

SCHOLAREYE.XYZ PRESENTS

CLASS 9 · CHEMISTRY · CHAPTER 03

Chemical Bonding

Complete Solved MCQs

A beautifully crafted set of 80 exam-focused multiple choice questions covering ionic, covalent, coordinate covalent & metallic bonding — each with the correct answer highlighted and a clear, original explanation.

80 MCQs

7 Sections

Fully Explained

scholareye.xyz

YOUR COMPANION FOR CSS & ACADEMIC EXCELLENCE

Table of Contents

 Chapter 03: Chemical Bonding 80 MCQs

Why Do Atoms Form Chemical Bonds?

6 Questions

Pg 3–8



Ionic Bonds (Electrovalent Bonds)

14 Questions

Pg 9–22



Covalent Bonds

15 Questions

Pg 23–37



Coordinate Covalent Bond (Dative Bond)

7 Questions

Pg 38–44



Metallic Bonding

6 Questions

Pg 45–50



Electropositivity, Electronegativity & Intermolecular Forces

10 Questions

Pg 51–60



Comprehensive Review & Properties

22 Questions

Pg 61–82

Each question includes the correct answer highlighted and a full explanation.

 Why Do Atoms Form Chemical Bonds?

QUESTION 1 / 80

Q1 What is the primary reason atoms have a tendency to combine with other atoms?

A) To increase their energy

B) To decrease their energy and increase stability ✓

C) To increase their reactivity

D) To become radioactive

 EXPLANATION

Atoms are naturally driven to achieve a lower, more stable energy state. By combining with other atoms, they can lower their overall energy, making the resulting molecule or compound more stable than the individual atoms.

 Why Do Atoms Form Chemical Bonds?

QUESTION 2 / 80

Q2 Which of the following noble gases has only two electrons in its outermost shell?

A) Neon

B) Argon

C) Helium 

D) Krypton

 EXPLANATION

Helium (He) is unique among the noble gases as it only has two electrons, filling its first and only shell. All other noble gases have eight electrons in their outermost shells.

 Why Do Atoms Form Chemical Bonds?

QUESTION 3 / 80

Q3 According to the Octet Rule, atoms tend to gain, lose, or share electrons to achieve how many electrons in their outermost shell?

A) 2

B) 8 ✓

C) 18

D) 32

 EXPLANATION

The Octet Rule states that atoms are most stable when they have eight electrons in their valence (outermost) shell, mimicking the electronic configuration of noble gases like Neon and Argon.

QUESTION 4 / 80

Q4 Sodium (Na) tends to lose one electron to achieve stability. Which noble gas configuration does it acquire?

A) Helium

B) Neon ✓

C) Argon

D) Krypton

 EXPLANATION

Sodium has 11 electrons (2, 8, 1). When it loses its single valence electron, it is left with 10 electrons (2, 8), which is the exact electronic configuration of the noble gas Neon.

 Why Do Atoms Form Chemical Bonds?

QUESTION 5 / 80

Q5 What is the force of attraction that holds atoms together in a molecule or compound called?

A) Intermolecular force

B) Chemical bond ✓

C) Nuclear force

D) Gravitational force

**EXPLANATION**

A chemical bond is the attractive force that binds atoms together, allowing them to form molecules or compounds and achieve a more stable state.

 Why Do Atoms Form Chemical Bonds?

QUESTION 6 / 80

Q6 When two atoms approach each other to form a bond, what happens when the forces of attraction dominate the forces of repulsion?

- A) The atoms move apart
- B) The energy of the system increases
- C) The energy of the system lowers and a bond forms ✓**
- D) The atoms become radioactive

 EXPLANATION

As atoms approach, attractive forces pull them together, lowering the system's energy. If attraction dominates repulsion, a stable bond is formed. If repulsion dominates, they simply bounce away.

 Ionic Bonds (Electrovalent Bonds)**QUESTION 7 / 80**

Q7 An ionic bond is formed by the complete _____ of one or more electrons from one atom to another.

A) Sharing

B) Transfer ✓

C) Overlap

D) Destruction

 EXPLANATION

Ionic bonding involves the complete transfer of electrons, typically from a metal atom to a non-metal atom, creating positively and negatively charged ions.

 Ionic Bonds (Electrovalent Bonds)**QUESTION 8 / 80**

Q8 Which types of elements generally react to form ionic bonds?

A) Two non-metals

B) Two metals

C) A metal and a non-metal ✓

D) Two noble gases

 EXPLANATION

Metals have a tendency to lose electrons (electropositive), while non-metals tend to gain them (electronegative). This transfer of electrons from metal to non-metal forms ionic bonds.

 Ionic Bonds (Electrovalent Bonds)

QUESTION 9 / 80

Q9 In the formation of Sodium Chloride (NaCl), what happens to the sodium atom?

A) It gains an electron to become Cl^-

B) It loses an electron to become Na^+ ✓

C) It shares an electron with chlorine

D) It loses a proton

 EXPLANATION

Sodium (Na) has one valence electron. To achieve the stable Neon configuration, it easily loses this electron, becoming a positively charged sodium ion (Na^+).

 Ionic Bonds (Electrovalent Bonds)**QUESTION 10 / 80**

Q10 What type of force holds the oppositely charged ions together in an ionic compound?

A) Magnetic force

B) Electrostatic force of attraction ✓

C) Gravitational force

D) Nuclear force

 EXPLANATION

Once positive and negative ions are formed, they are held together by the strong electrostatic force of attraction between opposite charges.

 Ionic Bonds (Electrovalent Bonds)

QUESTION 11 / 80

Q11 Which of the following is the correct formula for Calcium Chloride?

A) CaCl

B) Ca_2Cl

C) CaCl_2 ✓

D) Ca_2Cl_3

 EXPLANATION

Calcium (Ca) loses two electrons to become Ca^{2+} , while each Chlorine (Cl) atom gains one electron to become Cl^- . To balance the charges, two chloride ions are needed for every calcium ion, resulting in CaCl_2 .

⚡ Ionic Bonds (Electrovalent Bonds)**QUESTION 12 / 80**

Q12 Ionic compounds exist in the form of a regular three-dimensional arrangement called a:

A) Sea of electrons

B) Crystal lattice ✓

C) Molecule

D) Polymer

💡 EXPLANATION

The strong electrostatic forces arrange the ions in a highly ordered, repeating 3D pattern known as a crystal lattice, which gives ionic solids their distinct shapes.

 Ionic Bonds (Electrovalent Bonds)**QUESTION 13 / 80**

Q13 Why are ionic solids generally hard and brittle?

A) They have weak intermolecular forces

B) The strong electrostatic forces hold ions rigidly in place, and shifting layers causes repulsion ✓

C) They contain free-moving electrons

D) They are made of soft metals

**EXPLANATION**

Ionic solids are hard because of the strong electrostatic forces. They are brittle because if an external force shifts the layers of ions, ions of the same charge align and repel each other, causing the crystal to shatter.

 Ionic Bonds (Electrovalent Bonds)**QUESTION 14 / 80**

Q14 In the solid state, ionic compounds do not conduct electricity because:

A) They lack electrons

B) The ions are tightly held and cannot move ✓

C) They are covalent in nature

D) They are insoluble in water

**EXPLANATION**

For conductivity, charged particles must be free to move. In solid ionic compounds, the ions are locked in the crystal lattice and cannot move to carry an electric current.

 Ionic Bonds (Electrovalent Bonds)**QUESTION 15 / 80**

Q15 When do ionic compounds become good conductors of electricity?

A) In solid state

B) In molten (melted) or aqueous (dissolved) state ✓

C) When mixed with oil

D) At absolute zero

 EXPLANATION

Melting or dissolving an ionic compound breaks the crystal lattice, freeing the ions. These mobile ions can now move and carry an electric current, making the substance a good conductor.

 Ionic Bonds (Electrovalent Bonds)

QUESTION 16 / 80

Q16 Which of the following is an example of an ionic compound?

A) H_2O

B) CH_4

C) MgF_2 ✓

D) CO_2

 EXPLANATION

MgF_2 (Magnesium Fluoride) is formed from a metal (Mg) and a non-metal (F), making it an ionic compound. The others are covalent compounds formed between non-metals.

 Ionic Bonds (Electrovalent Bonds)**QUESTION 17 / 80**

Q17 The process where water molecules surround and interact with ions in a solution is called:

A) Hydrolysis

B) Hydration ✓

C) Electrolysis

D) Sublimation

 EXPLANATION

Hydration is the process where polar water molecules surround individual ions (cations and anions), stabilizing them in an aqueous solution and breaking the electrostatic forces of the crystal lattice.

 Ionic Bonds (Electrovalent Bonds)

QUESTION 18 / 80

Q18 What is the electronic configuration of a Chloride ion (Cl^-)?

A) 2, 8, 7

B) 2, 8, 8



C) 2, 8

D) 2, 7

 EXPLANATION

A neutral chlorine atom has 17 electrons (2, 8, 7). By gaining one electron, it becomes Cl^- with 18 electrons, achieving the stable octet configuration of Argon (2, 8, 8).

 Ionic Bonds (Electrovalent Bonds)**QUESTION 19 / 80**

Q19 Which of the following statements about ionic compounds is FALSE?

A) They have high melting and boiling points.

B) They are generally soluble in water.

C) They conduct electricity in solid form. ✓

D) They form crystalline structures.

 EXPLANATION

Ionic compounds do NOT conduct electricity in their solid form because the ions are immobile. They conduct only when molten or dissolved in water.

 Ionic Bonds (Electrovalent Bonds)

QUESTION 20 / 80

Q20 The reaction of sodium with chlorine to form sodium chloride is an example of:

- A) Covalent bonding
- B) Coordinate covalent bonding
- C) Ionic bonding** ✓
- D) Metallic bonding

 EXPLANATION

Sodium (a metal) transfers an electron to chlorine (a non-metal), forming Na^+ and Cl^- ions that attract each other. This is a classic example of ionic bonding.

 Covalent Bonds

QUESTION 21 / 80

Q21 A covalent bond is formed by the:

A) Transfer of electrons

B) Mutual sharing of electrons ✓

C) Loss of protons

D) Gain of neutrons

 EXPLANATION

Covalent bonding occurs primarily between non-metals, where atoms share electron pairs to achieve noble gas configurations rather than transferring them completely.

 Covalent Bonds

QUESTION 22 / 80

Q22 Which type of elements generally form covalent bonds?

A) Metals only

B) Non-metals ✓

C) Metals and non-metals

D) Noble gases

 EXPLANATION

Non-metals have high electronegativity and ionization energies. They prefer to share electrons with other non-metals rather than lose or gain them completely.

 Covalent Bonds

QUESTION 23 / 80

Q23 A single covalent bond involves the sharing of how many electrons?

A) One

B) Two ✓

C) Three

D) Four

 EXPLANATION

A single covalent bond is formed by the mutual sharing of one electron pair, which consists of two electrons (one from each atom).

 Covalent Bonds

QUESTION 24 / 80

Q24 How is a double covalent bond represented?

A) A single line (-)

B) Two lines (=) ✓

C) Three lines ($\equiv$)

D) A dot and a cross

 EXPLANATION

A double bond, which involves the sharing of two electron pairs (four electrons), is conventionally represented by two parallel lines between the atoms.

 Covalent Bonds

QUESTION 25 / 80

Q25 Which of the following molecules contains a triple covalent bond?

A) H_2

B) O_2

C) N_2 ✓

D) Cl_2

 EXPLANATION

Nitrogen (N_2) has five valence electrons per atom. To achieve an octet, they share three electron pairs, forming a triple bond ($\text{N}\equiv\text{N}$).

 Covalent Bonds

QUESTION 26 / 80

Q26 In a water molecule (H_2O), how many single covalent bonds are present?

A) 1

B) 2



C) 3

D) 4

**EXPLANATION**

Oxygen shares one electron with each of the two hydrogen atoms, forming two single covalent bonds (O-H).

 Covalent Bonds

QUESTION 27 / 80

Q27 What is the shape of a methane (CH_4) molecule?

A) Linear

B) Bent

C) Tetrahedral ✓

D) Trigonal planar

 EXPLANATION

Carbon shares its four valence electrons with four hydrogen atoms. The repulsion between these four bonding pairs arranges the hydrogen atoms at the corners of a tetrahedron.

Q28 Why do covalent compounds generally have low melting and boiling points?

A) They have strong ionic bonds

B) They have weak intermolecular forces of attraction ✓

C) They are made of metals

D) They have a crystal lattice structure

 EXPLANATION

While the covalent bonds within molecules are strong, the forces between separate molecules (intermolecular forces) are weak. Therefore, little energy is needed to separate the molecules, resulting in low melting and boiling points.

Q29 Which of the following is a characteristic property of covalent compounds?

A) They are good conductors of electricity.

B) They are generally soluble in water.

C) They are usually insoluble in water but soluble in organic solvents. ✓

D) They have extremely high melting points.

 EXPLANATION

Covalent compounds are typically non-polar or weakly polar, making them insoluble in polar solvents like water, but highly soluble in non-polar organic solvents like benzene or ether.

 Covalent Bonds

QUESTION 30 / 80

Q30 In a Carbon Dioxide (CO_2) molecule, what type of bonds are present?

A) Two single bonds

B) Two double bonds ✓

C) One single and one double bond

D) One triple bond

 EXPLANATION

Carbon needs four electrons to complete its octet. It shares two electron pairs with each of the two oxygen atoms, forming two double bonds ($\text{O}=\text{C}=\text{O}$).

 Covalent Bonds

QUESTION 31 / 80

Q31 Which of the following molecules is non-polar?

A) HCl

B) H₂O

C) Cl₂ ✓

D) NH₃

 EXPLANATION

Cl₂ consists of two identical chlorine atoms. The electronegativity difference is zero, so the shared electron pair is pulled equally, resulting in a non-polar covalent bond.

 Covalent Bonds

QUESTION 32 / 80

Q32 A polar covalent bond is formed when:

A) Two identical atoms share electrons

B) Two different atoms share electrons unequally ✓

C) Electrons are completely transferred

D) Metallic bonds are broken

 EXPLANATION

When two different atoms bond, the more electronegative atom pulls the shared electron pair closer to itself, creating partial positive and negative charges (a dipole), making the bond polar.

 Covalent Bonds

QUESTION 33 / 80

Q33 Which atom in an HCl molecule carries a partial negative charge (δ^-)?

A) Hydrogen

B) Chlorine ✓

C) Both equally

D) Neither

 EXPLANATION

Chlorine is more electronegative than hydrogen. Therefore, it pulls the shared electron pair closer to itself, acquiring a partial negative charge (δ^-), leaving hydrogen with a partial positive charge (δ^+).

Q34 The formation of an ethene (C_2H_4) molecule involves:

A) Only single bonds

B) A double bond between carbons and single bonds with hydrogens ✓

C) A triple bond between carbons

D) Ionic bonds

 EXPLANATION

In ethene, the two carbon atoms share two electron pairs with each other (a double bond) and one electron pair each with two hydrogen atoms (single bonds).

Q35 Which of the following compounds is an exception to the rule that covalent compounds are gases or liquids at room temperature?

A) Methane

B) Ammonia

C) Water ✓

D) Carbon dioxide

 EXPLANATION

Water (H_2O) is a liquid at room temperature due to strong hydrogen bonding between its molecules, unlike other low molecular weight covalent compounds which are typically gases.

 Coordinate Covalent Bond (Dative Bond)

QUESTION 36 / 80

Q36 In a coordinate covalent bond, the shared electron pair is provided by:

A) Both atoms equally

B) One atom only ✓

C) A proton

D) A neutron

**EXPLANATION**

A coordinate covalent bond is a special type of covalent bond where one atom (the donor) provides both electrons for the shared pair, while the other atom (the acceptor) provides none.

Coordinate Covalent Bond (Dative Bond)

QUESTION 37 / 80

Q37 Which of the following is formed by a coordinate covalent bond?

A) NaCl

B) H₂O

C) H₃O⁺ (Hydronium ion) ✓

D) CH₄

 EXPLANATION

The hydronium ion (H₃O⁺) is formed when a water molecule (where oxygen has lone pairs) donates an electron pair to a proton (H⁺), which has an empty orbital.

Coordinate Covalent Bond (Dative Bond)

QUESTION 38 / 80

Q38 In the reaction $\text{NH}_3 + \text{H}^+ \rightarrow \text{NH}_4^+$, which species acts as the donor?

A) H^+

B) NH_3 ✓

C) NH_4^+

D) Both NH_3 and H^+

 EXPLANATION

Nitrogen in ammonia (NH_3) has a lone pair of electrons. It donates this pair to the H^+ ion (which has an empty 1s orbital) to form the ammonium ion (NH_4^+).

Coordinate Covalent Bond (Dative Bond)

QUESTION 39 / 80

Q39 Which of the following molecules can act as an acceptor in a coordinate covalent bond?

A) NH_3

B) H_2O

C) BF_3 ✓

D) CH_4

 EXPLANATION

Boron trifluoride (BF_3) has an incomplete octet; boron only has six electrons. It has an empty p-orbital and can accept a lone pair of electrons from a donor molecule like NH_3 .

 Coordinate Covalent Bond (Dative Bond)

QUESTION 40 / 80

Q40 Once a coordinate covalent bond is formed, how does it differ from a normal covalent bond?

A) It is much weaker

B) It is much stronger

C) There is no difference in the bond once formed ✓

D) It can easily break

 EXPLANATION

Once formed, a coordinate covalent bond is indistinguishable from a regular covalent bond. The distinction only lies in how the electrons were originally supplied to form the bond.

Coordinate Covalent Bond (Dative Bond)

QUESTION 41 / 80

Q41 In the formation of the ammonium ion (NH_4^+), the positive charge is:

- A) Located only on the nitrogen atom
- B) Spread over the entire ion** ✓
- C) Located only on the hydrogen atoms
- D) Neutralized

 EXPLANATION

The positive charge in NH_4^+ is delocalized, meaning it is spread across the entire polyatomic ion, not just concentrated on one atom.

Coordinate Covalent Bond (Dative Bond)

QUESTION 42 / 80

Q42 Which of the following is NOT an example of a coordinate covalent bond formation?

A) Formation of H_3O^+

B) Formation of NH_4^+

C) Formation of Cl_2 ✓

D) Formation of NH_3BF_3

 EXPLANATION

Cl_2 is formed by the mutual sharing of electrons between two identical chlorine atoms. There is no donor-acceptor relationship, so it's a normal covalent bond.

Q43 What is a metallic bond?

- A) A bond formed by the transfer of electrons
- B) A bond formed by the mutual sharing of electrons
- C) A bond formed by positively charged ions submerged in a sea of mobile electrons ✓**
- D) A bond formed by weak van der Waals forces

**EXPLANATION**

In metals, valence electrons are delocalized. The metal atoms become positive ions, and these cations are held together by the attraction to the surrounding “sea” of freely moving valence electrons.

Q44 Which property of metals is directly explained by the presence of free-moving electrons?

A) Malleability

B) Ductility

C) Good conductivity of heat and electricity ✓

D) High density

 EXPLANATION

The mobile electrons in a metallic bond are free to move throughout the metal lattice. When a voltage is applied, these electrons flow, conducting electricity. They also transfer kinetic energy, conducting heat.

Q45 Why are metals malleable and ductile?

A) They have weak bonds

B) The layers of atoms can slide over each other without breaking the metallic bond ✓

C) They are liquid at room temperature

D) They contain non-metal impurities

 EXPLANATION

The non-directional nature of the metallic bond means that when pressure is applied, layers of positive ions can slide past one another. The sea of electrons adjusts and continues to hold the ions together, allowing metals to be hammered into sheets (malleable) or drawn into wires (ductile).

Q46 Which of the following metals will have a stronger metallic bond?

A) Sodium (Na)

B) Magnesium (Mg) ✓

C) Both have equal strength

D) Cannot be determined

 EXPLANATION

Magnesium (Mg) has two valence electrons per atom, while Sodium (Na) has only one. Mg releases more electrons into the sea of electrons and forms a +2 ion, resulting in a stronger electrostatic attraction compared to Na's +1 ion.

Q47 Metals generally have high melting and boiling points because:

- A) They have weak intermolecular forces
- B) The metallic bond is very strong, requiring a lot of energy to break ✓**
- C) They are poor conductors of heat
- D) They form covalent networks

 EXPLANATION

The strong electrostatic attraction between the positively charged metal ions and the sea of delocalized electrons requires a significant amount of thermal energy to overcome, resulting in high melting and boiling points.

Q48 Which of the following is NOT a characteristic property of metals?

A) Metallic lustre

B) High melting points

C) Brittleness ✓

D) Good conductors of heat

 EXPLANATION

Metals are generally malleable and ductile, not brittle. Brittleness is a characteristic of ionic solids and some covalent network solids, where shifting layers causes repulsion.

Q49 The tendency of an atom to lose electrons to form positive ions is called:

A) Electronegativity

B) Electropositivity ✓

C) Ionization energy

D) Electron affinity

 EXPLANATION

Electropositivity is the measure of an element's ability to lose electrons and form positive cations. Metals are typically electropositive.

Q50 Which group of elements is considered the most electropositive?

A) Halogens

B) Noble gases

C) Alkali metals ✓

D) Transition metals

 EXPLANATION

Alkali metals (Group 1) have a single valence electron that they lose very easily to achieve a stable noble gas configuration, making them highly electropositive and very reactive.

Electropositivity, Electronegativity & Intermolecular Forces**QUESTION 51 / 80**

Q51 The tendency of an atom to gain electrons to form negative ions is called:

A) Electropositivity

B) Electronegativity ✓

C) Metallic character

D) Atomic radius

 EXPLANATION

Electronegativity is the tendency of an atom to attract and gain electrons, forming negative anions. Non-metals are typically electronegative.

Q52 Which is the most electronegative element in the periodic table?

A) Oxygen

B) Chlorine

C) Fluorine



D) Nitrogen

 EXPLANATION

Fluorine (F) is the most electronegative element. It has a very strong tendency to attract electrons towards itself in a chemical bond.

Q53 What type of intermolecular force exists between polar molecules like HCl?

- A) Hydrogen bonding
- B) Dipole-dipole attraction** ✓
- C) London dispersion forces
- D) Ionic bonding

 EXPLANATION

Polar molecules have permanent partial positive (δ^+) and partial negative (δ^-) ends (dipoles). The positive end of one molecule attracts the negative end of another, creating dipole-dipole attractions.

Q54 Hydrogen bonding is a special type of dipole-dipole attraction that occurs when hydrogen is covalently bonded to:

A) Carbon, Hydrogen, or Oxygen

B) Fluorine, Oxygen, or Nitrogen ✓

C) Chlorine, Bromine, or Iodine

D) Any metal

 EXPLANATION

Hydrogen bonding is exceptionally strong because F, O, and N are highly electronegative. They pull the electron density away from hydrogen, leaving it highly positive (δ^+), which then strongly attracts the lone pairs on F, O, or N of neighboring molecules.

Q55 Why does water (H_2O) have a much higher boiling point than hydrogen sulfide (H_2S)?

A) Water has stronger covalent bonds

B) Water molecules experience strong hydrogen bonding ✓

C) H_2S is an ionic compound

D) Water has a lower molecular weight

 EXPLANATION

Oxygen is much more electronegative than Sulfur, allowing water to form strong hydrogen bonds. H_2S only experiences weaker dipole-dipole or dispersion forces. Breaking the hydrogen bonds in water requires significantly more energy.

Q56 Which of the following compounds will exhibit hydrogen bonding?

A) CH_4

B) HCl

C) NH_3 ✓

D) H_2S

 EXPLANATION

Ammonia (NH_3) has a hydrogen atom bonded directly to a highly electronegative nitrogen atom, fulfilling the criteria for hydrogen bonding.

Q57 The strength of intermolecular forces affects which physical properties of a substance?

A) Color and density

B) Melting and boiling points ✓

C) Electrical conductivity

D) Chemical reactivity

 EXPLANATION

Stronger intermolecular forces mean molecules are held together more tightly. Therefore, more energy (higher temperature) is required to overcome these forces during melting or boiling.

Q58 In the solid state, which forces are the strongest?

A) Intermolecular forces in gases

B) Intermolecular forces in solids ✓

C) Intramolecular forces in liquids

D) Nuclear forces

 EXPLANATION

In solids, particles are closely packed and have the strongest intermolecular forces of attraction, which holds them in a rigid structure. Gases have the weakest intermolecular forces.

Q59 Which of the following statements correctly describes ionic compounds?

- A)** They are gases at room temperature.
- B)** They are good conductors of electricity in solid state.
- C) They have high melting and boiling points.** ✓
- D)** They are insoluble in water.

 EXPLANATION

Ionic compounds form strong crystal lattices. The strong electrostatic forces require a lot of energy to break, resulting in high melting and boiling points.

Q60 Covalent compounds are generally bad conductors of electricity because:

- A) They have free ions
- B) They lack free ions or free electrons** ✓
- C) They are made of metals
- D) They are highly reactive

 EXPLANATION

Electrical conductivity requires mobile charged particles. Covalent compounds consist of neutral molecules. Even when dissolved, they do not dissociate into ions (except for acids), so they do not conduct electricity.

Q61 Which type of bond is present in Diamond?

A) Ionic

B) Metallic

C) Covalent ✓

D) Coordinate

 EXPLANATION

Diamond is a giant covalent structure where each carbon atom is covalently bonded to four other carbon atoms in a tetrahedral arrangement.

Q62 Why is graphite a good conductor of electricity, while diamond is not?

A) Graphite has free ions.

B) Graphite has mobile electrons between its layers. ✓

C) Diamond has metallic bonds.

D) Diamond is softer than graphite.

 EXPLANATION

In graphite, each carbon atom is bonded to three others, leaving one delocalized electron per atom. These electrons are free to move within the layers, making graphite a good conductor. In diamond, all four valence electrons are locked in sigma bonds, leaving no free electrons.

Q63 Which of the following is an example of a covalent compound that is a gas at room temperature?

A) NaCl

B) H₂O

C) CH₄ (Methane) ✓

D) SiO₂

 EXPLANATION

Methane (CH₄) has a very low molecular mass and weak intermolecular forces, so it exists as a gas at room temperature. NaCl is ionic, H₂O is a liquid, and SiO₂ is a solid.

Q64 Which of the following is NOT a property of metals?

A) Malleability

B) Ductility

C) Poor conductor of heat ✓

D) Metallic lustre

 EXPLANATION

Metals are excellent conductors of heat due to the presence of free-moving electrons that can transfer kinetic energy rapidly. They are not poor conductors.

Q65 The force of attraction between two oppositely charged ions is called:

A) Covalent bond

B) Electrostatic force ✓

C) Metallic bond

D) Hydrogen bond

 EXPLANATION

The ionic bond is essentially the strong electrostatic force of attraction between the positively charged cations and negatively charged anions.

Q66 In the formation of an ionic bond, the metal atom:

A) Gains electrons

B) Loses electrons ✓

C) Shares electrons

D) Keeps all its electrons

 EXPLANATION

Metals have low ionization energies and tend to lose their valence electrons to achieve a stable noble gas configuration, becoming positively charged cations.

Q67 Which of the following elements is a non-metal that exists as a diatomic molecule?

A) Sodium

B) Chlorine ✓

C) Calcium

D) Helium

 EXPLANATION

Chlorine (Cl_2) is a non-metal that forms a diatomic molecule by sharing one electron pair between two chlorine atoms. Helium is a noble gas and is monoatomic.

Q68 What is the electronic configuration of a Sodium ion (Na^+)?

A) 2, 8, 1

B) 2, 8



C) 2, 7

D) 2, 8, 8

 EXPLANATION

Neutral sodium has 11 electrons (2, 8, 1). Upon losing its single valence electron to form Na^+ , it is left with 10 electrons, which corresponds to the stable configuration of Neon (2, 8).

Q69 Which type of bond involves the sharing of an electron pair provided by one atom?

A) Ionic bond

B) Single covalent bond

C) Coordinate covalent bond ✓

D) Metallic bond

 EXPLANATION

This is the definition of a coordinate covalent bond (also known as a dative bond), where the donor atom provides the lone pair to an acceptor atom.

Q70 The “sea of electrons” model is used to describe which type of bonding?

A) Ionic

B) Covalent

C) Metallic ✓

D) Hydrogen bonding

 EXPLANATION

In metallic bonding, positive metal ions are depicted as being submerged in a “sea” of delocalized valence electrons that are free to move throughout the structure.

 Comprehensive Review & Properties

QUESTION 71 / 80

Q71 Which of the following compounds is likely to have the highest melting point?

A) CH_4

B) H_2O

C) NaCl ✓

D) CO_2

 EXPLANATION

NaCl is an ionic compound with a strong crystal lattice. The electrostatic forces holding the ions together are much stronger than the intermolecular forces in covalent compounds like CH_4 , H_2O , or CO_2 , giving NaCl a much higher melting point.

Q72 The bond formed between two identical non-metal atoms (e.g., H_2) is:

A) Polar covalent

B) Non-polar covalent ✓

C) Ionic

D) Coordinate

 EXPLANATION

When two identical atoms bond, they have the same electronegativity. The shared electron pair is attracted equally by both nuclei, resulting in a non-polar covalent bond.

Q73 Which of the following statements about the Duplet Rule is correct?

- A)** It applies to all noble gases.
- B)** It states that atoms are stable with 8 electrons in their outermost shell.
- C)** It applies specifically to helium and hydrogen, which are stable with 2 electrons in their outermost shell. ✓
- D)** It is another name for the Octet Rule.

 EXPLANATION

The Duplet Rule is a specific case for the first shell, which can hold a maximum of 2 electrons. Hydrogen and Helium achieve stability with a full 1s orbital containing 2 electrons.

Q74 In the hydration of ions, the partially negative oxygen atom of water is attracted to:

A) The anion

B) The cation ✓

C) Another water molecule

D) The electron sea

 EXPLANATION

In water (H_2O), oxygen is partially negative (δ^-) and hydrogen is partially positive (δ^+). When an ionic compound dissolves, the δ^- oxygen atoms are electrostatically attracted to the positive cations (e.g., Na^+), surrounding them.

Q75 Which of the following is NOT a characteristic of ionic compounds?

- A)** They are crystalline solids.
- B)** They have high melting points.
- C)** They conduct electricity in solid state. ✓
- D)** They are generally soluble in water.

 EXPLANATION

Ionic compounds do not conduct electricity in the solid state because their ions are fixed in the crystal lattice and cannot move. They only conduct when melted or dissolved.

Q76 Identify the bond formed in the reaction between ammonia (NH_3) and boron trifluoride (BF_3).

A) Ionic bond

B) Coordinate covalent bond ✓

C) Non-polar covalent bond

D) Metallic bond

**EXPLANATION**

Nitrogen in NH_3 has a lone pair, and Boron in BF_3 has an empty orbital. The lone pair is donated from N to B, forming a coordinate covalent bond (also called a dative bond).

Q77 Why does magnesium have a higher melting point than sodium?

- A) Magnesium has weaker metallic bonds.
- B) Magnesium forms 2+ ions and releases 2 electrons into the sea of electrons, making the bond stronger. ✓**
- C) Sodium is a non-metal.
- D) Magnesium has a larger atomic radius.

 EXPLANATION

Mg has two valence electrons per atom compared to Na's one. This results in Mg^{2+} ions and a denser sea of delocalized electrons (two per atom), creating a much stronger metallic bond than in Na, hence the higher melting point.

Q78 What is the fundamental difference between ionic and covalent bonding?

A) Ionic bonding involves sharing; covalent involves transfer.

B) Ionic bonding involves transfer of electrons; covalent involves sharing. ✓

C) Ionic bonding occurs between non-metals; covalent between metals.

D) Ionic bonding is weaker than covalent bonding.

 EXPLANATION

The core distinction is that ionic bonds are formed via the complete transfer of electrons from one atom to another, while covalent bonds are formed by the mutual sharing of electron pairs.

Q79 Which of the following statements is true regarding the physical state of covalent compounds?

- A)** All covalent compounds are gases at room temperature.
- B)** All covalent compounds are solids at room temperature.
- C)** They can exist as gases, liquids, or solids depending on their molecular mass and intermolecular forces. ✓
- D)** They are all liquids.

 EXPLANATION

Covalent compounds vary widely. Small molecules like CH_4 are gases, medium-sized ones like H_2O are liquids, and very large ones like diamond or SiO_2 are solids.

Q80 The high boiling point of water is primarily attributed to:

- A) Its low molecular weight
- B) Strong hydrogen bonding between water molecules ✓**
- C) Weak dipole-dipole interactions
- D) The presence of ionic bonds

 EXPLANATION

Water molecules form extensive networks of hydrogen bonds due to the highly electronegative oxygen atom. Breaking these strong intermolecular forces requires a lot of energy, resulting in a high boiling point.



Great Work, Achiever!

You've just completed a thorough review of Chemical Bonding — from ionic and covalent bonds to metallic bonding and intermolecular forces. Keep this pace, and Chapter 03 will be second nature on exam day.

80

MCQS SOLVED

7

TOPICS COVERED

100%

EXPLAINED

scholareye.xyz

KEEP LEARNING · KEEP GROWING