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Chemistry Grade 9 — Chapter 5

Chemical Bonding

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Practice MCQs extracted from the supplied Class 9 Chemistry chapter tests (Section A). Total: 30 questions.

A. Important / Main Topics

1. According to the octet rule, an atom is most stable when its valence shell contains:

(A) 8 electrons
(B) 2 electrons
(C) 18 electrons
(D) 32 electrons

Correct Answer: A

Explanation: The octet rule states that an atom is most s.

2. Which of the following elements is chemically inert due to a complete valence shell?

(A) Sodium (Na)
(B) Neon (Ne)
(C) Chlorine (Cl)
(D) Oxygen (O)

Correct Answer: B

Explanation: Neon is a noble gas (Group 18) with a complete octet (\(1s^2 2s^2 2p^6\)), making it chemically inert.

3. In an ionic bond, electrons are:

(A) Shared equally between atoms
(B) Shared unequally between atoms
(C) Transferred from one atom to another
(D) Lost by both atoms

Correct Answer: C

Explanation: An ionic bond forms when one atom (usually a metal) transfers electrons to another atom (usually a non-metal).

4. Which type of bond is formed when two non-metal atoms share a pair of electrons?

(A) Ionic bond
(B) Metallic bond
(C) Coordinate covalent bond
(D) Covalent bond

Correct Answer: D

Explanation: Covalent bonds form when two non-metal atoms share one or more pairs of electrons to achieve a s.

5. In a non-polar covalent bond, the shared electrons are:

(A) Pulled equally by both atoms
(B) Pulled more by one atom
(C) Completely transferred to one atom
(D) Lost to the surroundings

Correct Answer: A

Explanation: Non-polar covalent bonds form between identical atoms (e.g., H–H, Cl–Cl), so both atoms exert the same force on the shared electrons.

6. The bond in HCl is best described as:

(A) Non-polar covalent
(B) Polar covalent
(C) Ionic

(D) Metallic

Correct Answer: B

Explanation: HCl has a polar covalent bond because chlorine is more electronegative than hydrogen, pulling the shared electrons toward itself.

7. In a coordinate covalent bond, the shared electron pair comes from:

(A) Both atoms equally
(B) The nucleus
(C) A single atom (the donor)
(D) A third atom

Correct Answer: C

Explanation: In a coordinate covalent bond, one atom (the donor) provides both electrons for the shared pair.

8. Which of the following is a property of metals due to metallic bonding?

(A) They are brittle
(B) They are poor conductors of electricity
(C) They have low melting points
(D) They are malleable and ductile

Correct Answer: D

Explanation: In metallic bonding, layers of metal ions can slide over each other, making metals malleable and ductile.

9. Which of the following compounds contains an ionic bond?

(A) NaCl
(B) H□O
(C) Cl□
(D) CH□

Correct Answer: A

Explanation: NaCl is an ionic compound formed from a metal (Na) and a non-metal (Cl), involving the transfer of electrons.

10. The intermolecular force that is strongest among the following is:

(A) Dipole–dipole forces
(B) Hydrogen bonding
(C) London dispersion forces
(D) Ion–dipole forces

Correct Answer: B

Explanation: Hydrogen bonding is the strongest of the intermolecular forces discussed in the chapter, occurring when H is bonded to N, O, or F.

11. Why do noble gases not participate in ordinary chemical reactions?

(A) They have one valence electron
(B) They have high electronegativity
(C) They have a complete valence shell with a stable octet
(D) They are highly reactive metals

Correct Answer: C

Explanation: Noble gases (Group 18) have a completely filled valence shell (\(ns^2 np^6\), except He with \(1s^2\)), so they do not need to gain, lose, or share electrons.

12. Which of the following best explains why metals are electropositive?

(A) They have a strong tendency to gain electrons
(B) They have a complete octet
(C) They form covalent bonds with non-metals
(D) They have low ionization energy and low electronegativity, so they lose electrons easily

Correct Answer: D

Explanation: Metals are electropositive because they have low ionization energy and low electronegativity, allowing them to lose electrons and form positive ions.

13. In the formation of Mg^{2}□ from a neutral magnesium atom, what happens?

(A) Magnesium loses two electrons
(B) Magnesium gains two electrons
(C) Magnesium shares two electrons
(D) Magnesium gains two protons

Correct Answer: A

Explanation: Magnesium loses two electrons — this correctly answers the question.

14. Which of the following molecules contains a **double covalent bond?**

(A) H□
(B) O□
(C) Cl□
(D) HCl

Correct Answer: B

Explanation: O□ — this correctly answers the question.

15. In a coordinate covalent bond, the atom that donates both electrons is called the:

(A) Acceptor
(B) Cation
(C) Donor
(D) Anion

Correct Answer: C

Explanation: In a coordinate covalent bond, the donor atom provides both electrons for the shared pair, while the acceptor receives them.

B. Less Important / Secondary Topics

16. Which of the following statements about hydrogen bonding is correct?

(A) It occurs when hydrogen is bonded to N, O, or F
(B) It occurs between any two hydrogen atoms
(C) It is weaker than dipole–dipole forces
(D) It only occurs in non-polar molecules

Correct Answer: A

Explanation: Hydrogen bonding occurs when a hydrogen atom covalently bonded to a highly electronegative atom (N, O, or F) is attracted to a lone pair on a nearby N, O, or F atom.

17. Why does diamond have a very high melting point?

(A) It has weak intermolecular forces
(B) It has a giant covalent network of strong bonds throughout
(C) It contains free electrons
(D) It is an ionic compound

Correct Answer: B

Explanation: Diamond is a giant covalent structure; each carbon atom is bonded to four others by strong covalent bonds, so a lot of energy is needed to break the structure.

18. Why does graphite conduct electricity while diamond does not?

(A) Diamond has delocalized electrons; graphite has no free electrons
(B) Both have free electrons, but diamond's are less mobile
(C) Graphite has delocalized electrons; diamond has no free electrons
(D) Graphite is ionic; diamond is covalent

Correct Answer: C

Explanation: In graphite, the fourth valence electron of each carbon atom is delocalized and can move, allowing conductivity. In diamond, all valence electrons are used in covalent bonds, so no free electrons exist.

19. Which of the following is **not a property of ionic compounds?**

(A) High melting points
(B) Conduct electricity when molten or dissolved
(C) Often soluble in water
(D) Conduct electricity in the solid state

Correct Answer: D

*Explanation: Ionic compounds do **not** conduct electricity in the solid state because their ions are fixed in the lattice. They conduct only when molten or dissolved.*

20. Metals are malleable and ductile because:

(A) Their layers of ions can slide over one another while being held by the electron sea
(B) They have weak ionic bonds
(C) They have strong covalent bonds
(D) They contain free protons

Correct Answer: A

Explanation: In metallic bonding, the delocalized electron sea holds the layers of metal ions together even when the layers slide, so metals can be shaped without breaking.

21. An element \(X\) has the electronic configuration \(1s^2 2s^2 2p^5\). It reacts with an element \(Y\) that has the configuration \(1s^2 2s^2 2p^6 3s^1\). Which type of bond will most likely form between X and Y?

(A) Non-polar covalent bond
(B) Ionic bond
(C) Polar covalent bond
(D) Coordinate covalent bond

Correct Answer: B

Explanation: X is a non-metal (fluorine, 7 valence electrons) and Y is a metal (sodium, 1 valence electron). The metal transfers its electron to the non-metal, forming an ionic bond (NaF).

22. A molecule \(XY\) is formed between two elements, X and Y. If the electronegativity of X is 2.1 and that of Y is 3.5, which of the following is the most likely type of bond?

(A) Non-polar covalent
(B) Ionic
(C) Polar covalent
(D) Metallic

Correct Answer: C

Explanation: The electronegativity difference is \(3.5 - 2.1 = 1.4\), which is moderate. This difference indicates a polar covalent bond (like O–H in water).

23. Which of the following molecules contains a **coordinate covalent bond?**

(A) CH□
(B) NH□
(C) H□O
(D) H□O□

Correct Answer: D

Explanation: In the hydronium ion (H□O□), water donates a lone pair to H□. Both electrons in the new O–H bond come from oxygen, making it a coordinate covalent bond.

24. Graphite is a good conductor of electricity, but diamond is not. Which statement best explains this difference?

(A) Graphite has delocalized electrons between its layers, while diamond's electrons are all localized in covalent bonds
(B) Graphite has a 3D network, while diamond has a 2D layered structure
(C) Diamond has free ions, while graphite does not
(D) Graphite is ionic, while diamond is covalent

Correct Answer: A

Explanation: In graphite, the fourth valence electron of each carbon atom is delocalized and can move freely, allowing conductivity. In diamond, all valence electrons are used in covalent bonds, so no free electrons exist.

25. Why is the melting point of NaCl much higher than that of ice (H□O)?

(A) NaCl has a giant covalent network; ice has a simple molecular structure

(B) NaCl has strong ionic bonds throughout a giant lattice; ice has weak intermolecular forces between molecules

(C) NaCl is a metal; ice is a non-metal

(D) NaCl has delocalized electrons; ice does not

Correct Answer: B

Explanation: Ionic bonds in NaCl are much stronger than the intermolecular forces in ice. Melting NaCl requires breaking strong ionic bonds; melting ice requires breaking weak intermolecular forces.

26. What is the strongest intermolecular force among the following?

(A) London dispersion forces

(B) Dipole–dipole forces

(C) Hydrogen bonding

(D) Van der Waals forces

Correct Answer: C

Explanation: Hydrogen bonding is the strongest of the intermolecular forces discussed in the chapter, occurring when H is bonded to N, O, or F.

27. Which of the following combinations of elements would most likely form a **non-polar covalent bond?**

(A) Na and Cl

(B) H and Cl

(C) Mg and O

(D) H and H

Correct Answer: D

Explanation: H and H — this correctly answers the question.

28. Which of the following would you expect to have the **highest melting point?**

(A) Diamond

(B) H□O

(C) NaCl

(D) CO□

Correct Answer: A

Explanation: Diamond has a giant covalent structure with strong covalent bonds throughout a 3D network. A lot of energy is needed to break these bonds, so its melting point is very high (~3550 °C).

29. A metal such as copper is malleable and ductile. Which feature of its structure allows this?

(A) Strong ionic bonds

(B) Layers of atoms that can slide over each other, held together by a sea of delocalized electrons

(C) Giant covalent network

(D) Weak intermolecular forces

Correct Answer: B

Explanation: In metallic bonding, the layers of metal ions can slide without breaking the metallic bond because the delocalized electrons hold them together.

30. In the formation of an ionic compound, which of the following is true?

(A) The metal gains electrons, and the non-metal loses electrons

(B) Both atoms share electrons equally

(C) The metal loses electrons, and the non-metal gains electrons

(D) Both atoms lose electrons

Correct Answer: C

Explanation: The metal loses electrons, and the non-metal gains electrons — this correctly answers the question.