Q1 - 24 June - Shift 2

The correct order of bound orders of C_2^{2-}, N_2^{2-} and O_2^{2-} is, respectively.

(A) $C_2^{2-} < N_2^{2-} < O_2^{2-}$ (B) $O_2^{2-} < N_2^{2-} < C_2^{2-}$

(C) $C_2^{2-} < O_2^{2-} < N_2^{2-}$ (D) $N_2^{2-} < C_2^{2-} < O_2^{2-}$

Space for your notes:

Q2 - 25 June - Shift 1

Bonding in which of the following diatomic molecule(s) become(s) stronger, on the basis of MO Theory, by removal of an electron ?

(A) NO (B) N_2

(C) O_2 (D) C_2

(E) B_2

Space for your notes:

Q3 - 25 June - Shift 2

Amongst BeF_2, BF_3, H_2O, NH_3, CCl_4 and HCl, the number of molecules with non-zero net dipole moment is _____.

Space for your notes:

Q4 - 26 June - Shift 1

Consider the ions/molecule

O_2^+, O_2, O_2^-, O_2^{2-}

For increasing bond order the correct option is :

(A) $O_2^{2-} < O_2^- < O_2 < O_2^+$

(B) $O_2^- < O_2^{2-} < O_2 < O_2^+$

(C) $O_2^- < O_2^{2-} < O_2^+ < O_2$

(D) $O_2^- < O_2^+ < O_2^{2-} < O_2$

Space for your notes:

Q5 - 26 June - Shift 2

The oxide which contains an odd electron at the nitrogen atom is

(1) N_2O (2) NO_2 (3) N_2O_3 (4) N_2O_5

Space for your notes:

Q6 - 26 June - Shift 2

Amongst SF_4, XeF_4, CF_4 and H_2O, the number of species with two lone pairs of electrons _____.

Space for your notes:

Q7 - 27 June - Shift 1

Based upon VSEPR theory, match the shape (geometry) of the molecules in List-I with the molecules in List-II and select the most appropriate option

Space for your notes:

List-I (Shape)	**List-II (Molecules)**
(A) T-shaped	(I) XeF_4
(B) Trigonal planar	(II) SF_4
(C) Square planar	(III) ClF_3
(D) See-saw	(IV) BF_3

(A) (A) – I, (B) – (II), (C) – (III), (D) – (IV)

(B) (A) – (III), (B) – (IV), (C) – (I), (D) – (II)

(C) (A) – (III), (B) – (IV), (C) – (II), (D) – (I)

(D) (A) – (IV), (B) – (III), (C) – (I), (D) – (II)

Q8 - 27 June - Shift 2

Identify the **incorrect** statement for PCl_5 from the following.

Space for your notes:

(A) In this molecule, orbitals of phosphorous are assumed to undergo sp^3d hybridization.

(B) The geometry of PCl_5 is trigonal bipyramidal.

(C) PCl_5 has two axial bonds stronger than three equatorial bonds.

(D) The three equatorial bonds of PCl_5 lie in a plane.

Q9 - 27 June - Shift 2

The correct order of increasing intermolecular hydrogen bond strength is

(A) $HCN < H_2O < NH_3$

(B) $HCN < CH_4 < NH_3$

(C) $CH_4 < HCN < NH_3$

(D) $CH_4 < NH_3 < HCN$

Space for your notes:

Q10 - 28 June - Shift 1

The hybridization of P exhibited in PF_5 is sp^xd^y. The value of y is _____.

Space for your notes:

Q11 - 28 June - Shift 2

In the structure of SF_4, the lone pair of electrons on S is in.

(A) equatorial position and there are two lone pair-bond pair repulsions at 90°

(B) equatorial position and there are three lone pair-bond pair repulsions at 90°

(C) axial position and there are three lone pair – bond pair repulsion at 90°.

(D) axial position and there are two lone pair – bond pair repulsion at 90°.

Space for your notes:

Q12 - 29 June - Shift 1

Arrange the following in the decreasing order of their covalent character :

(A) LiCl

(B) NaCl

(C) KCl

(D) CsCl

Question: Choose the **most appropriate** answer from the options given below :

(A) (A)> (C) > (B)> (D)

(B) (B) > (A) > (C) > (D)

(C) (A) > (B) > (C) > (D)

(D) (A) > (B) > (D) > (C)

Space for your notes:

Q13 - 29 June - Shift 2

Consider the species CH_4, NH_4^+ and BH_4^-. Choose the correct option with respect to the there species:

(A) They are isoelectronic and only two have tetrahedral structures

(B) They are isoelectronic and all have tetrahedral structures

(C) Only two are isoelectronic and all have tetrahedral structures

(D) Only two are isoelectronic and only two have tetrahedral structures

Space for your notes:

Q14 - 29 June - Shift 2

Number of lone pair (s) of electrons on central atom and the shape of BrF_3 molecule respectively, are :

(A) 0, triangular planar.

(B) 1, pyramidal.

(C) 2, bent T-shape.

(D) 1, bent T-shape

Space for your notes:

Answer Key

Q1 (B) **Q2** (C) **Q3** (3) **Q4** (A)

Q5 (B) **Q6** (3) **Q7** (B) **Q8** (C)

Q9 (C) **Q10** (1) **Q11** (A) **Q12** (C)

Q13 (B) **Q14** (C)

Q1 (B)

Species	Bond order
C_2^{2-}	3
N_2^{2-}	2
O_2^{2-}	1

Q2 (C)

Bond strength $\propto$ Bond order

removal of electron from antibonding MO increases B.O.

NO & O_2 has valence e- in π^*orbital.

Q3 (3)

BeF_2, BF_3 and $CCl_4 \Rightarrow \mu_{net} = 0$

H_2O, NH_3 and $HCl \Rightarrow \mu_{net} \neq 0$

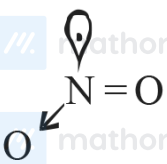
Q4 (A)

ion/molecule	Number of e^- in BMO	Number of e^- in ABMO	Bond order
O_2^+	10	5	2.5
O_2	10	6	2
O_2^-	10	7	1.5
O_2^{2-}	10	8	1

Bond order $O_2^{2-} < O_2^- < O_2 < O_2^+$

Q5 (B)

$NO_2 \rightarrow 7 + 2 \times 8 = 23$ electron (odd)



Q6 (3)

Number of lone pair on central atom for H_2O and XeF_4 is equal to 2.

Q7 (B)

T-shaped ClF_3 sp^3d, 2lp

Trigonal planar BF_3 sp^2, 0lp

Square planar XeF_4 sp^3d^2, 2lp

See-saw SF_4 sp^3d, 1lp

Q8 (C)

In PCl_5, axial bonds are weaker than equatorial.

Q9 (C)

Order of H-Bonding

$CH_4 < HCN < NH_3$

NCH . . . NCH

H_2NH . . . NH_3

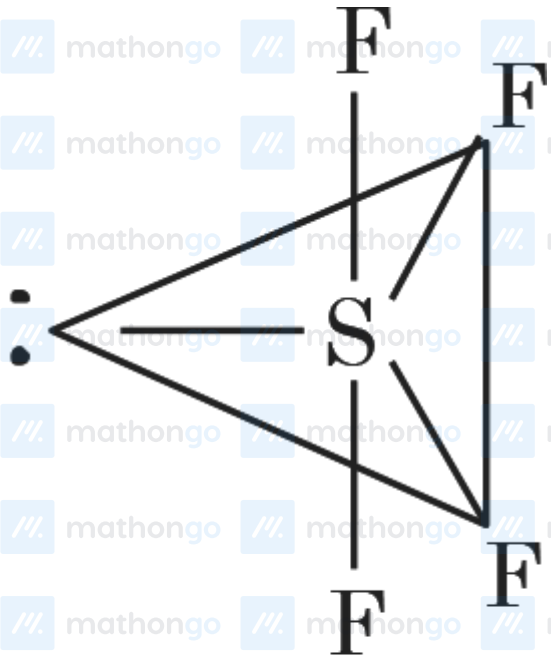
Q10 (1)

$PF_5 \Rightarrow sp^3d$ hybridisation

(5 sigma bonds, zero lone pair on central atom)

Value of y = 1

Q11 (A)

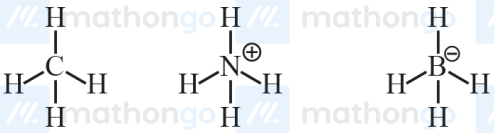


sp^3d, See-Saw

Q12 (C)

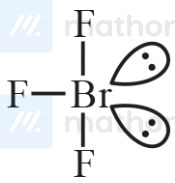
LiCl > NaCl > KCl > CsCl (Covalent character)

Q13 (B)



All are tetrahedral and each have 10 electrons.

Q14 (C)



Steric no. = 5 (sp^3d), lone pair = 2

Bent T shape.