Sharya Academy

Chemistry | Test | Class XI
Hybridization and Bond Order

Time: 1:00 hr. M.M: 30

1. Choose the correct option 1 x 8 = 8

i. Which of the following species has tetrahedral geometry?

a) BH_4^- b) NH_2^-

c) CO_3^{2-} d) H_3O^+

ii. The types of hybrid orbitals of nitrogen in NO_2^+, NO_3^- and NH_4^+ respectively are expected to be

a) sp, sp^3 and sp^2 b) sp, sp^2 and sp^3

c) sp^2, sp and sp^3 d) sp^2, sp^3 and sp

iii. In PO_4^{3-} ion the formal charge on the oxygen atom of P–O bond is

a) +1 b) –1

c) –0.75 d) + 0.75

iv. In NO_3^- ion, the number of bond pairs and lone pairs of electrons on nitrogen atom are

a) 2, 2 b) 3, 1

c) 1, 3 d) 4, 0

v. Which of the following species has tetrahedral geometry?

a) BH_4^- b) NH_2^-

c) CO_3^{2-} d) H_3O^+

vi. Which of the following angle corresponds to sp^2 hybridization?

a) 90° b) 120°

c) 180° d) 109°

vii. Which of the following species have the same shape?

a) CO_2 b) CCl_4

c) O_3 d) NO_2^-

viii. Which of the following options represents the correct bond order :

a) $O_2^- > O_2 > O_2^+$ b) $O_2^- < O_2 < O_2^+$

c) $O_2^- > O_2 < O_2^+$ d) $O_2^- < O_2 > O_2^+$

2. Match the species in Column I with the geometry/shape in Column II. 1 x 4 = 4

Column I	Column II
i) H_3O^+	a) Linear
ii) $HC \equiv CH$	b) Angular
iii) ClO_2^-	c) Tetrahedral
iv) NH_4^+	d) Trigonal bipyramidal
	e) Pyramidal

3. Predict the shapes of the following molecules on the basis of hybridization. 2

BCl_3, CH_4, CO_2, NH_3

4. What is the difference between sp, sp^2 and sp^3 hybridization? 3

5. Explain the five basic shapes of hybridization. 5

6. Draw diagrams showing the formation of a double bond and a triple bond between carbon atoms in C_2H_4 and C_2H_2 molecules. 2

7. Arrange the bonds in order of increasing ionic character in the molecules: LiF, K_2O, N_2, SO_2 and ClF_3 2

8. What is the effect of the following processes on the bond order in N_2 and O_2? 2

a) $N_2 \rightarrow N_2^+ + e-$

b) $O_2 \rightarrow O_2^+ + e-$

9. Read the statements below and choose the correct answer- 2

Assertion (A) : Though the central atom of both NH_3 and H_2O molecules are sp^3 hybridized, yet H–N–H bond angle is greater than that of H–O–H.

Reason (R) : This is because nitrogen atom has one lone pair and oxygen atom has two lone pairs.

a) A and R both are correct, and R is the correct explanation of A.

b) A and R both are correct, but R is not the correct explanation of A.

c) A is true but R is false.

d) A and R both are false.