INORGANIC CHEMISTRY TIME :30 Min

Single Correct

1. Find the pair of species having the same shape but different hybridization of the central atom?

(A) $[SnCl_3]^{\ominus}$, XeO_3 (B) XeO_2F_2, SF_4 (C) XeF_2, $NO_2^{\oplus}$ (D) BrF_3 , $XeOF_2$

2. Select the **CORRECT** order of bond angle?

(A) $NH_3 < NH_2^{\ominus} < CH_4$ (B) $CO_2 = NO_2^{\oplus} < NO_2^{\ominus}$

(C) $SO_3^{-2} < SO_4^{-2} < SO_2$ (D) $BF_3 < BCl_3 < BBr_3$

3. Borazine shows a close similarity with benzene and therefore also named as inorganic benzene. Which of the following statement(s) is/are **INCORRECT** for benzene and borazine?

(A) Both are planar

(B) Both are aromatic

(C) Both are isoelectronic species

(D) Both have 2pπ – 2pπ type of coordinate bond.

4. Identify the chemical specie(s), which is/are polar as well as planar.

(A) $SnCl_2$ (B) XeF_6 (C) BF_3 (D) XeF_2

5. With respect to valence bond theory, the **CORRECT** statement is

(A) Bond energy order is $H_2 > F_2$

(B) Number of lone pair of electron order is $I_3^{\oplus} > I_3^{\ominus}$

(C) s % character order in lone pair of electron(s) is $OCl_2 > OF_2$

(D) Bond angle order is $SCl_2 > OCl_2$

6. Which of the following set of order is **INCORRECT** for their indicated properties?

(A) Bond length of O–F ; $O_2F_2 > OF_2$

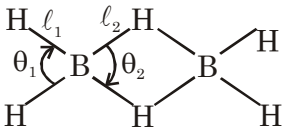
(B) Lewis acidic strength ; $BCl_3 > BF_3$

(C) Basic strength ; $N(CH_3)_3 < N(SiH_3)_3$

(D) p_π–p_π back bond strength ; $BF_3 > BCl_3$

7. Observe the following conversion and structure of B_2H_6 (Diborane)

$2BH_{3(g)} \longrightarrow B_2H_{6(g)}$



The correct statement is :

(A) $\ell_1 > \ell_2$

(B) $\theta_1 > \theta_2$

(C) B_2H_6 consists 3c–2e bond and is a planar species

(D) The hybridisation state of Boron atom in B_2H_6 is not changed as compared to monomeric form of BH_3

8. Which of the following acid/base reaction is most difficult to proceed in forward direction ?

(A) $BCl_3 + NMe_3 \longrightarrow Cl_3B{\leftarrow}NMe_3$ (B) $BF_3 + NH_3 \longrightarrow F_3B{\leftarrow}NH_3$

(C) $NH_3 + H_2O \longrightarrow NH_4^+ + OH^-$ (D) $PH_3 + H_2O \longrightarrow PH_4^+ + OH^-$

9. Which of the following species is having highest p% character in the orbital occupied by bond pair as compared to orbital occupied by lone pair ?

(A) NH_3 (B) PH_3 (C) AsH_3 (D) CH_3^-

10. Which of the following species has bond angle ≥ 120°, w.r.t. underlined atom?

(A) $\underline{O}(CH_3)_2$ (B) $\underline{N}(CH_3)_3$ (C) $\underline{N}(SiH_3)_3$ (D) $\underline{P}(SiH_3)_3$

11. The **CORRECT** order of indicated bond length is :-

(A) d_{C-Cl} ; $CF_3-Cl > CH_3-Cl$ (B) d_{C-H} ; $CF_3-H < Cl_3C-H$

(C) d_{N-N} ; $H_2N-NH_2 < F_2N-NF_2$ (D) d_{O-O} ; $O_2F_2 > H_2O_2$

One or more than one Correct

12. Which of the following statement is/are **CORRECT**?

(A) In NSF_3 both π-bonds are pπ-dπ type.

(B) The ratio of σ-bonds to π-bond in SO_3 and SO_2 are identical.

(C) $[ICl_4]^{\ominus}$ & $[XeF_5]^{\ominus}$ are planar.

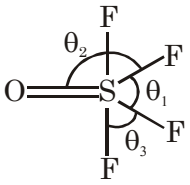
(D) $Cl_2O_{6(s)}$ exist as $ClO_2^{\oplus}$ & $ClO_4^{\ominus}$

13. Select the **CORRECT** order of bond energy?

(A) H–F < H–Cl < H–Br (B) $3p_\pi$-$3p_\pi < 3d_\pi$-$3d_\pi$

(C) $Cl_2 > Br_2 > F_2$ (D) $O_2 < O_3$(O–O)

14. Which of the following option is/are **CORRECT** about



(A) $\theta_2 > \theta_1 > \theta_3$

(B) $d_{x^2-y^2}$ orbital involved in hybridization

(C) maximum number of atoms in plane are 4.

(D) $S-F_{(axial)}$ bond length < $S-F_{(eq.)}$ bond length

15. Consider the following reaction and choose **CORRECT** statements

$3B_2H_6 + 6NH_3 \xrightarrow{\text{room temperature}}$ 3 mole ionic product (A)

$\downarrow$ Heat

Product (B) + Flammable gas (C)

(A) Product (B) contain aromatic character.

(B) Boiling point of product (C) is less than Helium.

(C) All Boron in product (A) are sp^3 hybridised.

(D) In product (B), $2p_\pi$–$3p_\pi$ type back bond present.

16. Which of the following is example of cyclic silicate?

(A) dioptase $Cu_6Si_6O_{18}.6H_2O$ (B) Crocidolite $Na_2Fe_5(OH)_2[(Si_4O_{11})]_2$

(C) Serpentine $Al_2(OH)_2Si_4O_{10}$ (D) Catapleite $Na_2ZrSi_3O_9.H_2O$

17. In which of the following odd electron species single electron is present in hybrid orbital.

(A) NO_2 (B) $\dot{C}F_3$ (C) ClO_3 (D) ClO_2

18. Identify the pair(s) in which first chemical species has greater % s-character on lone pair of central atom than second one.

(A) (NH_3, NF_3) (B) (PF_3, PH_3) (C) ($SnCl_2$, $SnCl_3^-$) (D) (SbH_3, PH_3)

Matrix Match Type

1.

Column-I (Treatment of reactant with excess water at room temperature)		**Column-II (Reaction Characteristics)**	
(A)	$XeF_4 \xrightarrow{H_2O}$	(P)	Disproportionation reaction
(B)	$XeF_6 \xrightarrow{H_2O}$	(Q)	One of the product is oxygen gas
(C)	$SF_6 \xrightarrow{H_2O}$	(R)	Complete hydrolysis
(D)	$N_2O_4 \xrightarrow{H_2O}$	(S)	Inert towards hydrolysis
		(T)	One of the product is monobasic oxyacid

Numb Type

1. Identify the pair in which the specified bond length of first is greater than second.

PCl_3F_2 , PF_3Cl_2 : B L_{P-Cleq}

SO_2Cl_2 , SO_2F_2 : B $L_{S=O}$

BF_3 , BCl_3 : B L_{B-X} X = F/Cl

NO_3^- , NO_2^- : B L_{N-O}

O_3 , O_2 : B L_{O-O}

CO , CO_2 : B L_{C-O}

2. Find the total number of chemical specie(s) in which effective pπ – dπ type of back bonding is observed.

$N(SiH_3)_3$, $O(SiH_3)_2$, $:CCl_2$, $P(CH_3)_3$, $N(GeH_3)_3$, $B(OMe)_3$, $B(OEt)_3$, SiF_4 , $P(SiH_3)_3$

3. Write sum of basicity of oxy acid formed by hydrolysis of

$PCl_3 \xrightarrow{\text{Hydrolysis}}$ oxy acid (I) + hydra acid

$SF_4 \xrightarrow{\text{Hydrolysis}}$ oxy acid (II) + hydra acid

$BrF_5 \xrightarrow{\text{Hydrolysis}}$ oxy acid (III) + hydra acid