO}_2$ ) molecule.



- 5) Identify the following reactions as oxidation or reduction

- a.  $\text{Na} \rightarrow \text{Na}^+ + \text{e}^-$   
 b.  $\text{Fe}^{3+} + 2\text{e}^- \rightarrow \text{Fe}^+$

**Answer :** (a) oxidation  
 (b) reduction

- 6) Identify the compounds as Ionic/Covalent/Coordinate based on the given characteristics.

- a. Soluble in non polar solvents -  
 b. undergoes faster/instantaneous reactions -  
 c. Non conductors of electricity -  
 d. Solids at room temperature -

**Answer :** a. Co-ordinate Covalent compound.  
 b. Ionic compound.  
 c. Covalent compound  
 d. Ionic compound

- 7) Why are Noble gases inert in nature?

**Answer :** Atoms of noble gases have little or no tendency to combine with each other or with atoms of other elements. This means that these atoms must be having stable electronic configuration. So they are inert in nature.

- 8) Fill in the following table according to the type of bonds formed in the given molecule.

$\text{CaCl}_2$ ,  $\text{H}_2\text{O}$ ,  $\text{CaO}$ ,  $\text{CO}$ ,  $\text{KBr}$ ,  $\text{HCl}$ ,  $\text{CCl}_4$ ,  $\text{HF}$ ,  $\text{CO}_2$ ,  $\text{Al}_2\text{Cl}_6$

Ionic bond	Covalent bond	Coordinate covalent bond


**Answer :**

<b>Ionic bond</b>	<b>Covalent bond</b>	<b>Coordinate covalent bond</b>
CaCl <sub>2</sub>	H <sub>2</sub> O	CO
CaO	CCl <sub>4</sub>	Al <sub>2</sub> Cl <sub>6</sub>
KBr	CO <sub>2</sub> , HCl, HF	

9) What is chemical bond?

**Answer :** A chemical bond may be defined as the force of attraction between the two atoms that binds them together as a unit called molecule

10) Write the basic concept of Kossel - Lewis theory

**Answer :** Kossel - Lewis theory is based on the concept of electronic configuration of noble gases.

11) What is covalent bond?

**Answer :** Bond which is formed between atoms by the mutual sharing of electrons is known as covalent bond.

12) What are oxidising agents? Given example

**Answer :** Substances which have the ability to oxidise other substances are called oxidising agents. These are also called as electron acceptors because they remove electrons from other substances.

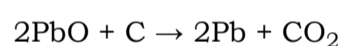
**Example:** H<sub>2</sub>O<sub>2</sub>, MnO<sub>4</sub><sup>-</sup>, CrO<sub>3</sub>, Cr<sub>2</sub>O<sub>7</sub><sup>2-</sup>

13) Ionic bond is also called electrostatic bond.

**Answer :** In ionic bond formation the bond is formed between the oppositely charged ions and these ions come closer to each other due to electrostatic force of attraction. So ionic bond is also called electrostatic bond

14) Define - Redox reaction.

**Answer :** The oxidation and reduction reactions occur in the same reaction. If one reactant gets oxidised, the other gets reduced. Such reaction is called as Redox reaction.



15) What is Rancidity?

**Answer :** The oxidation reaction in food materials that were left open for a long period is responsible for spoiling of food. This is called Rancidity.

16) Define oxidation number.

**Answer :** Oxidation number of an element is defined as the formal charge which an atom of that element appears to have when electrons are counted.

**5 Marks**

6 x 5 = 30

17) List down the differences between Ionic and Covalent compounds.

**Answer :**

S.No	Ionic Compounds	Covalent Compounds
1.	Formed by the transfer of electrons from a metal to a non-metal atom.	Formed by sharing of electrons between non-metal atoms.
2.	Strong electrostatic force of attraction between cations and anions	Mutual sharing of electrons and so weak force of attraction between atoms.
3.	Solids at room temperature.	Gases, liquids and soft solids
4.	Conducts electricity in molten state or in solutions	Non-conductors of electricity
5.	Have high melting and boiling points	Have low melting and boiling points.
6.	Soluble in polar solvents.	Soluble in non-polar solvents
7.	Hard and brittle	Soft and waxy.
8.	Undergo ionic reaction which are fast and instantaneous.	Undergo molecular reactions which are slow.

- 18) Give an example for each of the following statements.
- A compound in which two Covalent bonds are formed
  - A compound in which one ionic bond is formed
  - A compound in which two Covalent and one Coordinate bonds are formed
  - A compound in which three covalent bonds are formed
  - A compound in which Coordinate bond is formed

**Answer :** a) Formation of Oxygen molecule ( $O_2$ )

b) Formation of Sodium chloride ( $NaCl$ )

c) Formation of Ammonia and  $BF_3$  molecules

d) Formation of Nitrogen molecule ( $N_2$ )

e) Formation of Ammonium Ion.

- 19) Identify the incorrect statement and correct them.
- Like covalent compounds, Coordinate compounds also contain charged particles (ions), so they are good conductors of electricity.
  - Ionic bond is a weak bond when compared to Hydrogen bond.
  - Ionic or electrovalent bonds are formed by mutual sharing of electrons between atoms.
  - Loss of electrons is called Oxidation and Gain of electron is called Reduction.
  - The electrons which are not involved in bonding are called valence electrons.

**Answer :** (a) Like covalent compounds, coordinate compounds also do not contain charged particles (ions) so they are bad conductors of electricity.

(b) Ionic bond is a strong bond when compared to Hydrogen bond.

(c) Ionic or electrovalent bonds are formed by transfer of electrons between atom.

(e) The electron which are involved in bonding are called valence electrons.

- 20) Discuss in brief about the properties of Coordinate covalent compounds.

**Answer :** The compounds containing coordinate covalent bonds are called coordinate compounds.

(a) **Physical state** - These compounds exist as gases, liquids or solids.

(b) **Electrical conductivity** - Like covalent compounds, co-ordinate compounds also do not contain charged particles (ions), so they are bad conductors of electricity.

(c) **Melting point** - These compounds have melting and boiling points higher than those of purely covalent compounds but lower than those of purely ionic compounds.

(d) **Solubility** - Insoluble in polar solvents like water but are soluble in non-polar solvents like benzene,  $CCl_4$ , and toluene.

(e) **Reactions** - Coordinate covalent compounds undergo molecular reactions which are slow.

- 21) Give the characteristics of ionic compounds.

**Answer : Physical state:**

These compounds are formed because of the strong electrostatic force between cations and anions which are arranged in a well-defined geometrical pattern. Thus Ionic compounds are crystalline solids at room temperature.

**Electrical conductivity:**

Ionic compounds are crystalline solids and so their ions are tightly held together. The ions, therefore, cannot move freely, so they do not conduct electricity in solid state. However in molten state and their aqueous solutions conduct electricity.

**Melting point:**

The strong electrostatic force between the cations and anions hold the ions tightly together, so very high energy is required to separate them. Hence ionic compounds have high melting and boiling points.

**Solubility:**

Ionic compounds are soluble in polar solvents like water. They are insoluble in nonpolar solvents like benzene (C<sub>6</sub>H<sub>6</sub>), carbon tetrachloride (CCl<sub>4</sub>).

**Density hardness and brittleness:**

Ionic compounds have high density and they are quite hard because of the strong electrostatic force between the ions. But they are highly brittle.

- 22) List the characteristics of covalent compounds.

**Answer : Physical state** - Depending on force of attraction between covalent molecule the bond may be weaker or stronger. Thus covalent compounds exists in gaseous, liquid and solid form. Eg. Oxygen-gas; Water-liquid; Diamond-solid.

**Electrical conductivity** - Covalent compounds do not contain charged particles (ions), so they are bad conductors of electricity.

**Melting point** - Except few covalent compounds (Diamond, Silicon carbide), they have relatively low melting points compared to Ionic compounds.

**Solubility** - Covalent compounds are readily soluble in non-polar solvents like benzene (C<sub>6</sub>H<sub>6</sub>), carbon tetrachloride (CCl<sub>4</sub>). They are insoluble in polar solvents like water.

**Hardness and brittleness** - Covalent compounds are neither hard nor brittle. But they are soft and waxy.

**Reactions** - Covalent compounds undergo molecular reactions in solutions and these reactions are slow.