

CHEMISTRY

CLASS XI

COMPETENCY BASED EXAM – SEPTEMBER 2025

Chemical Bonding MCQs

- Q1.** The bond angle in NH_3 is less than that in BF_3 because:
- A. Lone pair–bond pair repulsion in NH_3 reduces bond angle
 - B. BF_3 has sp^3 hybridization
 - C. NH_3 has sp^2 hybridization
 - D. BF_3 has lone pairs on boron

Answer: A

Reasoning: NH_3 has sp^3 hybridization with one lone pair, reducing bond angle to $\sim 107^\circ$. BF_3 has sp^2 hybridization with 120° bond angle.

- Q2.** Which of the following molecules is non-polar despite having polar bonds?
- A. H_2O
 - B. NH_3
 - C. CO_2
 - D. HF

Answer: C. CO_2

Reasoning: Linear geometry causes dipole cancellation.

Q3. Assertion–Reason

Assertion (A): Ionic compounds are generally soluble in polar solvents.

Reason (R): Polar solvents stabilize ions by solvation.

- A. Both A and R are true, and R is the correct explanation of A
- B. Both A and R are true, but R is not the correct explanation of A
- C. A is true, R is false
- D. A is false, R is true

Answer: A

Q4. The hybridization of carbon in ethyne (C_2H_2) is:

- A. sp^3
- B. sp^2
- C. sp
- D. None

Answer: C. sp

Reasoning: Each carbon forms two σ bonds and two π bonds \rightarrow linear geometry.

Q5. The bond order of O_2 molecule according to MO theory is:

- A. 1
- B. 2
- C. 3
- D. 2.5

Answer: B. 2

Reasoning: O_2 has 8 bonding and 4 antibonding electrons \rightarrow bond order = $(8-4)/2 = 2$.

Q6. Which of the following has maximum ionic character?

- A. $NaCl$
- B. $MgCl_2$
- C. $AlCl_3$
- D. $BeCl_2$

Answer: A. $NaCl$

Reasoning: Greater difference in electronegativity \rightarrow maximum ionic character.

Q7. Assertion-Reason

Assertion (A): H_2O is liquid at room temperature while H_2S is a gas.

Reason (R): Strong hydrogen bonding in H_2O leads to higher boiling point.

- A. Both A and R are true, and R is the correct explanation of A
- B. Both A and R are true, but R is not the correct explanation of A
- C. A is true, R is false
- D. A is false, R is true

Answer: A

Q8. Which of the following molecules has a dipole moment?

- A. CCl_4
- B. CHCl_3
- C. BF_3
- D. CO_2

Answer: B. CHCl_3

Reasoning: Tetrahedral geometry with unequal distribution \rightarrow net dipole.

Q9. The shape of XeF_4 molecule is:

- A. Tetrahedral
- B. Square planar
- C. Octahedral
- D. Trigonal bipyramidal

Answer: B. Square planar

Reasoning: Xe has sp^3d^2 hybridization with two lone pairs \rightarrow square planar.

Q10. Assertion-Reason

Assertion (A): The bond angle in H_2O is less than that in NH_3 .

Reason (R): H_2O has two lone pairs, causing greater repulsion than NH_3 .

- A. Both A and R are true, and R is the correct explanation of A
- B. Both A and R are true, but R is not the correct explanation of A
- C. A is true, R is false
- D. A is false, R is true

Answer: A