EXERCISE-01

CHECK YOUR GRASP

SELECT THE CORRECT ALTERNATIVE (ONLY ONE CORRECT ANSWER)

##1. Out of the two compounds shown below, the vapour pressure of B at a particular temperature is expected to be



(A) higher than that of A(B) lower than that of A

(C) same as that of A

- (D) can be higher or lower depending upon the size of the vessel
- **##2.** The structure of IF_5 can be best described as :-



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11.	The experimental value o The percentage of ionic o	f the dipole moment of HC :haracter in HCl is :-	Cl is 1.03 D. The length of	the $H - Cl$ bond is 1.275 E.
	(A) 43	(B) 21	(C) 17	(D) 7
12.	The shapes of IF_5 and IF_7	are respectively :-		
	(A) tetragonal pyramidal a	and pentagonal bipyramida	al	
	(B) octahedral and pyram	idal		
	(C) trigonal bipyramidal a	nd square antiprismatic		
	(D) distorted square plana	ar and distorted octahedral		
13.	Amongst LiCl, RbCl, Ber respectively are :-	Cl ₂ and MgCl ₂ , the comp	ounds with the greatest ar	nd the least ionic character,
	(A) LiCl and RbCl	(B) RbCl and BeCl ₂	(C) RbCl and MgCl ₂	(D) MgCl ₂ and BeCl ₂
##14.	PCl_5 , exists but NCl_5 does	s not because :-		
	(A) Nitrogen has no vacar	nt 2d-orbitals	(B) NCl ₅ is unstable	
	(C) Nitrogen atom is much	h smaller than P	(D) Nitrogen is highly iner	rt
15.	$(C - Cl)$ bond in $CH_2 = Cl$	H – Cl (vinyl chloride) is sta	bilised in the same way as	in :-
	(A) benzyl chloride	(B) ethyl chloride	(C) chlorobenzene	(D) allyl chloride
16.	In ICl_4^{Θ} , the shape is squa	are planar. The number of	bond pair-lone pair repuls	ion at 90° are :-
	(A) 6	(B) 8	(C) 12	(D) 4
17.	The structure of diborane	(B_2H_6) contains :-		
	(A) four $(2c - 2e^{-})$ bonds a	and two $(2c - 3e^{-})$ bonds	(B) two (2c – 2e ⁻) bonds a	and two ($3c - 2e^{-}$) bonds
	(C) four $(2c - 2e^{-})$ bonds a	and four $(3c - 2e^{-})$ bonds	(D) none	
18.	Among the following spec	cies, identity the isostructur	al pairs : NF_3 , NO_3^- , BF_3 , I	H ₃ O ⁺ , HN ₃ :-
	(A) $[NF_3, NO_3^-]$ and $[BF_3, I]$	H ₃ O ⁺]	(B) $[NF_3, HN_3]$ and $[NO_3]$,	BF ₃]
10	(C) $[NF_3, H_3O^T]$ and $[NO_3^T]$, BF ₃]	(D) $[NF_3, H_3O^{\dagger}]$ and $[HN_3]$	3, BF ₃]
19.	Which of the following ex.	hibit/s H-bonding ?		
00	(A) CH_4	(B) H ₂ Se	$(C) N_2 H_4$	(D) H_2S
20.	(A) total a ⁻ in an atom	ally :	(D) stamiaity of an alama	nt
	(C) oxidation number of a	n element	(D) combining capacity of	f an element
21	Which element do not ha	ve valency equals to its gro		i un cicilient
21.	(A) sodium	(B) aluminium	(C) oxvgen	(D) carbon
22.	Which condition favours t	he bond formation:-	(-/-)3-	
	(A) maximum attraction a	nd maximum potential ene	ergy	
	(B) minimum attraction ar	nd minimum potential ener	gy	
	(C) minimum potential en	ergy and maximum attract	ion	
	(D) none of the above			
23.	Number of σ and π be $CH_3 - CH = CH - C \equiv CH$	onds present in : H are -		
	(Α) 10 σ , 3 π	(B) 10σ, 2π	(C) 9σ, 2π	(D) 8σ, 3π
24.	Which is not characteristic	c of π -bond:-		
	(A) π - bond is formed whe	en a sigma bond already for	med	
	(B) π - bond are formed from	om hybrid orbitals	1 • 1	
	(C) π - bond may be forme	a by the overlapping of p-o	proitals	
25	When addium and able	eral overlap of atomic oroll	lais	
20.	(Δ) released and ionic her	nd is formed	(B) released and equalant	hand is formed
	(C) abcorbed and ionic bol	nd is formed	(D) abcorbod and covalent	t hand is formed
		na is ioimea	(L) ausoi veu anu covalen	

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26.	The electron pair which t	forms a bond between two	similar non-metallic atoms	will be :-
	(A) dissimilar shared betw	veen the two	(B) by complete transfer	from one atom to other
	(C) in a similar spin condi	tion	(D) equally shared in betw	ween the two
27.	In N_2 molecule, the atom	ns are bonded by :-		
	(A) 1 σ and 2 π - bonds, 2	2 L.P.	(B) 1 σ and 1 π - bonds,	1 L.P.
	(C) 2 σ and 1 π - bonds, 1	No L.P.	(D) 1 σ, 2 π & No L.P.	
28.	An atom of element A ha	is three electrons in its oute	r shell and B has six electro	ons in its outermost shell. The
	formula of the compound	d formed between these tw	o will be :-	
	$(A) A_6 B_6$	(B) $A_2 B_3$	(C) $A_3 B_2$	(D) A_2B
##29.	Two element X and Y ha	ve following electronic con	figuration :-	
	X $1s^2$; $2s^2$, $2p^6$; $3s^2$, $3s$	$p^{6}; 4s^{2}$		
	Y $1s^2$; $2s^2$, $2p^6$; $3s^2$, 3	p^5		
	The expected compound	l formed by combination of	f X and Y will be expressed	l as :
	(A) XY_2	(B) X ₅ Y ₂	(C) $X_2 Y_5$	(D) XY ₅
30.	Polarisibility of halide ion	s increases in the order :-		
	(A) F ⁻ , I ⁻ , Br ⁻ , Cl ⁻	(B) Cl ⁻ , Br ⁻ , I ⁻ , F ⁻	(C) I [_] , Br [_] , Cl [_] , F [_]	(D) F ⁻ , Cl ⁻ , Br ⁻ , I ⁻
31.	The correct order of the	O–O bond length in O ₂ , H ₂	$_2O_2$ and O_3 is :-	
	$(A) O_2 > O_3 > H_2 O_2$	$(B) O_3 > H_2 O_2 > O_2$	$(C) H_2 O_2 > O_3 > O_2$	(D) $H_2O_2 > O_2 > O_3$
32.	In which of the following	the central atom does not	use sp ³ hybrid orbitals in its	s bonding :-
	(A) BeF_3^-	(B) OH ₃ ⁺	(C) NH ₂ ⁻	(D) NF ₃
33.	According to Fajjan's rule	e, covalent bond is favoured	d by :-	
	(A) large cation and smal	l anion	(B) large cation and large	e anion
	(C) Small cation and large	e anion	(D) Small cation and sma	ll anion
##34.	Resonance hybrid of nitra	ate ion is :-		



 $\begin{array}{lll} \textbf{35.} & \mbox{The correct order of bond angle (smallest first) in H_2S, NH_3, BF_3 and SiH_4 is :- (A) $H_2S < NH_3 < BF_3 < SiH_4$ (B) $NH_3 < H_2S < SiH_4 < BF_3$ (C) $H_2S < NH_3 < SiH_4 < BF_3$ (D) $H_2S < SiH_4 < NH_3$ < BF_3$ (D) $H_2S < SiH_4$ < SH_3$ (D) $H_3S < SH_4$ <$

CHECK YOUR GRASP						A	NSV	NER	KE	ΞΥ						EXE	RCISE	E -1		
Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	Α	С	Α	С	Α	D	В	В	D	В	С	Α	В	А	С	В	D	С	С	D
Que.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35					
Ans.	С	С	Α	В	Α	D	А	В	Α	D	С	Α	С	С	С					

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EXERCISE-02

BRAIN TEASERS

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 Which of the following does not have same shape :- (A) SO₄², S₅² (B) CO₅⁴, V₆⁶ (C) CO₂, SO₂ (D) NO₅⁶, NO₅⁶ Select correct about above reaction : (A) no reaction (B) B₃N₃H₄ is solution of hydrochloric acid — ? Select correct about above reaction and produce B₃N₃H₆C₁ in which Cl is bonded to boron (D) B₃N₃H₄ show addition reaction and produce B₃N₃H₆C₁ in which Cl is bonded to boron (D) B₃N₃H₄ show addition reaction and produce B₃N₃H₆C₁ in which Cl is bonded to nitrogen Nodel planes of π bonds in benzene are located in : (A) all are in molecular plane (B) one in molecular plane and two in plane perpendicular to molecular plane which contain C - C σ bond and C - H σ bond (D) perpendicular to molecular plane which bisect benzene ring in two equal half Which of the following has fractional bond order :- (A) O₂² (B) O₂² (C) F₂²⁻ (D) H₂ Which of the following compounds have the same no. of lone pairs with their central atom :- (M) O(M) and (W) (B) O(M) (M) and (W) (C) (D) and (M) (D) (M) and (M) (D) Ar₅ (M) Sr₆² (D) (M) and (W) (D) and (M) (D) all are correct (A) (D) and (W) (B) O(M) and (W) (C) (D) and (M) (D) (M) (M) and (W)		SELECT THE COR	RECT ALTERNATIVES (O	NE OR MORE THEN	ONE CORRECT ANSWERS)
(A) SO_{1}^{2}, S_{1}^{2} (B) $IG_{1}^{\alpha}, I_{2}^{\alpha}$ (C) CO_{2}, SO_{2} (D) $NO_{2}^{\alpha}, NO_{2}^{\alpha}$ B ₃ N ₂ H ₆ + solution of hydrochloric acid \longrightarrow ? Select correct about above reaction : (A) no reaction (B) B ₃ N ₂ H ₆ show substitution reaction and produce B ₃ N ₃ Cl ₆ (C) B ₃ N ₃ H ₆ show substitution reaction and produce B ₃ N ₃ Cl ₆ (C) B ₃ N ₃ H ₆ show addition reaction and produce B ₃ N ₄ Cl ₅ in which Cl is bonded to boron (D) B ₃ N ₂ H ₆ show addition reaction and produce B ₃ N ₄ Cl ₅ in which Cl is bonded to boron (D) B ₃ N ₂ H ₆ show addition reaction and produce B ₃ N ₄ Cl ₅ in which Cl is bonded to boron (C) Wo in molecular plane are located in : (A) all are in molecular plane and new in plane perpendicular to molecular plane which contain C - C σ bonds. (C) two in molecular plane and one in plane perpendicular to molecular plane which contain C - C σ bond and C - H σ bond (D) perpendicular to molecular plane which bisect benzene ring in two equal half 4. Which of the following has fractional bond order :- (A) O_{2}^{α} (B) O_{2}^{α} (C) F_{2}^{α} (D) H_{2}^{α} ++5. Which is correct statement ? As the s-character of a hybrid orbital decreases (I) The bond angle decreases (II) The bond strength increases (III) The bond angle decreases (IV) Size of orbitals increases (A) (D, (III) and (IV) (B) (III) and (IV) (C) (D) and (II) (D) all are correct 6. Which of the following compounds have the same no. of lone pairs with their central atom :- (I) XeF ₅ ⁻ (II) BrF ₃ (III) XeF ₂ (IV) Triple methylene (A) (IV) and (V) (B) (I and (III) (C) (I) and (II) (D) (IV) and (V) 7. Select pair of compounds in which both have different hybridization but have same molecular geometry :- (A) BF ₃ , BF ₃ ⁻ (B) S(C_{1}^{\alpha}, BCL_{2} (C) BeCL_{3}, PCL_{3} (D) PCL_{3}, NCL_{3} 8. The states of hybridization of boron and oxygen atoms in boric acid (H ₁ BO ₃) are respectively. (A) BF ₃ and sp ² (B) sp ² and sp ² (C) sp ² and sp ² (D); S ² and sp ² (D) sp ³	1.	Which of the following	ng does not have same shap	e :-	
 B₃N₃H₆ + solution of hydrochloric acid → ? Select correct about above reaction : (A) no reaction (B) B₃N₃H₆ show substitution reaction & produce B₃N₄Cl₆ (C) B₃N₃H₆ show addition reaction and produce B₃N₄Cl₂ in which Cl is bonded to boron (D) B₃N₃H₆ show addition reaction and produce B₃N₄Cl₃ in which Cl is bonded to nitrogen Nodal planes of π bonds in benzene are located in : (A) all are in molecular plane (B) one in molecular plane and one in plane perpendicular to molecular plane which contain C - C σ bonds. (C) two in molecular plane and one in plane perpendicular to molecular plane which contain C - C σ bond and C - H σ bond (D) perpendicular to molecular plane which bisect benzene ring in two equal half 4. Which of the following has fractional bond order :- (A) O₂² (B) O₂² (C) F₂²⁻ (D) H₂² ++5. Which is correct statement ? As the s-character of a hybrid orbital decreases (I) The bond strength increases (II) The bond sngle decreases (IV) Size of orbitals increases (II) The bond length increases (IV) Mich of the following compounds have the same no. of lone pairs with their central atom :- (I) XeF₅⁻ (II) BrF₃ (III) XeF₂ (IV) Triple methylene (A) (V) and (V) (B) (IB) and (IU) (C) (I) and (II) (D) PCl₃, NCl₃ 8. The states of hybridization but horon and coygen atoms in boric acid (H₃DSD₃) are respectively. (A) Br₃ BrF₃ (B) ICl₂⁹ BeCl₂ (C) Se₂⁰, of (2p)², n (2p)¹, π (2p)¹, m (2p)		(A) SO_4^{-2}, S_5^{-2}	(B) $ICl_4^{\Theta}, I_5^{\Theta}$	$(C) CO_2, SO_2$	(D) $NO_2^{\oplus}, NO_2^{\Theta}$
Select correct about above reaction : (A) no reaction (B) B,N,H ₆ show substitution reaction & produce B ₃ N ₃ H ₆ C ₆ (C) B ₃ N ₃ H ₆ show addition reaction and produce B ₃ N ₃ H ₆ C ₁ in which C1 is bonded to boron (D) B,N,J ₆ show addition reaction and produce B ₃ N ₃ H ₆ C ₁ in which C1 is bonded to nitrogen 3. Nodal planes of n bonds in benzene are located in : (A) all are in molecular plane and two in plane perpendicular to molecular plane which contain C - C σ bond and C - H σ bond (D) perpendicular to molecular plane and one in plane perpendicular to molecular plane which contain C - C σ bond and C - H σ bond (D) perpendicular to molecular plane which bisect benzene ring in two equal half 4. Which of the following has fractional bond order :- (A) Q_2^{\pm} (B) Q_2^{\pm} (C) F_2^{\pm} (D) H_2^{\pm} ++5. Which is correct statement ? As the s-character of a hybrid orbital decreases (I) The bond strength increases (II) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (III) the following compounds have the same no. of lone pairs with their central atom :- (I) and (III) (I) Size of obtals increases (IV) Thigh methylane (A) (Q) and (Q) (B) (D) and (I	2.	$B_3N_3H_6$ + solution of	f hydrochloric acid \longrightarrow ?		
(A) no reaction (B) $B_3N_3H_6$ show substitution reaction & produce $B_3N_3H_6C_1$ in which Cl is bonded to boron (D) $B_3N_3H_6$ show addition reaction and produce $B_3N_3H_6C_1$ in which Cl is bonded to nitrogen 3. Nodal planes of π bonds in benzene are located in : (A) all are in molecular plane (B) one in molecular plane and one in plane perpendicular to molecular plane which contain $C - C \sigma$ bonds. (C) two in molecular plane and one in plane perpendicular to molecular plane which contain $C - C \sigma$ bond and $C - H \sigma$ bond (D) perpendicular to molecular plane which bisect benzene ring in two equal half 4. Which of the following has fractional bond order :- (A) O_2^{h} (B) O_2^{h} (B) O_2^{h} (C) F_2^{h} (D) H_2^{-} ++5. Which is correct statement ? As the s-character of a hybrid orbital decreases (II) The bond angle decreases (III) The bond strength increases (III) The bond angle decreases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (IV) Size of orbitals increases (IV) Size of orbitals increases (IV) Triple methylene (A) (IV) and (IV) (B) (III) and (IV) (C) (I) and (III) (D) all are correct 6. Which of the following compounds have the same no. of lone pairs with their central atom :- (IV) XeF_2^{-} (IV) Triple methylene (A) (V) and (V) (B) (I) and (IIII) (C) (I) and (III) (D) (III, (IV) and (V) 7. Select pair of compounds in which both have different hybridization but have same molecular geometry :- (A) BF_3 , BF_3 (B) IC_2^{h} , BeC_2 (C) BeC_3 , PC_1 (D) PC_3 , NC_1 8. The states of hybridization of boron and oxygen atoms in boric acid (H ₁ BO ₂) are respectively. (A) sp ³ and sp ² (B) sp ² and sp ³ (C) sp ² and sp ² (D) sp ³ and sp ³ 9. Which of the following option w.r.t. increasing bond order is correct ? (A) $NO < C_2 < O_2 - (He_2^{+}(B) C_2^{-} < NO < He_2^{+} < O_2^{-} (C) He_2^{-i} < O_2^{-} < (NO < C_2(D) He_2^{+} < O_2^{-} < (NO) (D) Mn_2O_2 11. The molecular orbital confi$		Select correct about a	above reaction :		
 (B) B₃N₃H₆ show substitution reaction & produce B₃N₃C₆. (C) B₃N₃H₆ show addition reaction and produce B₃N₃H₂Cl₃ in which Cl is bonded to boron (D) B₃N₃H₆ show addition reaction and produce B₃N₃H₂Cl₃ in which Cl is bonded to nitrogen 3. Nodal planes of π bonds in benzene are located in : (A) all are in molecular plane (B) one in molecular plane and two in plane perpendicular to molecular plane which contain C - C σ bonds. (C) two in molecular plane and one in plane perpendicular to molecular plane which contain C - C σ bond and C - H σ bond (D) perpendicular to molecular plane which bisect benzene ring in two equal half 4. Which of the following has fractional bond order :- (A) O₂^{2*} (B) O₂²⁻ (C) F₂²⁻ (D) H₂' ++5. Which is correct statement? As the s-character of a hybrid orbital decreases (II) The bond strength increases (III) The bond length increases (IV) Size of orbitals increases (IV) Triple methylene (A) (IV) and (IV) (B) (III) and (IV) (C) (I) and (II) (D) all are correct 6. Which of the following compounds have the same no. of lone pairs with their central atom :- (IV) XeF₂ (IV) Triple methylene (A) (IV) and (V) (B) (II) and (III) (C) (I) and (II) (D) (III) and (V) 7. Select pair of compounds in which both have different hybridization but have same molecular geometry :- (A) BF₃, BrF₃ (B) ICl₂⁰, BeCl₂ (C) BeCl₃, PCl₃ (D) PCl₃, NCl₃ 8. The states of hybridization of boron and oxygen atoms in boric acid (H₃BO₃) are respectively. (A) P₃³ and sp² (B) MO (C) C) CrO₃ (D) Mn₂O₇ 11. The molec		(A) no reaction			
 (C) B₃N₃H₆ show addition reaction and produce B₃N₃H₉Cl₃ in which Cl is bonded to boron (D) B₃N₃H₆ show addition reaction and produce B₃N₃H₉Cl₃ in which Cl is bonded to nitrogen 3. Nodal planes of π bonds in benzene are located in : (A) all are in molecular plane (B) one in molecular plane and two in plane perpendicular to molecular plane which contain C - C σ bonds. (C) two in molecular plane and one in plane perpendicular to molecular plane which contain C - C σ bond and C - H σ bond (D) perpendicular to molecular plane which bisect benzene ring in two equal half 4. Which of the following has fractional bond order :- (A) O₂²⁺ (B) O₂²⁻ (C) F₂²⁻ (D) H₂⁻ ++5. Which is correct statement ? As the s-character of a hybrid orbital decreases (I) The bond angle decreases (II) The bond strength increases (III) The bond length increases (IV) Size of orbitals increases (IV) Triple methylene (A) (W) and (W) (B) (M) and (W) (C) (D and (II) (D) (D) all are correct 6. Which of the following compounds have the same no. of lone pairs with their central atom :- (D) XeF₅⁻ (II) BrF₃ (B) ICl₂ⁿ, BeCl₂ (C) BeCl₃, PCl₃ (D) PCl₉, NCl₃ 8. The states of hybridization of boron and oxygen atoms in boric acid (H₃BO₃) are respectively. (A) SP₃³ and sp² (B) Sp² and sp² (C) Sp² and sp² (D) Sp³ and sp³ 9. Which of the following option w.r.t. increasing bond order is correct ? (A) P₂O₅ (B) MnO (C) CrO₃ (D) Mn₂O₇ 11. The molecular orbital configuration of CN' is :- (A) P₂O₅ (B) MnO (C) CrO₃ (D) Mn₂O₇ 12. Menolecular bordia configuration of CN' is :- (A) P₂O₅		(B) $B_3N_3H_6$ show subs	stitution reaction & produce	B ₃ N ₃ Cl ₆	
 (D) B₃N₄H₆ show addition reaction and produce B₃N₃H₂Cl₃ in which Cl is bonded to nitrogen 3. Nodal planes of π bonds in benzene are located in : (A) all are in molecular plane (B) one in molecular plane and two in plane perpendicular to molecular plane which contain C - C σ bonds. (C) two in molecular plane and one in plane perpendicular to molecular plane which contain C - C σ bond and C - H σ bond (D) perpendicular to molecular plane which bisect benzene ring in two equal half 4. Which of the following has fractional bond order :- (A) O₂^{2,*} (B) O₂^{2,*} (C) F₂^{2,*} (D) H₂[*] ++5. Which is correct statement? As the s-character of a hybrid orbital decreases (II) The bond angle decreases (II) The bond length increases (III) The bond strength increases (III) The bond length increases (III) The bond strength increases (III) The bond length increases (III) The bond angle decreases (III) The probability of third is different hybridization but have same molecular geometry:- (A) BF₃, BF₃ (B) ICl⁶₂, BeCl₂ (C) BeCl₃, PCl₃ (D) PCl₃, NCl₃ 8. The states of hybridization of boron and oxygen atoms in boric acid (H₃BO₃) are respectively. (A) BF₃ BeF₃ (B) MnO (C) CrO₃ (D) Mn₂O₇ 9. Which of the following option w.r.t. in		(C) $B_3N_3H_6$ show add	ition reaction and produce B	$_{3}N_{3}H_{9}Cl_{3}$ in which Cl is t	oonded to boron
 3. Nodal planes of π bonds in benzene are located in : (A) all are in molecular plane (B) one in molecular plane and two in plane perpendicular to molecular plane which contain C - C σ bonds. (C) two in molecular plane and one in plane perpendicular to molecular plane which contain C - C σ bond and C - H σ bond (D) perpendicular to molecular plane which bisect benzene ring in two equal half 4. Which of the following has fractional bond order :- (A) O²/₂ (B) O²/₂ (C) F²/₂ (D) H²/₂ ++5. Which is correct statement? As the s-character of a hybrid orbital decreases (I) The bond angle decreases (II) The bond strength increases (III) The bond length increases (IV) Size of orbitals increases (A) (III) and (IV) (B) (III) and (IV) (C) (I) and (II) (D) all are correct 6. Which of the following compounds have the same no. of lone pairs with their central atom :- (IV) Size of orbitals increases (IV) Triple methylene (A) (V) and (V) (B) (III) and (III) (C) (I) and (III) (D) (III) (IV) riple methylene (A) (V) and (V) (B) (III) (III) and (III) (C) (I) and (III) (D) (IV) riple methylene (A) (V) and (V) (B) (III) (C) (I) and (III) (D) (III), (IV) and (V) 7. Select pair of compounds in which both have different hybridization but have same molecular geometry :- (A) BF₃, BrF₃ (B) ICl⁰₂, BeCL₂ (C) BeCL₃, PCL₃ (D) PCL₃, NCL₃ 8. The states of hybridization of boron and oxygen atoms in boric acid (H₃BO₃) are respectively. (A) Sp³ and sp² (B) Sp² and sp³ (C) BeC₃, O(2₃, O(2₃), T(2₅)³, T(2₅)³, T(2₅)³, T(2₅)³, T(2₅)³, T		(D) $B_3N_3H_6$ show add	ition reaction and produce B	$_{3}N_{3}H_{9}Cl_{3}$ in which Cl is t	ponded to nitrogen
(A) all are in molecular plane and two in plane perpendicular to molecular plane which contain $C - C \sigma$ bonds. (C) two in molecular plane and one in plane perpendicular to molecular plane which contain $C - C \sigma$ bond and $C - H \sigma$ bond (D) perpendicular to molecular plane which bisect benzene ring in two equal half 4. Which of the following has fractional bond order :- (A) O_2^{2} (B) O_2^{2-} (C) F_2^{2-} (D) H_2^{-} ++5. Which is correct statement ? As the s-character of a hybrid orbital decreases (I) The bond angle decreases (II) The bond strength increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (IV) Triple methylene (A) (IV) and (V) (B) (IIII) and (IV) (C) (II) and (III) (D) (III) (IV) and (V) 7. Select pair of compounds in which both have different hybridization bat was me molecular geometry :- (A) BF_3 , BF_3 (B) ICI_2^{0} , $BeCI_2$ (C) $BeCI_3$, PCI_3 (D) PCI_3 , NCI_3 8. The states of hybridization of boron and oxygen atoms in boric acid (H ₃ BO ₃) are respectively. (A) sp ³ and sp ² (B) sp ² and sp ³ (C) sp ² and sp ² (D) sp ³ and sp ³ 9. Which of the following option w.r.t. increasing bond order is correct ? (A) $NO < C_2 < O_2^{-} < He_2^{+}(B) C_2 < NO < He_2^{+} < $	3.	Nodal planes of π box	nds in benzene are located ir	ו :	
(B) one in molecular plane and two in plane perpendicular to molecular plane which contain $C - C \sigma$ bonds. (C) two in molecular plane and one in plane perpendicular to molecular plane which contain $C - C \sigma$ bond and $C - H \sigma$ bond (D) perpendicular to molecular plane which bisect benzene ring in two equal half 4. Which of the following has fractional bond order :- (A) O_2^{2+} (B) $O_2^{}$ (C) $F_2^{}$ (D) H_2^{-} ++5. Which is correct statement ? As the s-character of a hybrid orbital decreases (II) The bond angle decreases (II) The bond strength increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond length increases (IV) Size of orbitals increases (III) The bond with (IIII) (C) (I) and (III) (D) (III), (IV) and (V) 7. Select pair of compounds in which both have different hybridization but have same molecular geometry :- (A) BF ₂ , BrF ₃ (B) ICl ₂ ^a , BeCl ₂ (C) BeCl ₃ , PCl ₃ (D) PCl ₃ , NCl ₃ 8. The states of hybridization of boron and oxygen atoms in boric acid (H ₃ BO ₃) are respectively. (A) sp ³ and sp ² (B) sp ² and sp ³ (C) sp ² and sp ² (D) sp ³ and sp ³ 9. Which of the following option w.r.t. increasing bond order is correct ? (A) NO < $C_2 < O_2^- < He_2^+(B) C_2 < NO < He_2^+ < O_2^-$ (C) $He_2^+ < O_2^- < NO < C_2(D) He_2^+ < O_2^- < C_2 < NO 10. Which is most ionic: (A) P_2O_5 (B) MnO (C) CrO_3 (D) Mn_2O_711. The molecular orbital configu$		(A) all are in molecula	ar plane		
(C) two in molecular plane and one in plane perpendicular to molecular plane which contain $C - C \sigma$ bond and $C - H \sigma$ bond(D) perpendicular to molecular plane which bisect benzene ring in two equal half4.Which of the following has fractional bond order :- (A) O_2^{2n} (B) O_2^{2n} (C) F_2^{2n} (D) H_2^{-} ++5.Which is correct statement ? As the s-character of a hybrid orbital decreases (II) The bond angle decreases (III) The bond strength increases (III) The bond length increases (III) Select pair of compounds in which both have different hybridization but have same molecular geometry :- (A) BF3, BrF3 (B) Br2 and s		(B) one in molecular <u>p</u>	plane and two in plane perpe	ndicular to molecular pla	ne which contain $C - C \sigma$ bonds.
(D) perpendicular to molecular plane which bisect benzene ring in two equal half4.Which of the following has fractional bond order :- (A) O_2^{2*} (B) $O_2^{2^-}$ (C) F_2^{2-} (D) H_2^- ++5.Which is correct statement ? As the s-character of a hybrid orbital decreases (II) The bond angle decreases(II) The bond strength increases (IV) Size of orbitals increases (III) The bond length increases (III) The bond strength increases (III) The bond length increases (III) The bond strength increases (IV) Size of orbitals increases (IV) Size of orbitals increases (IV) Size of orbitals increases (IV) Triple methylene (A) (IV) and (IV)(B) (II) and (IV) (III) and (IV)(C) (I) and (III) (III) (D) all are correct6.Which of the following compounds have the same no. of lone pairs with their central atom :- (IV) XeF_5^- (IV) Triple methylene (A) (IV) and (V)(B) (I) and (III) (III)(C) (I) and (III) (III) (IV) and (V)7.Select pair of compounds in which both have different hybridization but have same molecular geometry :- (A) BF3, BrF3 (B) B) Cl_2^0, BeCl_2 (C) BeCl_3, PCl_3 (C) Sp2 and sp2 (D) sp3 and sp3(D) PCl_3, NCl_38.The states of hybridization of born and oxygen atoms in boric acid (H_3BO3) are respectively. (A) sp3 and sp2 (B) sp2 and sp3 (C) sp2 and sp2 (D) sp3 and sp3(D) Mp_2O3 (D) sp3 and sp39.Which of the following option w.r.t. increasing bond order is correct ? (C) He2^+ < O2^- < (C) He2^+ < O2^- < (C) < CO_2 < NO < He2^+ < O2^- < (C) < CO_2^+ , $\pi(2p_1)^2, \pi(2p$		(C) two in molecular $_{1}$ and C – H σ bond	plane and one in plane perpe	endicular to molecular pl	ane which contain C – C σ bond
4. Which of the following has fractional bond order :- (A) $O_2^{2^+}$ (B) $O_2^{2^-}$ (C) $F_2^{2^-}$ (D) H_2^- ++5. Which is correct statement? As the s-character of a hybrid orbital decreases (II) The bond strength increases (II) The bond angle decreases (II) The bond strength increases (III) The bond length increases (IV) Size of orbitals increases (A) (III) and (IV) (B) (III) and (IV) (C) (I) and (II) (D) all are correct 6. Which of the following compounds have the same no. of lone pairs with their central atom :- (I) XeF_5^- (II) BrF₃ (III) XeF₂ (IV) Y and (V) (D) (III) and (III) (D) (III) (IV) and (V) 7. Select pair of compounds in which both have different hybridization but have same molecular geometry:- (A) BF₃, BrF₃ (B) LCl²₂, BeCl₂ (C) BeCl₃, PCl₃ (D) PCl₃, NCl₃ 8. The states of hybridization of boron and oxygen atoms in boric acid (H ₃ BO ₃) are respectively. (A) sp³ and sp² (B) sp² and sp³ (C) sp² and sp² (D) sp³ and sp³ 9. Which of the following option w.r.t. inc		(D) perpendicular to 1	molecular plane which bisect	benzene ring in two equ	ual half
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	4.	Which of the followin	g has fractional bond order :-	-	
++5. Which is correct statement ? As the s-character of a hybrid orbital decreases (I) The bond angle decreases (II) The bond length increases (III) And (IV) (B) (III) and (IV) (C) (I) and (II) (D) all are correct 6. Which of the following compounds have the same no. of lone pairs with their central atom :- (I) XeF_5^- (II) BrF_3 (III) XeF_2 (IV) Triple methylene (A) (IV) and (V) (B) (I) and (III) (C) (I) and (II) (D) (III, (IV) and (V) 7. Select pair of compounds in which both have different hybridization but have same molecular geometry :- (A) BF_3 , BrF_3 (B) ICl_2^{0} , $BeCl_2$ (C) $BeCl_3$, PCl_3 (D) PCl_3 , NCl_3 8. The states of hybridization of boron and oxygen atoms in boric acid (H ₃ BO ₃) are respectively. (A) sp ³ and sp ² (B) sp ² and sp ³ (C) sp ² and sp ² (D) sp ³ and sp ³ 9. Which of the following option w.r.t. increasing bond order is correct ? (A) NO $C_2 < O_2^- < He_2^+ (B) C_2 < NO < He_2^+ < O_2^- (C) He_2^+ < C_2^- < (C) He_2^+ < O_2^- < (C) CrO_3 (D) Mn_2O_7 11. The molecular orbital configuration of CN+ is :- (A) KK \sigma (2s)^2, \sigma (2s)^2, \sigma (2p_2)^2, \pi (2p_2)^2, \pi (2p_2)^2 (B) KK \sigma (2s)^2, \sigma^* (2s)^2, \sigma (2p_2)^2, \pi (2p_2)^1, \pi (2p_2)^1(C) KK \sigma (2s)^2, \sigma^* (2s)^2, \sigma (2p_2)^2, \pi (2p_$		(A) O ₂ ²⁺	(B) O ₂ ²⁻	(C) F_2^{2-}	(D) H ₂
As the s-character of a hybrid orbital decreases(II) The bond strength increases(II) The bond angle decreases(II) The bond strength increases(III) The bond strength increases(III) The bond length increases(IV) Size of orbitals increases(III) The bond strength increases(IV) and (IV)(III) Stef_5(III) Stef_2(IV) Triple methylene(IV) and (V)(A) (IV) and (V)(B) (I) and (III)(III) XeF_2(IV) Triple methylene(A) (IV) and (V)(B) (I) and (III)(III) XeF_3(IIII) XeF_2(IV) Triple methylene(A) (IV) and (V)(A) BF3, BrF3(B) ICl2°, BeCl2(C) BeCl3, PCl3(D) PCl3, NCl38.The states of hybridization of boron and oxygen atoms in boric acid (H3BO3) are respectively.(A) sp3 and sp2(B) sp2 and sp3(C) He2 < Q2 < (H2 + (B) C2 < NO < H2 + < Q2 -(C) He2 < Q2 < (NO < C2)(D) He2 + < Q2 - < C2 < NO10.Which is most ionic :(A) NO < C2 < Q2 < (H2 + (B) C2 < NO < H2 + < Q2 -(C) He2 < Q2 - < (NO < C2)(D) He2 + < Q2 - < C2 < NO11.The molecular orbital configuration of CN* is :-(A) XG (2s) ² , $\sigma^*(2s)^2$, $\sigma(2c)^2$, $\pi(2c)^2$, $\pi(2c$	++5.	Which is correct state	ement ?		
(1) The bond angle decreases (II) The bond strength increases (II) The bond length increases (III) The bond length increases (IV) Size of orbitals increases (IV) Size of orbitals increases (IV) Size of orbitals increases (A) (I), (III) and (IV) (B) (II), and (IV) (C) (I) and (II) (D) all are correct (I) XeF_5 ⁻ (II) BrF_3 (III) XeF_2 (IV) Triple methylene (A) (IV) and (V) (B) (I) and (III) (C) (I) and (II) (D) (II), (IV) and (V) (B) (I) and (III) (C) (I) and (II) (D) (II), (IV) and (V) (B) (I) and (III) (C) (I) and (II) (D) (II), (IV) and (V) (A) BF_3, BrF_3 (B) ICl_9^{0}, BeCl_2 (C) BeCl_3, PCl_3 (D) PCl_3, NCl_3 (A) BF_3, BrF_3 (B) ICl_9^{0}, BeCl_2 (C) BeCl_3, PCl_3 (D) PCl_3, NCl_3 (A) sp^3 and sp^2 (B) sp^2 and sp^3 (C) sp^2 and sp^2 (D) sp^3 and sp^3 (C) sp^3 and sp^3 (C) sp^2 and sp^2 (D) sp^3 and sp^3 (C) sp^2 and sp^2 (D) sp^3 and sp^3 (C) BeCl_2 (C) BeCl_2 (C) BeCl_3, PCl_3 (D) PCl_3, NCl_3 (A) NO < C_2 < O_2^{-} He_2^{+}(B) C_2 < NO < He_2^{+} < O_2^{-} (C) He_2^{+} < O_2^{-} (C) He_2^{+} < O_2^{-} < (C) SP^2 and sp^2 (D) sp^3 and sp^3 (D) sp^3 and sp^3 (D) Sp^2 and sp^2 (D) sp^3 and sp^3 (D) Sp_2^{-} and sp^2 (D) sp^3 and sp^3 (D) Sp_2^{-} (C) He_2^{+} < O_2^{-} < (C) CrO_3 (D) Mn_2O_7		As the s-character of	a hybrid orbital decreases		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		(I) The bond angle d	ecreases	(II) The bond strengt	h increases
(A) (h, (III) and (IV) (B) (III) and (IV) (C) (I) and (II) (D) all are correct (A) (III) and (IV) (B) (III) and (IV) (C) (I) and (III) (D) all are correct (I) XeF_5^- (II) BrF_3 (III) XeF_2 (IV) Triple methylene (A) (IV) and (V) (B) (I) and (III) (C) (I) and (II) (D) (II), (IV) and (V) 7. Select pair of compounds in which both have different hybridization but have same molecular geometry :- (A) BF_3 , BrF_3 (B) ICl_2^0 , $BeCl_2$ (C) $BeCl_3$, PCl_3 (D) PCl_3 , NCl_3 8. The states of hybridization of boron and oxygen atoms in boric acid (H ₃ BO ₃) are respectively. (A) sp^3 and sp^2 (B) sp^2 and sp^3 (C) sp^2 and sp^2 (D) sp^3 and sp^3 9. Which of the following option w.r.t. increasing bond order is correct ? (A) $NO < C_2 < O_2 < He_2^+(B) C_2 < NO < He_2^+ < O_2^-$ (C) $He_2^+ < O_2^- < NO < C_2(D) He_2^+ < O_2^- < C_2 < NO$ 10. Which is most ionic : (A) P_2O_5 (B) MnO (C) CrO_3 (D) Mn_2O_7 11. The molecular orbital configuration of CN^+ is :- (A) $KK \sigma (2s)^2$, $\sigma^* (2s)^2$, $\pi (2p_x)^2$, $\pi (2p_y)^2$ (B) $KK \sigma (2s)^2$, $\sigma^* (2s)^2$, $\sigma (2p_y)^2$, $\pi (2p_y)^1$ (C) $KK \sigma (2s)^2$, $\sigma^* (2s)^2$, $\sigma (2p_y)^2$, $\pi (2p_y)$		(III) The bond length in	ncreases	(IV) Size of orbitals ir	ncreases
6. Which of the following compounds have the same no. of lone pairs with their central atom :- (I) XeF ₅ ⁻ (II) BrF ₃ (III) XeF ₂ (IV) Triple methylene (A) (IV) and (V) (B) (I) and (III) (C) (I) and (II) (D) (II), (IV) and (V) 7. Select pair of compounds in which both have different hybridization but have same molecular geometry :- (A) BF ₃ , BrF ₃ (B) ICl ⁹ ₂ , BeCl ₂ (C) BeCl ₃ , PCl ₃ (D) PCl ₃ , NCl ₃ 8. The states of hybridization of boron and oxygen atoms in boric acid (H ₃ BO ₃) are respectively. (A) sp ³ and sp ² (B) sp ² and sp ³ (C) sp ² and sp ² (D) sp ³ and sp ³ 9. Which of the following option w.r.t. increasing bond order is correct ? (A) NO < C ₂ < O ₂ ⁻ < He ₂ *(B) C ₂ < NO < He ₂ * < O ₂ ⁻ (C) He ₂ * < O ₂ ⁻ < NO < C ₂ (D) He ₂ * < O ₂ ⁻ < C ₂ < NO 10. Which is most ionic : (A) P ₂ O ₅ (B) MnO (C) CrO ₃ (D) Mn ₂ O ₇ 11. The molecular orbital configuration of CN ⁺ is :- (A) KK σ (2s) ² , σ^* (2s) ² , π (2p ₃) ² , π (2p ₃) ² , π (2p ₃) ¹ , π (2p ₃) ¹ , π (2p ₃) ¹ , (C) KK σ (2s) ² , σ^* (2s) ² , σ^* (2s) ² , σ (2p ₃) ² , π (2p ₃) ² , π (2p ₃) ² 12. Among the following orbital bonds, the angle is minimum between :- (A) sp ³ bonds (D) sp bonds		(A) (I), (III) and (IV)	(B) (II), (III) and (IV)	(C) (I) and (II)	(D) all are correct
	6.	Which of the followin	g compounds have the same	no. of lone pairs with th	neir central atom :-
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		(1) XeF ₅ ⁻	(II) BrF ₃	(III) XeF_2	(IV) Triple methylene
7.Select pair of compounds in which both have different hybridization but have same molecular geometry :- (A) BF3, BrF3(B) ICl2, BeCl2(C) BeCl3, PCl3(D) PCl3, NCl38.The states of hybridization of boron and oxygen atoms in boric acid (H3BO3) are respectively. (A) sp3 and sp2(B) sp2 and sp3(C) sp2 and sp2(D) sp3 and sp39.Which of the following option w.r.t. increasing bond order is correct? (A) NO < C2 < O2 - < He2+(B) C2 < NO < He2+ < O2 - (C) He2+ < O2 - < C2 < NO(D) Mn2O710.Which is most ionic : (A) P2O5(B) MnO(C) CrO3(D) Mn2O711.The molecular orbital configuration of CN+ is :- (A) KK σ (2s)², σ^* (2s)², σ^* (2s)², σ (2p2)², π (2py)²(B) KK σ (2s)², σ^* (2s)², σ (2p2)², π (2py)²12.Among the following orbital bonds, the angle is minimum between :- (A) sp3 bonds(B) p_x and p_y orbitals (C) H-Q-H in water(D) sp bonds		(A) (IV) and (V)	(B) (I) and (III)	(C) (I) and (II)	(D) (II), (IV) and (V)
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	7.	Select pair of compo	unds in which both have diffe	erent hybridization but h	ave same molecular geometry :-
8. The states of hybridization of boron and oxygen atoms in boric acid (H_3BO_3) are respectively. (A) sp ³ and sp ² (B) sp ² and sp ³ (C) sp ² and sp ² (D) sp ³ and sp ³ 9. Which of the following option w.r.t. increasing bond order is correct? (A) NO < C ₂ < O ₂ ⁻ < He ₂ ⁺ (B) C ₂ < NO < He ₂ ⁺ < O ₂ ⁻ (C) He ₂ ⁺ < O ₂ ⁻ < NO < C ₂ (D) He ₂ ⁺ < O ₂ ⁻ < C ₂ < NO 10. Which is most ionic: (A) P ₂ O ₅ (B) MnO (C) CrO ₃ (D) Mn ₂ O ₇ 11. The molecular orbital configuration of CN ⁺ is :- (A) KK σ (2s) ² , σ^* (2s) ² , π (2p ₃) ² , π (2p ₃) ² (B) KK σ (2s) ² , σ^* (2s) ² , σ (2p ₂) ² , π (2p ₃) ¹ , π (2p ₃) ¹ (C) KK σ (2s) ² , σ^* (2s) ² , σ (2p ₂) ² , π (2p ₃) ² , π (2p ₃) ¹ (D) KK σ (2s) ² , σ^* (2s) ² , σ (2p ₂) ² , π (2p ₃) ² , π (2p ₃) ² 12. Among the following orbital bonds, the angle is minimum between :- (A) sp ³ bonds (B) p _x and p _y orbitals (C) H–O–H in water (D) sp bonds		(A) BF_3 , BrF_3	(B) ICl_2^{Θ} , $BeCl_2$	(C) BeCl_3 , PCl_3	(D) PCl ₃ , NCl ₃
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	8.	The states of hybridiz	ation of boron and oxygen a	toms in boric acid (H ₃ BC	D_3) are respectively.
9. Which of the following option w.r.t. increasing bond order is correct ? (A) NO $< C_2 < O_2^- < He_2^+(B) C_2 < NO < He_2^+ < O_2^-$ (C) $He_2^+ < O_2^- < NO < C_2(D) He_2^+ < O_2^- < C_2 < NO$ 10. Which is most ionic : (A) P_2O_5 (B) MnO (C) CrO ₃ (D) Mn ₂ O ₇ 11. The molecular orbital configuration of CN ⁺ is :- (A) KK σ (2s) ² , σ^* (2s) ² , π (2p _x) ² , π (2p _y) ² (B) KK σ (2s) ² , σ^* (2s) ² , σ (2p _x) ² , π (2p _y) ¹ , π (2p _y) ¹ (C) KK σ (2s) ² , σ^* (2s) ² , σ (2p _x) ² , π (2p _x) ² , π (2p _y) ¹ (D) KK σ (2s) ² , σ^* (2s) ² , σ (2p _x) ² , π (2p _y) ² 12. Among the following orbital bonds, the angle is minimum between :- (A) sp ³ bonds (B) p _x and p _y orbitals (C) H-O-H in water (D) sp bonds		(A) sp^3 and sp^2	(B) sp^2 and sp^3	(C) sp^2 and sp^2	(D) sp^3 and sp^3
$\begin{array}{llllllllllllllllllllllllllllllllllll$	9.	Which of the followin	g option w.r.t. increasing boi	nd order is correct ?	
$\begin{array}{llllllllllllllllllllllllllllllllllll$		(A) NO < $C_2 < O_2^- <$	$He_{2}^{+}(B) C_{2} < NO < He_{2}^{+} <$	O ₂ ⁻	
10. Which is most ionic : (A) P_2O_5 (B) MnO (C) CrO_3 (D) Mn_2O_7 11. The molecular orbital configuration of CN^+ is :- (A) KK σ (2s) ² , σ^* (2s) ² , π (2p _x) ² , π (2p _y) ² (B) KK σ (2s) ² , σ^* (2s) ² , σ (2p _x) ² , π (2p _y) ¹ , π (2p _y) ¹ (C) KK σ (2s) ² , σ^* (2s) ² , σ (2p _z) ² , π (2p _x) ² , π (2p _y) ¹ (D) KK σ (2s) ² , σ^* (2s) ² , σ (2p _z) ² , π (2p _y) ² 12. Among the following orbital bonds, the angle is minimum between :- (A) sp ³ bonds (B) p _x and p _y orbitals (C) H–O–H in water (D) sp bonds		(C) $\text{He}_{2}^{+} < \text{O}_{2}^{-} < \text{NO}$	$< C_2(D) He_2^+ < O_2^- < C_2 <$	NO	
11. The molecular orbital configuration of CN^+ is :- (A) KK σ (2s) ² , σ^* (2s) ² , π (2p _x) ² , π (2p _y) ² (B) KK σ (2s) ² , σ^* (2s) ² , π (2p _x) ¹ , π (2p _y) ¹ (C) KK σ (2s) ² , σ^* (2s) ² , σ (2p _z) ² , π (2p _x) ² , π (2p _x) ² , π (2p _y) ¹ (D) KK σ (2s) ² , σ^* (2s) ² , σ (2p _z) ² , π (2p _y) ² 12. Among the following orbital bonds, the angle is minimum between :- (A) sp ³ bonds (B) p _x and p _y orbitals (C) H–O–H in water (D) sp bonds	10.	Which is most ionic : $(A) P O$		$(C) C_{\tau}O$	$(D) M_{D} \cap$
(A) KK σ (2s) ² , σ^* (2s) ² , π (2p _x) ² , π (2p _y) ² (B) KK σ (2s) ² , σ^* (2s) ² , π (2p _x) ¹ , π (2p _y) ¹ (C) KK σ (2s) ² , σ^* (2s) ² , σ (2p _z) ² , π (2p _x) ² , π (2p _y) ¹ (D) KK σ (2s) ² , σ^* (2s) ² , π (2p _x) ² , π (2p _y) ² 12. Among the following orbital bonds, the angle is minimum between :- (A) sp ³ bonds (C) H–O–H in water (D) sp bonds	11	(A) $\Gamma_2 O_5$ The molecular orbital	(D) MITO	$(C) CIO_3$	(D) $\operatorname{MII}_2 \operatorname{O}_7$
12. Among the following orbital bonds, the angle is minimum between :- (A) sp ³ bonds (C) H–O–H in water (A) sp $(2s)^2$, $\sigma (2p_2)^2$, $\pi (2p_3)^2$, $\pi $	11.	(A) KK σ (2s) ² σ^* (2s)	$(2n)^2 \pi (2n)^2 \pi (2n)^2$	(Β) KK σ (2s) ² σ* (2s	$(2n)^2 \sigma (2n)^2 \pi (2n)^1 \pi (2n)^1$
12. Among the following orbital bonds, the angle is minimum between :- (A) sp ³ bonds (C) H–O–H in water (D) sp bonds (D) sp bonds		$(C) KK \sigma (2s)^2 \sigma^* (2s)^2$	$(2p_x)^2 \pi (2p_y)^2 \pi (2p_y)^2$	(D) KK σ (2s) ² σ^* (2s)	$(2p_z)^2 \sigma (2p_z)^2 \pi (2p_x)^2 \pi (2p_y)^2$
(A) sp ³ bonds (B) p_x and p_y orbitals (C) H–O–H in water (D) sp bonds	12	Among the following	orbital bonds the angle is m	inimum hetween ·-	P_{1} , P_{2} , P
(C) $H-O-H$ in water (D) sp bonds	- - .	(A) sp^3 bonds	erencer condo, the ungle is in	(B) p and p orbitals	
		(C) H–O–H in water		(D) sp bonds	

13.	Molecule having dipo	ole moment is :-				
	(A) 2, 2-dimethylpro	pane	(B) trans-2-pentene			
	(C) neopentane		(D) 2,2.3,3-tetramethyll	outane.		
++14.	The AsF ₅ molecule is	s trigonal bipyramidal. The hyt	orid orbitals used by the As atoms for bonding are :-			
	(A) $dx^2 - y^2$, dz^2 , s, p	p_x, p_y	(B) dxy, s, p _x , p _y , p _z			
	(C) s, p_x , p_y , p_z , dz^2		(D) $dx^2 - y^2$, s, p_x , p_y			
15.	Polarisation is the dis	stortion of the shape of an anic	on by an adjacently placed	cation. Which of the following		
	statements is correct	:-				
	(A) maximum polaris	sation is brought about by a cat	ion of high charge			
	(B) minimum polarisa	ation is brought about by a cati	on of low radius			
	(C) a large cation is l	likely to bring about a large deg	gree of polarisation			
	(D) polarising power	of a cation is less than that of a	anion			
++16.	Amongest NO_3^- , As	$D_3^{3-}, CO_3^{2-}, ClO_3^{-}, SO_3^{2-}$ and BO	O_3^{3-} , the non-planar specie	es are :-		
	(A) CO_3^{2-} , SO_3^{2-} and	BO ₃ ³⁻	(B) AsO_3^{3-} , ClO_3^{-} and SC	2- 3		
	(C) NO_3^- , CO_3^{2-} and	BO_3^{3-} (D) SO_3^{2-} , NO_3^{-} and BO_3^{3-}	3-			
17.	The nature of π -bond	ds in perchlorate ion is :-				
	(A) O (d π) – Cl (p π)	(B) O (p π) – Cl (d π)	(C) O (d π) – Cl (d π)	(D) O (p π) – Cl (p π)		
18.	CaO and NaCl have	e the same crystal structure and	d approximately the same	ionic radii. If U is the lattice		
	energy of NaCl, the	approximate lattice energy of	CaO is :-			
	(A) U/2	(B) U	(C) 2 U	(D) 4 U		
19.	The ease of hydrolys	sis of trichlorides of group 15 e	elements decreases in the o	order :-		
	(A) $\mathrm{NCl}_3 > \mathrm{PCl}_3 > \mathrm{As}$	$sCl_3 > SbCl_3 > BiCl_3$	(B) $PCl_3 > NCl_3 > AsCl_3$	> SbCl ₃ $>$ BiCl ₃		
	(C) $AsCl_3 > NCl_3 > P$	$PCl_3 > SbCl_3 > BiCl_3$	(D) $SbCl_3 > BiCl_3 > PC$	$l_3 > NCl_3 > AsCl_3$		
20.	Which of the following	ng solid sold have highest value	e of ${\sf K}_{ m p}$ when heated in clos	sed vessel :-		
	(A) Li_2CO_3 (s)	(B) $BeCO_3$ (s)	(C) Na ₂ CO ₃ (s)	(D) $BaCO_3(s)$		
21.	Type of bonds betwe	een calcium and carbon in CaC	C_2 are :-			
	(Α) σ, π	(B) only σ	(C) only π	(D) ionic bond		
22.	Ethanol has a higher	boiling point than dimethyl ethe	r though they have the sam	e molecular weight. This is due		
	to :-					
	(A) resonance	(B) coordinate bonding	(C) hydrogen bonding	(D) ionic bonding		
23.	Write order of dipole	e moment of following compou	nds :-			
	a	D	D			
	<u> </u>	<u> </u>	λ_{a}			
	(i) (i)	(ii)	(iii)			
	\uparrow		d a			
	Q		~			
	D	a I				
		(V)				
	-	 D	u u			
	(A) (iii) > (ii) > (i) > (iv	v) > (v) > (vi)	(B) (iii) > (i) > (ii) = (vi) >	(iv) > (v)		
	(C) (ii) > (i) = (iii) = (iv	v) > (v) = (vi)	(D) (iii) > (i) > (iv) > (v) > (ii) > (vi)			

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24.	The correct order of increasing	ng X – O – X bond ang	gle is (X = H, F or Cl) :-	
	(A) $H_2O > Cl_2O > F_2O$		(B) $Cl_2O > H_2O > F_2O$	
	(C) $F_2O > Cl_2O > H_2O$		(D) $F_2O > H_2O > Cl_2O$	
25.	Out of given reaction which s	how change in hybridi	sation of central atom :-	
	(A) $H_2 \underline{B}O_3$ dissolve in water		(B) H ₂ SO ₄ dissolve in wa	ter
	(C) $\underline{N}_2O_{5(g)} \longrightarrow N_2O_{5(s)}$		(D) $\underline{P}Br_{5(g)} \longrightarrow PBr_{5(s)}$	
	(E) C ₂ H ₆ <u>Homolytic</u>	\rightarrow		
26.	In the cyclo- S_8 molecule of respectively (give approximate	hombic sulphur, all the te values) :-	e S–S bond lengths and a	ll the S-S-S bond angles are
	(A) 204 pm and 105°		(B) 102 pm and 120°	
	(C) 204 pm and 180°		(D) 102 pm and 60°	
27.	The structure of the SO_3 mol	ecule in the gaseous p	hase contains :-	
	(A) only σ -bonds between sul	phur and oxygen		
	(B) σ -bonds and a (p π -p π) bor	nds between sulphur a	nd oxygen	
	(C) σ -bonds and a (d π -p π) bor	nds between sulphur a	nd oxygen	
	(D) σ -bonds, and a (p π -p π) ar	nd a (p π -d π) bonds betw	ween sulphur and oxygen	
28.	Which of the following allotro	ppic forms of sulphur is	s the most stable thermody	namically :-
	(A) Orthorhombic		(B) β-monoclinic	
	(C) γ-monoclinic		(D) Plastic sulphur	
29.	Which of the following acids i	is not a peroxo acid :-		
	(A) CF_3CO_3H (B)	$H_2S_2O_8$	(C) $H_2S_2O_7$	(D) $H_2 N_2 O_2$
30.	The hydrolysis of 1 mol of pe	eroxodisulphuric acid p	produces :-	
	(A) 2 mol of sulphuric acid			
	(B) 2 mol of peroxomonosulp	huric acid		
	(C) 1 mol each of sulphuric a	cid and peroxomonosi	ulphuric acid	
	(D) 1 mol each of sulphuric a	cid, peroxomonosulph	uric acid and hydrogen pe	roxide
31.	Which of the following statem	nents is correct :-		
	(A) SF_6 does not react with w	ater	(B) OF ₆ is d ² Sp ³ -hybridiz	ed
	(C) $S_2O_3^{2-}$ is a linear ion		(D) There is no π -bondin	g in SO_4^{2-}
32.	In H_2O , the bond angle H–O 90°. This suggests that :-	–H is 104°28' but in H	H_2S , H_2Se and H_2Te the b	ond angles are pretty close to
	(A) oxygen uses sp ² -hybrid or atoms	bitals while S, Se and [*]	Te use sp ³ -hybrid orbitals fo	or bonding with the hydrogen
	(B) oxygen uses sp ³ -hybrid orl p orbitals	bitals to bond with the	two hydrogen atoms while	S, Se and Te use almost pure
	(C) oxygen uses sp ³ -hybrid or	bitals while S, Se and T	Γe utilize d orbitals for bond	ding with the hydrogen atoms
	(D) all the atoms use pure p o	orbitals to bond with th	e hydrogen atoms	
33.	Which of the following staten	nents are correct for th	ne SO_4^{2-} ion ?	
	(A) it is tetrahedral		.1 . 1	
	(B) all the S–O bond length a (C) it contains form $=$ hands he	re equal, and shorter	than expected	polized even the S and the form
	O atoms, and all the S-O	bonds have a bond or	der of 1.5	anzeu over the 3 driu the lour
	(D) Oxidation state of sulphu	r is +6 and all oxugen	in -2	

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- 34. The colour of halogens progressively deepens from fluorine to iodine because :-
 - (A) halogens of higher atomic number absorb light of longer wavelength since the difference in energy between the ground state and excited state decreases as the atomic number increases.
 - (B) fluorescence and phosphorescence become more intense as the atomic numbers of halogen increases
 - (C) the standard electrode potential increases from I_2 to F_2
 - (D) halogens of higher atomic number absorb light of shorter wavelength since the difference in energy between the ground state and excited state increases as the atomic number increases.
- 35. Which of the following pairs of halogens have approximately identical bond energy ?

(B) F_2 and I_2 (A) F_2 and Br_2 (C) F_2 and Cl_2 (D) Cl_2 and I_2

36. Which of the following is arranged in order of increasing ionic character :-

(A) $PbCl_2 < SnCl_4 < KCl < MgCl_2$	(B) $SnCl_4 < PbCl_2 < KCl < MgCl_2$
(C) $SnCl_4 < PbCl_2 < MgCl_2 < KCl$	(D) $PbCl_2 < SnCl_4 < MgCl_2 < KCl$

37. XeOF₄ contains :-

(A) six electron pairs forming an octahedron with two positions occupied by lone pairs

- (B) two π -bonds and the remaining six electron pairs, forming an octahedron
- (C) three π -bonds and the remaining four electron pairs forming an tetrahedron
- (D) one π -bonds and the remaining six electron pairs forming an octahedron with one position occupied by a lone pair
- 38. The azide ion has :-
 - (A) 20 outer electrons and is isoelectronic with Br_2O (B) 18 outer electrons and is isoelectronic with NO_2^-
 - (C) 16 outer electrons and is isoelectronic with CO_2 (D) 14 outer electrons and is isoelectronic with H_2O_2

39. Which of the following pairs of ions do not represent cyclic and chain silicates ?

- (A) $Si_2O_7^{2-}$ and $(SiO_3)_n^{2n-}$ (B) $Si_{3}O_{0}^{6-}$ and $(Si_{4}O_{11})_{n}^{6n-}$ (D) $Si_{2}O_{7}^{7-}$ and $(SiO_{3})_{2}^{2n-}$ (C) $Si_2O_7^{2-}$ and $(Si_2O_5)_n^{2n-}$
- 40. Which of the following statements is/are incorrect?
 - (A) B_2H_6 is not an electron-deficient molecule.
 - (B) the dipole moment of BF_3 is zero
 - (C) B(OH)₃ partially reacts with water to form H_3O^+ and $[B(OH)_4]^-$, and behaves like a weak acid.

 $(C) \underline{C}_{2}H_{2}$

- (D) BF_3 and BrF_3 molecules have different shapes.
- 41. Rotation around the bond (between the underlined atoms) is restricted in : $(B) H_2O_2$

(A) $C_{2}H_{4}$ The H bond in solid HF can be best represented as :

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 $(D) \underline{C}_{2}H_{6}$

- 43. Which of the following statements is/are correct?
 - (A) NH_2^+ shows sp² hybridisation whereas NH_2^- shows sp³ hybridisation
 - (B) $Al(OH)_4^{-}$ has a regular tetrahedral geometry
 - (C) sp^2 -hybridized orbitals have equal s-and p-character
 - (D) usually hybridized orbitals form σ -bonds

44.	Which of the following statements is/are true for	BaO and MgO ?
	(A) BaO is more ionic than MgO	(B) MgO is more ionic than BaO
	(C) BaO has a higher melting point than MgO	(D) MgO has a higher melting point than BaO
45.	Select the correct statement (s) about the compou	nd $NO[BF_4]$:
	(A) it has 5σ and 2π bond	
	(B) nitrogen - oxygen bond length is higher than n	itric oxide (NO)
	(C) it is a diamagnetic species	
	(D) B–F bond length in this compound is lower that	n in BF ₃
46.	Silane is more reactive than CH ₄ due to :	
	(A) larger size of Si compared to C which facilitate	e the attack by nucleophile
	(B) polarity of Si–H bond is opposite to that of C -	- H bond
	(C) availability of vacant 3d orbitals in case of Si to	o form the reaction intermediate easily
	(D) Si-H bond energy is lower than that of C–H bo	ond
47.	Select correct statement (s) :	
	(A) acidic strength of HBr > HCl but reverse is tru	e for their reducing property
	(B) basic strength of $PH_3 > AsH_3$ but reverse is tru	e for their bond angle
	(C) dipole moment of $CH_3Cl > CH_3F$ but reverse	is true for their HĈH bond angle
	(D) K _a of fumaric acid is higher than maleic acid	but reverse is true for their K
48.	Nodal planes of π -bonds (s) in CH ₂ = C = C = CH	I_2 are located in :
	(A) all are in molecular plane	-
	(B) two in molecular plane and one in a plane j σ-bond	perpendicular to molecular plane which contains C – C
	(C) one in molecular plane and two in a plane σ -bonds	perpendicular to molecular plane which contains C – C $$
	(D) two in molecular plane and one in a plane $\sigma\text{-bonds}$ at right angle	perpendicular to molecular plane which bisects C – C
49.	BF_3 and NF_3 both molecules are covalent, but BF_3	$_3$ is non-polar and NF $_3$ is polar. Its reason is :
	(A) in uncombined state boron is metal and nitrog	en is gas
	(B) B–F bond has no dipole moment whereas N–F	bond has dipole moment
	(C) the size of boron atom is smaller than nitrogen	L
	(D) BF_3 is planar whereas NF_3 is pyramidal	
50.	Which of the following has been arranged in orde	r of decreasing bond length :-
	(A) $P - O > Cl - O > S - O$	(B) $P - O > S - O > Cl - O$
	(C) S - O > Cl - O > P - O	(D) $Cl - O > S - O > P - O$
51.	Which of the following models best describes the	bonding with in a layer of the graphite structure ?
	(A) metallic bonding	(B) ionic bonding
	(C) non-matallia accurlent handing	(D) vander Waals forces
52.	(C) non - metallic covalent bonding	(_) (
	Which of the following is tetrabasic acid ?	(_ /
	(C) non - metanic covarent bonding Which of the following is tetrabasic acid ? (A) orthophosphoric acid	(B) hypophosphorus acid

BRAIN	TEASE	ERS				AN	SWE	R KEY	Y				EXERCI	SE -2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A,B,C,D	С	Α	D	А	С	В	С	D	В	А	В	В	С	А
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
В	В	D	А	В	D	С	С	В	A,C,D, E	А	D	Α	C,D	С
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
А	В	A,B,C,D	А	В	С	D	С	A,C,D	А	A,B,C	С	A,B,D	A,D	A,C
46	47	48	49	50	51	52								
A,B,C,D	С	В	D	В	С	D								
							04							

EXERCISE-03

MISCELLANEOUS TYPE QUESTIONS

TRUE OR FALSE :

- **1**. The polarising power of a cation is directly proportional to its size.
- 2. The polarisability of an anion is directly proportional to its charge.
- **3**. For a given cation, greater the polarisability of the anion, more the covalent character.
- **4.** An element with low ionization potential is most likely to form a covalent bond with an other element having a high electron affinity.
- 5. Ionic interactions are stronger than covalent bonds.
- **6**. Two non-metal atoms are likely to form covalent bonds on combination.
- 7. Ionic interactions are directional.
- 8. All molecules having polar bonds are polar.
- 9. The $CH_{2}Cl_{2}$ molecule may be polar or nonpolar depending on its geometry.
- **10.** Two isomers of $C_2H_2Cl_2$ are polar.
- **11.** The net dipole in the water molecules is the resultant of its bond dipoles.
- **12.** SO_2 is polar whereas CO_2 is non-polar.
- 13. If all bonds in a molecule are polar, the molecule as a whole must be polar.
- **14.** The bond angle around B in BCl₃ and BF₃ is same.
- **15.** NH_3 molecule involve sp³ hybridisation of N-atom.
- 16. The bond length decreases with increase in multiplicity of bonds between two atoms.
- **17.** The geometry of NH_3 and BH_3 is same.
- **18.** Dipole moment of NF_3 is less than that of NH_3 .
- **19.** A non-polar molecule can have a polar bond in it.
- **20.** In ionic bond formation octet is completed.
- **21**. π -bond is formed by the colateral overlapping of atomic orbitals.
- **22.** Normally the covalent bond is non-directional.
- **23.** He_2 having no existence because its bond order is zero.
- **24.** O_2, O_2^- and O_2^+ all are paramagnetic.
- **25.** When bond order increases, bond length decreases.
- **26.** Bond order is the measurement of bond strength.
- **27.** In hybridisation, only orbitals are involved not electrons.
- **28.** SF_6 molecule is octahedral.
- **29.** Ethyne is a linear molecule.
- **30.** CO_2 is a polar molecule but not have polar bond.
- **31.** C-C sigma bond in ethyne is sp^2-sp^2 .
- **32.** XeF_4 molecule is square planar in shape.
- **33.** Hybridised orbitals have identical shape.
- **34.** The bond angle in Cl_2O is equal to that of OF_2 .
- **35**. The density of water is more than ice.
- **36.** HCl is a gas while HF is high boiling point liquid because H–F bond is stronger.
- **37.** Liquid NH_3 does not contain H-bond.

- **38.** Dipole moment is completely based on ionic nature of bond.
- **39.** BeF_2 containing dipole moment while H_2O having zero dipole moment.
- **40.** In CO_2 molecule, C–O bond is polar but CO_2 molecule is non-polar because the vector sum of two C–O bond is zero.
- **41**. Odd electron molecule is paramagnetic.
- **42.** The reason for resonance, is delocalisation of π -electrons.
- **43.** During the formation of covalent bond both shared electron having opposite spin.
- **44.** The bond Hg–Cl is more ionic in HgCl₂ than Hg_2Cl_2 .
- **45**. The solubility of ionic solids decreases when hydration energy of ions increases.
- **46.** Between layers of graphite, bond will be covalent.
- **47.** The polarising power of Zn^{2+} is greater than Ca^{2+} ions.
- **48.** The colour of PbI_2 is yellow. The reason for this is large size of Pb^{+2} ion.
- **49.** The H N H bond angle in NH_3 is greater than H As H bond angle in AsH_3 .
- **50.** Linear overlap of atomic p-orbitals leads to a sigma bond.
- **51.** The dipole moment of CH_3F is greater than that of CH_3Cl .
- **52.** sp^2 hybrid orbitals have equal s- and p-character.
- **53.** All the Al Cl bonds in $Al_2 Cl_6$ are not equivalent.

FILL IN THE BLANKS :

- 1. Hydrogen bond energy is around
- 2. The valence atomic orbitals on carbon in silver acetylide are hybridised.
- 3. The hybridisation state of oxygen in water molecule is
- 4. When N_2 goes to N_2^+ , then N–N bond distance and when O_2 goes to O_2^+ , then O–O bond distance
- 5. Among N_2O , SO_2 , I_3^+ and I_3^- , the linear species are and And

MATCH THE COLUMN :

1. (Column-I	Column-II		
	(A) (B) (C) (D)	$\begin{array}{l} O_3 \\ H_2 O_{(\ell)} \\ CuSO_4 \cdot 5H_2 O \\ (NH_4)_2 SO_4 \end{array}$	(p) (q) (r) (s)	covalent bond Co-ordinate bond Hydrogen bond Ionic bond	
2. (Column-I	Column-II		
	(A) (B) (C) (D)	$B_{3}N_{3}H_{6}$ $H_{2}O_{2}$ $B_{2}H_{6}$ $I_{2}CI_{6}$	(p) (q) (r) (s)	planar geometry non planar geometry no lone pair non polar molecule	

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3.

	Column-I	\square	Column-II
(A)	$\underline{B}_{2}H_{6} + 2NaH \longrightarrow$	(p)	no change in hybridisation of under line atom
(B)	$H_3\underline{B}O_3$ + water \longrightarrow	(q)	$sp^2 \longrightarrow sp^3$ (change in hybridisation)
(C)	$\underline{B}eH_2 \longrightarrow (BeH_2)_{(s)}$	(r)	breaking of 3C – 2e⁻ bond
(D)	$\underline{B}F_3 + NaF \longrightarrow$	(s)	formation of $3C - 2e^{-}$ bond

4.

\bigcap	Column-I		Column-II
(A)	$N_2^{ +}$ is stable than $N_2^{ -}$	(p)	due to one have higher electrons in antibonding than other
(B)	NO can easily loss its electron than N_2	(q)	one have B.O. 3 and other have 2.5
(C)	NO have large bond length than NO ⁺	(r)	both are paramagnetic with same bond order
(D)	${\rm He_2}^+$ exist but less stable than ${\rm H_2}^+$	(s)	one paramagnetic and other diamagnetic

ASSERTION & REASON QUESTION :

These questions contains, Statement-I (assertion) and Statement-II (reason).

(A) Statement-I is True, Statement-II is True ; Statement-II is a correct explanation for Statement-I

(B) Statement-I is True, Statement-II is True ; Statement-II is NOT a correct explanation for Statement-I

(C) Statement-I is True, Statement-II is False.

(D) Statement-I is False, Statement-II is True.

1. Statement-I : Fel₃ cannot exist in an aqueous solution.

Because

Statement-II : Fe^{3+} oxidizes I^- to I_2 easily.

- **2.** Statement-I : SF_6 exists but SH_6 does not.
 - Because

Statement-II : $d\pi$ -p π bonding cannot take place in SH₆

Statement-I : The stability of peroxides and superoxides increases in passing from Li to Cs.
 Because

Statement-II : The electropositive character of the elements in the periodic table increases on moving down a group.

4. **Statement-I** : Borazole is aromatic in nature.

Because

Statement-II : Nitrogen contributes π -electrons to the system.

- 5. Statement-I : The first ionization energy of Be is greater than that of B.
 - Because

Statement-II : The 2p orbital is lower in energy than the 2s.

6. Statement-I : Bond order of O₂ and BN is same.

Because

Statement-II : O₂ and BN are isoelectronic

7. Statement-I : CO₂ is non polar while SO₂ is polar molecule. Because

Statement-II : S-O bonds are polar while C-O non polar.

Ε

8.	Statement-I : CO_2 and SiO_2 has same physical state at room temp.
	Because
	Statement-II : Carbon has more electronegativity than silicon atom.
9.	Statement-I : In NF ₃ molecule lone pair resides in sp^3 hybrid orbital.
	Because
	Statement-II : NF ₃ has pyramidal shape.
10.	Statement-I : N_2O , $CO_2 \& I_3^-$ are isostructral.
	Because
	Statement-II : All three have same hybridise central atom.
11.	Statement-I : Dipole moment of \bigcirc is similar as bromo benzene.
	Because
	Statement-II : Dipole moment of Cl - C bond is greater than Br- C bond.
	Q
12.	Statement-I : PCl_3 on hydrolysis gives $OH = P = OH$ and $OH = P = OH$.
	Because
	Н
	Statement-II · H PO exists in two tautomeric forms · HO_P_OH AAAA HO_P_OH
	OH O
13.	Statement-I : Super oxide ion is paramagnetic whereas peroxide ion is diamagnetic.
	Because
	Statement-II : Super oxide ion has one unpaired electron whereas per oxide ion has no unpaired
	electron.
14.	Statement-I : Although PF_5 , PCl_5 and PBr_5 are known, the penta halide of nitrogen have not been observed.
	Because
	Statement-II : Phosphorus has lower electronegativity than nitrogen.
15.	Statement-I : Among alkali metal cations, Li ⁺ (aq.) has highest electrical conductance.
	Because
	Statement-II : Li ⁺ (aq.) is largest alkali metal cation because of greater degree of hydration.
16.	Statement-I : HNO_3 is a stronger acid than HNO_2 .
	Because
	Statement-II : In HNO_3 , there are two N–O linkage whereas in HNO_2 there is only one.
17.	Statement-I : Al(OH) ₃ is amphoteric in nature.
	Because
	Statement-II : Al–O and O–H bonds can be broken with equal case in $Al(OH)_3$.
18.	Statement-I : H_2SO_4 in more viscous than water.
	Because
	Statement-II : In H_2SO_4 , S has highest oxidation state.
19.	Statement-I : F_3^- ion is known, which has same geometry as X_3^- (X = Cl, Br, I)
	Because
	Statement-II : F is most electronegative element.

– E

20. Statement-I : The p-isomer of dichlorobenzene has higher melting point than o-and m-isomer. Because

Statement-II : p-isomer is symmetrical and thus shows more closely packed structure.

Statement-I : Boron does not show univalent nature but unipositive nature of thallium is quite stable.
 Because

Statement-II : Inert pair effect predominates in thallium.

22. Statement-I : H₃BO₃ is monobasic acid in water.

Because

Statement-II : In water ionise as $H_3BO_3 \square \square \square H_2BO_3^- + H^+$.

COMPREHENSION BASED QUESTIONS :

Comprehension # 1

In order to explain the shape and geometry of molecules. The valence bond theory was supplemented by the concept of Hybridization. This is a Hypothetical concept and has been introduced by Pauling and Slater. According to this concept any number of atomic orbitals of an atom which differ in energy slightly may mix with each other to form new orbitals called hybrid orbitals. The process of mixing or amalgamation of atomic orbitals of nearly same energy to produced a set of entirely new orbitals of equivalent energy is known as Hybridization.

1.	The hybridization of cart	oon atoms in C – C single	ingle bond of $H - C \equiv C - CH = CH_2$ is			
	(A) $sp^3 - sp^3$	(B) $sp^2 - sp^3$	(C) sp $-$ sp ²	(D) $sp^3 - sp$		
2.	In XeF $_2$, XeF $_4$ and XeF $_6$	the number of lone pairs	s on Xe is respectively :			
	(A) 2, 3, 1	(B) 1, 2, 3	(C) 4, 1, 2	(D) 3, 2, 1		
3.	Which of the following is	s the correct set :				
	(A) H_2O ; sp^3 , angular		(B) H_2O ; sp^2 , linear			
	(C) NH_3 ; sp^2 , pyramida	1	(D) BF_3 ; sp ³ , trigonal planar			
4.	In NO_3^- ion, number of	bond pair and lone pairs	of electrons on nitrogen a	atom are :		
	(A) 2, 2	(B) 3, 1	(C) 1, 3	(D) 4, 0		
5. T-shape is exhibited by molecule :						
	(A) CIF ₃	(B) CHCl ₃	(C) CCl ₄	(D) PCl ₅		

Comprehension # 2

Е

 $Na[BH_4]$ is ionic compound contain BH_4^{Θ} tetrahydrido borate ion and in solid state $NaBH_4$ has sodium chloride structure. Not all tetrahydridoborates are ionic. The beryllium, aluminium and transition metal borohydrides become increasingly covalent and volatile. In these type of tetrahydrido borate, the BH_4^{Θ} form covalent bond with metal ion. One or more H atoms in a BH_4^{Θ} act as a bridging and bond to metal, forming a three centre bond with two electrons shared by three atoms.

The BH_4^{Θ} is usually in that it may form one two or three such three centre bonds to the metal ion when forms covalent bond.

 $Be(BH_4)_2$ and $Al(BH_4)_3$ are covalent and structures are given below.



1. $Li[AlH_4]$ is used as a reducing agent in many reaction & it is prepared by excess LiH and $AlCl_3$. Select incorrect statement about $Li[AlH_4]$.

(A) hybridisation of Al is same as B in $Na[BH_4]$ (B) geometry of around Al is same as $AlCl_4^{\Theta}$

(C) AlH_4^{Θ} , BH_4^{Θ} , $AlCl_4^{\Theta}$ are iso-structral (D) AlH_4^{Θ} , $AlCl_4^{\Theta}$, BH_4^{Θ} are iso electronic.

2. Select correct about $Al(BH_4)_3$:

(A) all three tetrahydride borate form two hydrogen bridges

(B) two BH_4^{Θ} form 2 hydrogen bridges and one form one hydrogen bridge.

(C) one BH_4^{Θ} form 2 hydrogen bridge and two form one hydrogen bridge

	(D) B form only 2	c−2e ⁻ bond							
3.	Total no. of 2c–2	Total no. of $2c-2e^{-}$ bond and $3c-2e^{-}$ bond in Al(BH ₄) ₃ are respectively :							
	(A) 6 , 12	(B) 6 , 6	(C) 12 , 12	(D) 12 , 6					
4.	I . Total 2c–2e and 3c–2e bonds in $Be(BH_4)_2$ are respectively :								
	(A) 8, 4	(B) 4, 8	(C) 4, 4	(D) 8, 8					

Comprehension # 3

1

The molecular orbital with the lowest energy is filled first. Thus σ (1s) is filled first where as σ^{*} (2p) is filled in the last, also the maximum number of electron in bonding and antibonding molecular orbitals are according to Pauli and Hund's rule. As an electron in an antibonding molecular orbital cancels out the stability introduced by the electron in a bonding molecular orbital, it means that in order for bonding of atoms to occur there should be an excess of bonding electrons over antibonding electrons. In case where the number of bonding and antibonding electrons are equal, no bond will be formed between the atoms. With the help of above discussion, we can define easily bond order, relative bond length, relative stability and magnetic properties for a molecule.

Read the above paragraph carefully and give the answer of following questions :

- 1. In an antibonding molecular orbital, there is a point between the two probability contours of hydrogen atoms. This is called.
 - (A) antinode
 - (B) node
 - (C) a plane where electron charge density is maximum
 - (D) A and C both are correct

2. According to MOT which statement is correct about Boron molecule ?

- (A) it is diamagnetic in nature
- (B) it is paramagnetic in nature having magnetic moment 2.8 B.M. by using spin only formula
- (C) it is paramagnetic but having magnetic moment 1.7 B.M.
- (D) its bond order is 2
- **3.** Which of the following are paramagnetic in nature ?
 - (A) B_2 , N_2 and C_2 (B) O_2 , B_2 , N_2^- and O_2^- (C) O_2^{--} , N_2^+ and CO (D) B_2 , C_2 and F_2

MIS	CELLANEOUS TY	PE QUESTION	IA	NSWER K	EY		EXERCISE -5	
•	<u> True / False</u>							
	1. F	2. T	3. T	4. F	5. F	6. T	7. F	
	8. F	9. F	10 . T	11 . F	12. T	13 . F	14. T	
	15. T	16 . T	17. F	18. T	19 . T	20 . T	21. T	
	22. F	23 . T	24. T	25 . T	26. T	27 .T	28. T	
	29. T	30 . F	31 . F	32 . T	33. T	34 . F	35. T	
	36 . F	37 . F	38. F	39 . F	40. T	41 . T	42. T	
	43. T	44 . F	45. F	46. F	47. T	48. F	49. T	
	50 . T	51 . F	52 . F	53. T				
•	<u>Fill in the Bl</u>	anks						
	1. 4.2 – 8.4 kJ i	mol^{-1}		2. sp		3. sp^3		
	4. increases, dec	creases		5. N_2O, I_3^-				
•	Match the Co	<u>olumn</u>			a			
	I. A - (p, q), B	- (p, r), C - (p, q, t	r, s), D - (p, q,	, s) 2. A - (p, r, s), B - (q), C - (q, r, s), D - (p, s)				
	3. A - (p, r), B	- (q), C - (s), D - (q	l)	4. A - (p, r),	B - (p, q, s), C - (p	o, q, s), D - (p, s	r)	
•	<u>Assertion - π</u> 1 Δ	2 R	<u>אווא</u> אם	4 R	5 (6 C	7 С	
	8 D	9 Δ	10 C	11 D	12 Δ	ο. ο 13 Δ	11 B	
	15 D	1 6 C	10.C	11. D 10 D	12. A	10. A	14 . D	
	13. D	10.0	17.0	10. D	19. D	20. A	21. A	
	22. C	an Record Ou	41					
•	Comprehension	<u>оп Базеа Qu</u> . #1 . 1 (С)	2 (D)	3 (A)	1 (D)	5 (A)		
	Comprehension	m = 1 + 1 + 1 + (C) m = m = 2 + 1 + (D)	2. (D) 2 (A)	3.(A) 3.(B)	4. (<i>C</i>)	J. (n)		
	Comprehension	n #3 : 1. (B)	2 . (B)	3. (B)	•• (0)			
		(-)	_ (_)	- (-)				

EXERCISE-04 [A]

SUBJECTIVE QUESTIONS :

- **1**. Give reasons for the following :
 - (a) KHF₂ is known whereas KHCl₂ is unknown.
 - (b) $(CH_3)_3 N$ is pyramidal but $(SiH_3)_3 N$ is trigonal planar.
 - (c) CO_2 is a gas but SiO_2 is a solid.
- **2.** (a) The structures of $N_2 O_3$ and $P_2 O_3$ are different. Explain.
 - (b) Among H–I, H–Br and H–Cl bonds which is weakest?
- **3.** Suppose that the stability of carbonates when heated depends on the ability of the metal cation to polarize the carbonate ion and remove an oxide ion from it, so releasing CO_{2} .
 - (a) Predict the order of thermal stability of the group 1 and 2 metal carbonates ?
 - (b) Comment on the likely stability of aluminium carbonate ?
- **4.** (a) BF_3 has less lewis acidic property than BBr_3 . Why?
 - (b) $(CH_3)_3 C$ -OH is less acid than $(CH_3)_3 Si$ -OH. Why ?
 - (c) Why in the presence of ethyne HF exhibit more acidic character.
 - (d) Why SF_4 can be hydrolysed easily but SF_6 can not?
- 5. In what hybridization state is the beryllium atom in $BeCl_2$ molecule? How will the type of hybridization change when $BeCl_2$ transform to the solid state.
- **6**. Give a suitable reason for the high mobility of H^+ ions through the ice than through liquid water.
- **7.** (a) Example the following :
 - (i) Boron trichloride has triangular planar geometry whereas aluminium trichloride has tetrahedral dimeric structure.
 - (ii) Barium sulphate is sparingly soluble in water whereas beryllium sulphate is freely soluble.
 - (iii) Dioxygen (O_2) molecule is stable whereas disulphur (S_2) is unstable at the room temperature.
- 8. Assuming Z-axis as molecular axis, lable the molecular orbitals formed by the following combination of atomic orbitals :
 - (i) 1s + 1s
 - (ii) $2p_{v} 2p_{v}$
 - (iii) $2p_{z} + 2p_{z}$
 - (iv) 2s + 2s
 - (v) $2p_x + 2p_x$
- **9.** When a magnet is dipped in a jar of liquid O_2 , some O_2 clings to it. Why ?
- 10. (a) What type of bonding holds the layer in graphite ?Why will graphite conduct electricity well in a direction parallel to the planes of hexagons, but not at all well in a direction perpendicular to the planes ?
 - (b) PCl_5 exists as solid in the form of $[PCl_4]^+$ $[PCl_6]^-$, yet it is a non conductor of electricity. Why?
- **11.** A diatomic molecule has a dipole moment of 1.2 D. If the bond distance is 0.1 E, what fraction of an electron charge, e exist on each atom?
- 12. Through the electronegativities of nitrogen and chlorine are same, NH₃ exists as liquid whereas HCl as gas. Why?

- E

- **13.** The percent ionic character in HCl is 18.08. The observed dipole moment is 1.08 D. Find the internuclear distance in HCl.
- 14. HBr has dipole moment $2.6 \text{ H} 10^{-30} \text{ CM}$. If the ionic character of the bond is 11.5 %, calculate the interatomic spacing.
- **15.** Dipole moment of LiF was experimentally determined and was found to be 6.32 D. Calculate percentage ionic character in LiF molecule Li F bond length is 0.156 nm.
- **16.** Based upon M.O. theory state reason for the paramagnetic character of CN, the diamagnetic character of CN^{-} , the stability of CN^{-} and calculate their respective bond orders.
- **17.** Draw the structure of following compound
 - (i) S₈
 - (ii) N_2H_4
 - (iii) P₄H₁₀
 - (iv) POCl₃
 - (v) $XeOF_4$
 - (vi) C_3O_2
 - (vii) BrF_5

CONCEPTUAL SUBJECTIVE EXERCISE	ANSWER KEY	EXERCISE -4(A)
14. 1.4 E 15. 84.35	% 16. $2\frac{1}{2}, 3$	

EXERCISE-04 [B]

BRAIN STORMING SUBJECTIVE EXERCISE

SUBJECTIVE QUESTIONS :

- 1. Draw the structure of following compound
 - (i) $Na[B_3O_3(OH)_4]$
 - (ii) $Na[B_4O_5(OH)_4].8H_2O$
 - (iii) $Na_6P_6O_{18}$
 - (iv) $S_3 O_6^{-2}$
 - (v) S_3O_9
 - (vi) (CN)₂
- 2. What is the increasing order of the bond angle for the following compounds ?



- **3**. How many S S linkage present in $H_2S_nO_6$
- 4. Draw the geometry of following three molecules and explain with proper reasoning :
 - (i) $N(CH_3)_3$
 - (ii) $N(SiH_3)_3$
 - (iii) P(SiH₃)₃
- 5. The dipole moment of LiH is $1.964 \text{ Y} 10^{-29} \text{ CM}$ and the intermolecular distance between Li and H in this molecule is 1.596 E. What is percent ionic character in molecule ?
- 6. The dipole moment of KCl is 3.336 Y 10⁻²⁹ coulomb metre which indicates that it is a highly polar molecule. The interatomic distance between K⁺ and Cl⁻ in this molecule is 2.6 Y 10⁻¹⁰ m. Calculate the dipole moment of KCl molecule, if these were opposite charges of one fundamental unit located at each nucleus. Calculate percentage ionic charcter of KCl.
- 7. Assuming covalent radii to be additive property ; calculate the iodine iodine distance in o-, m-, p- diiodobenzene. The benzene ring is regular hexagon and each C - I bond lies on a line passing through the centre of hexagon. The C - C bond length C₆H₆ are 1.40 E and covalent radius of iodine and carbon atom are 1.33 E and 0.77 E. Also neglect different overlapping effect.
- Assuming that all the four valency of carbon atom in propane pointing towards the corners of a regular tetrahedron. Calculate the distance between the terminal carbon atoms in propane. Given, C C single bond length is 1.54 E.

CONCEPTUA	L SUBJECTIVE EXERCISE	ANS	SWER KEY	EXERCISE -4(B)
5.	76.82%	6.	4.165 Ч 10 ⁻²⁹ coulomb metre.	
7.	3.50 E, 6.06 E, 7.0 E	8.	2.514 Е	

Ε

EXERCISE-05[A]

Е-

PREVIOUS YEARS QUESTIONS

1.	In which of the following	g species is the underlined ca	arbon having sp ³ - hybridisat	ion ? [AIEEE 2002]
	(1) CH ₃ - <u>C</u> OOH	(2) CH ₃ <u>C</u> H ₂ OH	(3) CH ₃ <u>C</u> OCH ₃	$(4) \operatorname{CH}_2 = \underline{C} H - C H_3$
2.	Which of the following s	tatements is true ?		[AIEEE 2002]
	(1) HF is less polar than	HBr		
	(2) Water does not conta	in any ions		
	(3) Chemical bond form	ation takes place when force	es of attraction overcome th	e forces of repulsion
0	(4) In covalent bond, tra	nsfer of electrons takes plac		
3.	A square planar comple	x is formed by hybridisation	of which atomic orbital ?	[AIEEE 2002]
	(1) s, $p_{x}^{}$, $p_{y}^{}$, $d_{yz}^{}$	(2) $s, p_x, p_y, d_{x^2-y^2}$	(3) s, p_x, p_y, d_{z^2}	(4) s, $p_x p_y$, d_{xy}
4.	The reason for double h	elical structure of DNA is op	peration of :	[AIEEE 03]
	(1) dipole-dipole interact	tion	(2) hydrogen bonding	
	(3) electrostatic attractio	ns	(4) vander Walls' forces	
5.	Which one of the follow	ing pairs of molecules will ha	ave permanent dipole mom	ents for both members
				[AIEEE 03]
-	(1) NO_2 and CO_2	(2) NO_2 and O_3	(3) SiF ₄ and CO ₂	(4) SiF_4 and NO_2
6.	The pair of species havi $(1) X_{e} F = C O$	ng identical shapes for mole (2) BF PCI	cules of both species is	[AIEEE 03]
7.	The correct order of be	angles (smallest first) in	H_2S , NH_3 , BF_3 and SiH_4	$(+) OI_4, OI_4$ is :- [AIEEE-2004]
	(1) $H_2S < NH_3 < SiH_4$	< BF ₃	(2) $NH_3 < H_2S < SiH_4$	$_{4} < BF_{3}$
	(3) $H_2S < SiH_4 < NH$	₃ < BF ₃	(4) $H_2S < NH_3 < BF_3 <$	< SiH ₄
8.	The bond order in NO i	is 2.5 while that in NO^+ is 3	3. Which of the following st	tatements is true for these two
	species ?			[AIEEE-2004]
	(1) Bond length in NO+ is	s equal to that in NO	(2) Bond length in NO is g	greater than in NO+
	(3) Bond length in NO ⁻	+ is greater than in NO	(4) Bond length is unpre	edictable
9.	The states of hybridizat	ion of boron and oxygen a	atoms in boric acid (H ₃ BO ₃	a) are respectively
				[AIEEE-2004]
10	(1) sp ³ and sp ²	(2) sp^2 and sp^3	(3) sp^2 and sp^2	(4) sp ³ and sp ³
10.	Which one of the follo	wing has the regular tetrah	edral structure ?	[AIEEE-2004]
	(1) BF ₄ ⁻	(2) SF ₄	(3) XeF ₄	(4) [Ni(CN) ₄] ^{2–}
	(Atomic nos.: $B = 5$, S	6 = 16, Ni = 28, Xe = 54	ł)	
11.	The maximum number	of 90° angles between bo	nd pair-bond pair of electr	ons is observed in :-
				[AIEEE-2004]
	(1) dsp ² hybridization	(2) sp ³ d hybridization	(3) dsp ³ hybridization	(4) sp ³ d ² hybridization
12.	Beryllium and aluminium	m exhibit many properties	which are similar. But, the	e two elements differ in
	(1) Forming covalent ha	alides	(2) Forming polymeric h	ydrides [AIEEE-2004]
	(3) Exhibiting maximum	n covalency in compounds	(4) Exhibiting amphoteri	c nature in their oxides

13.	Which one of the following species is diamagnetic in nature ?						
	(1) He_{2}^{+}	(2) H ₂	(3) H ₂ ⁺	(4) H ₂ ⁻			
14.	lattice energy of an ionic	compound depends upon			[AIEEE-2005]		
	(1) charge on the ion only		(2) size of the ion only				
	(3) packing of the ion only	J	(4) charge and size of the	ion			
15.	The molecular shapes of S	SF_4 , CF_4 and XeF_4 are					
	(1) the same with 2, 0 and	d 1 lone pair of electrons or	n the central atom, respeci	tvely	[AIEEE-2005]		
	(2) the same with 1, 1 and	d 1 lone pair of electrons or	n the central atoms, respec	tively			
	(3) different with $0, 1$ and	l 2 lone pair of electrons on	the central atoms, respect	ively			
	(4) different with $1, 0$ and	l 2 lone pair of electrons on	the central atoms, respect	ively			
16.	Of the following sets whic	h one does not contain isoe	lectronic species ?		[AIEEE-2005]		
	(1) PO_4^{3-} , SO_4^{2-} , ClO_4^{-}		(2) CN ⁻ , N ₂ , C ₂ ²⁻				
	(3) SO ₃ ²⁻ , CO ₃ ²⁻ , NO ₃ ⁻		(4) BO_3^{3-} , CO_3^{2-} , NO_3^{-}				
17.	Which of the following mo	olecules\ions does not conta	ain unpaired electrons?		[AIEEE-2006]		
	(1) N_2^+	(2) O ₂	(3) O_2^{2-}	(4) B ₂			
18.	Among the following mix	tures, dipole-dipole as the m	najor interaction, is present	in	[AIEEE-2006]		
	(1) KCl and water		(2) benzene and carbon te	etrachloride			
	(3) benzene and ethanol		(4) acetonitrile and acetor	ne			
19.	A metal, M forms chlorid chlorides is correct?	es in its +2 and +4 oxidation	on states. Which of the foll	owing statemen	nts about these [AIEEE-2006]		
	(1) MCl_2 is more ionic than	n MCl ₄	(2) MCl ₂ is more easily hy	drolysed than M	1Cl ₄		
	(3) MCl_2 is more volatile the	nan MCl ₄	(4) MCl ₂ is more soluble in	n anhydrous eth	anol than MCl_4		
20.	In which of the following	molecules/ions are all the b	onds not equal?		[AIEEE-2006]		
	(1) XeF ₄	(2) BF ₄	(3) SF ₄	(4) SiF ₄			
21.	The decreasing values of b to	oond angles from NH ₃ (106°	°) to SbH ₃ (91°) down group	-15 of the perio	odic table is due [AIEEE-2006]		
	(1) decreasing lp – bp re	epulsion	(2) increasing electronega	ativity			
	(3) increasing bp – bp re	epulsion	(4) increasing p-orbital cl	naracter in sp ³			
22.	In which of the following changed	ionizion processes, the bo	nd order has increased and	d the magnetic	behaviour has [AIEEE-2007]		

(1) $NO \rightarrow NO^+$ (2) $O_2 \rightarrow O_2^+$ (3) $N_2 \rightarrow N_2^+$ (4) $C_2 \rightarrow C_2^+$

23.	Which of the following hydrogen bonds is the strongest [AIEE									(AIEEE	-2007]						
	(1)]	F–H	F		(2)	О–Н	O		(3) O–H.	F		(4	4) O–H	[N		
24.	Which of the following species exhibits the diamagnetic behaviour [AIEEE-200									-2007]							
	(1)	O_2^+			(2)	O ₂			(3) NO			(4	4) O ₂ ²⁻			
25.	The the	e charg increa	e/size sing or	ratio of rder of	a catio the po	on deter larizing	mines 3 powe	its pola r of the	rizing p catior	oower. nic spe	Which cies, K	one of +, Ca+2	the foll ² , Mg+ ²	owing ² , Be ⁺²	sequen	ces rep [AIEEE	resents -2007]
	(1)	Be+2 <	: K+ <	Ca+2 <	: Mg+2				(2) K+ <	Ca+2 <	< Mg+2	² < Be	+2			
	(3)	Ca+2 <	: Mg+2	< Be+2	$^{2} < K^{+}$				(4) Mg+2	< Be	$+2 < K^+$	<ca+2< th=""><th></th><th></th><th></th><th></th></ca+2<>				
26.	Usi	ng MC) theor	ry pred	ict whi	ch of t	he follo	owing s	species	s has th	ne shoi	rtest bo	nd len	gth?		(AIEEE	-2009]
	(1)	O_2^-			(2)	O_2^{2-}			(3) O_2^{2+}			(4	4) O ₂ ⁺			
27.	The (1)	e hybri sp, sp	disatio ³ , sp ²	n of or	bitals (2)	of N at sp ² , s	om in p ³ , sp	NO_3^- ,	NO2 ⁺ a (3	nd NH) sp, sj	H_4^+ are p^2 , sp^3	respec	tively:- (4	4) sp ² ,	sp, sp	AIEEE	-2011]
28.	The	e struct	ture of	IF ₇ is	:-				(0)			• .				(AIEEE	-2011]
	(1) (3)	octahe	edral	nid					(2 (4) penta) trigor	agonal agl hin	bipyra uramid	mid				
29.	(0) Am	ong th	ne follo	wing t	he ma:	kimum	covale	nt chai	racter	is show	vn by t	he con	npound	1 :-		(AIEEE	-2011]
	(1)	AlCl ₃			(2)	MgCl ₂	2		(3) FeCl ₂	2		(4	4) SnC	l_2		
30.	Wh	ich of	the fo	ollowing	g has r	naximı	ım nur	nber o	f lone	pairs a	associa	ited wi	th Xe	? • • • •	[A	IEEE-20)11]
31	(1). The	XeO ₃ 2 numl	her of	tunes	(2) of bon	XeF ₄ ds hetu	veen ti	vo car	(J hon at) XeF ₆ oms in	calciu	ım carl	4) Nide is	4) XeF ₂ 	2 [AIFF	F-2005	20111
01.	(1)	One si	gma, t	two pi	(2)	One s	sigma,	one pi	(3) Two	sigma,	one p	i (4	1) Two	sigma	, two <u>p</u>	, 2011 ,
32. 33.	Ort (1) (2) (3) (4) Iror	ho-Nit Melting o-Nitr o-Nitr o-Nitro	ropher g poin ophen ophen ophen ophen	nol is le t of o– ol is m ol show ol show 2 and +	ess solu Nitrop ore vo vs Intra vs Inter 3 oxic	uble in henol i latile ir umolect rmolect lation s	water s lowe: 1 stean 1lar H- 1lar H- states.	than p r than - than -bondir -bondir Which	– and those of those of ng of the	m– Nit of m– a of m– follow	trophe and p- and p- ving sta	nols be · isome · isome atemen	ecause rs ers ts abou	:- ut iron	IAIEEE	-2005, prrect	2012]
	(1)	Forrow	is com	nounde	are n	ore es	cilu bu	droluce	d than	the c	orracio	onding	forric	compo	unde	[AIEEE	-2012]
	(1)	Ferrou	is com	e is me	ore has	sic in n	ature t	han th	e ferri	n ne co	sriespo	Juning	IGITIC (compo	unus.		
	(2)	Ferrou	is com	pounds	s are re	elativel	, more	ionic	than th	ne corr	respon	ding fei	rric coi	mpoun	ıds.		
	(4)	Ferrou	is com	pounds	s are le	ess vola	, itile tha	an the	corres	pondin	g ferri	c comp	ounds				
34.	The	e mole	cule ha	aving s	mallest	t bond	angle	is :-								[AIEEE	-2012]
25	(1)	PCl ₃	- f 41	f . 11	(2)	NCl ₃			(3) AsCl ₃	3	r	(4	4) SbC	l_3		00101
35.	(1)	AlF_6^{3-}	and SF		ng pan (2)	CO_3^{2-}	and N	O_3^-	е пог (З) PCl_4^+	and S	r iCl ₄	(4	4) PF ₅	and Bi	iaieee :F ₅	-2012]
PR	REVI	IOUS	SYE/	AR Q	UES	TION	S	СН	EMI		BON	DING	•	EXE	RCIS	SE-0	5(A)
Q.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Α.	2	3	2	2	2	1	1	2	3	1	4	3	2	4	4	3	3
$\left 0 \right $	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34

	Α.	4
	Q.	35
	Α.	4
E		

EXERCISE-05[B]

PREVIOUS YEARS QUESTIONS

Choose	e the correct alter-native	(only one correct answ	ver).		
1.	The geometry & the type	of hybrid orbitals present	about the central atom in	BF_3 is : [JE]	E '98]
	(A) linear, sp	(B) trigonal planar, sp^2	(C) tetrahedral, sp^3	(D) pyramidal, sp ³	
2.	The correct order of increa	sing C–O bond length of,	CO, CO_3^{2-} , CO_2 is	[JE	E '99]
	(A) $CO_3^{2-} < CO_2 < CO$	(B) $CO_2 < CO_3^{2-} < CO$	(C) CO < CO_3^{2-} < CO_2	(D) $CO < CO_2 < CO_2$	O_{3}^{2-}
3.	In the dichromate anion			[JE	E '99]
	(A) 4Cr – O bonds are equ	ivalent			
	(B) 6Cr – O bonds are equ	ivalent			
	(C) all Cr – O bonds are eq	quivalent			
	(D) all Cr – O bonds are no	on equivalent			
4.	The geometry of $\mathrm{H_2S}$ and	its dipole moment are		[JE	E '99]
	(A) angular & non zero	(B) angular & zero	(C) linear & non zero	(D) linear & zero	
5.	In compounds type ECl_3 , w	where $E = B$, P, As or Bi,	the angles $Cl - E - CI$ for	different E are in the	e order F. '991
	(A) $B > P = As = Bi$	(B) B > P > As > Bi	(C) $B < P = As = Bi$	(D) $B < P < As < F$	
6.	The most likely representat	tion of resonance structure	e of p-nitrophenoxide is:	JE	E '991
	The most moly representation				,
	(A)	(B) [
	O^{-}	Ö	$\dot{\mathrm{O}}^-$	Ö [–]	
7.	Amongst H_2O , H_2S , H_2Se	and H_2 Te, the one with t	he highest boiling point is	[JEE	2000]
	(A) H_2O because of hydrog	en bonding	(B) H ₂ Te because of high	ner molecular weight	
	(C) H_2S because of hydroge	en bonding	(D) H_2 Se because of low	er molecular weight	
8.	The hybridization of atomic	c orbitals of nitrogen in N	$O_2^{\scriptscriptstyle +},NO_3^{\scriptscriptstyle -}$ and $NH_4^{\scriptscriptstyle +}$ are	[JEE	2000]
	(A) sp^2 , sp^3 and sp^2 respectively.	tively	(B) sp, sp^2 and sp^3 respe	ectively	
	(C) sp^2 , sp , and sp^3 respectively.	tively	(D) sp ² , sp ³ and sp respe	ectively	
9.	The correct order of hybrid	lization of the central ator	n in the following species i	NH_3 , $PtCl_4^{-2}$, PCl_5 and	d BCl ₃
	is			[JEE	2001]
	(A) dsp ² , sp ³ d, sp ² and sp ³		(B) sp^3 , dsp^2 , sp^3d , sp^2		
1.0	(C) dsp^2 , sp^2 , sp^3 , sp^3d		(D) dsp^2 , sp^3 , sp^2 , sp^3d		00011
10.	The common features amo	ing the species CN ⁻ , CO a	and NO ⁺ are	[JEE	2001]
	(A) Bond order three and is	soelectronic			
	(B) Bond other three and v	veak field ligands			
	(C) Bond order two and π -	facteptors			
11	(D) Isoelectronic and weak	neid ligands			20021
11.	Specify hybridization of N	and D atoms in a $1:1$ co	(\mathbf{R}) N , purpose idal (\mathbf{r}_3^3)	[JEE 2. nurramidal an ³	2002j
	(A) \mathbf{N} : lettaneoral, sp; B	: lettatieutal, sp p_{abar}	(D) N : pyramidal sp^3	\mathbf{p} : pyramudal, sp \mathbf{R} , totrahadrah an ³	
	(C) $(N : pyramual, sp ; D :$	קצ, זמוזמון	יו נים : pyrainiuai, sp ; f	s : retraileural, sp	

12.	The nodal plane in t	he π -bond of ethene is loc	ated in		[JEE 2002]			
	(A) the molecular pla	ine						
	(B) a plane parallel t	o the molecular plane						
	(C) a plane perpendicu	ular to the molecular plane w	hich bisects, the carbon-carbo	on a bond at right	angle.			
	(D) a plane perpendi	cular to the molecular plan	ne which contains, the cart	oon-carbon bond				
13.	Identify the least stab	le ion amongst the followi	ng :		[JEE 2002]			
	(A) Li [−]	(B) Be ⁻	(C) B ⁻	(D) C ⁻				
14.	Which of the followir	ng molecular species has u	npaired electron(s) ?		[JEE 2002]			
	(A) N ₂	(B) F ₂	(C) O_2^-	(D) O_2^{2-}				
15.	Which of the followir	ng are isoelectronic and iso	ostructural ?		[JEE 2003]			
		NO ₃ ⁻ . CO ₃ ²⁻ , ClO ₃ ⁻	, SO ₃					
	(A) NO ₃ ⁻ , CO ₃ ²⁻	(B) SO ₃ , NO ₃ ⁻	(C) ClO ₃ ⁻ , CO ₃ ²⁻	(D) CO ₃ ^{2–} ,	SO ₃			
16.	According to molecul	ar orbital theory which of th	ne following statement about	the magnetic ch	aracter and bond			
	order is correct rega	rding O_2^+			[JEE 2004]			
	(A) Paramagnetic and	d Bond order < O_2	(B) Paramagnetic ar	nd Bond order >	• O ₂			
	(C) Diamagnetic and	Bond order $< O_2$	(D) Diamagnetic and	d Bond order >	O_2			
17.	Which species has th	e maximum number of lo	ne pair of electrons on the	central atom?				
	(A) ClO_3^-	(B) XeF ₄	(C) SF ₄	(D) I ₃ ⁻	[JEE 2005]			
18.	The percentage of p	-character in the orbitals fo	orming P–P bonds in ${\rm P}_4$ is					
	(A) 25	(B) 33	(C) 50	(D) 75				
19.	Among the following	, the paramagnetic compo	ound is		[JEE 2007]			
	(A) Na ₂ O ₂	(B) O ₃	(C) N ₂ O	(D) KO ₂				
20.	The species having b	oond order different from t	hat in CO is		[JEE 2007]			
	(A) NO [_]	(B) NO ⁺	(C) CN⁻	(D) N ₂				
21.	The structure of XeC	D_3 is			[JEE 2007]			
	(A) linear	(B) planar	(C) pyramidal	(D) T-shap	bed			
22.	Statement-1 : p-Hyd	roxybenzoic acid has a lov	wer boiling point than o-hy	droxybenzoic ac	id.			
	and				[JEE 2007]			
	Statement-2 : o-Hyd	roxybenzoic acid has intra	amolecular hydrogen bondi	ng.				
	(A) Statement-1 is True	e, Statement-2 is True; Staten	nent-2 is a correct explanation	for Statement-1.				
	(B) Statement-1 is True	, Statement-2 is True; Statem	nent-2 is NOT a correct explar	nation for Stateme	nt-1.			
	(C) Statement-1 is Tr	rue, Statement-2 is False.						
	(D) Statement-1 is Fa	alse, Statement-2 is True.						
23.	Statement-1 : In wat	ter, orthoboric acid behave	es as a weak monobasic a	cid.	[JEE 2007]			
	and							
	Statement-2 : In wat	ter, orthoboric, acid acts a	as a proton donor.					
	(A) Statement-1 is True	e, Statement-2 is True; Staten	nent-2 is a correct explanation	for Statement-1.				
	(B) Statement-1 is True	e, Statement-2 is True; Staten	nent-2 is NOT a correct expla	nation for Stateme	ent-1.			
	(C) Statement-1 is Tr	rue, Statement-2 is False.						
	(D) Statement-1 is False, Statement-2 is True.							

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24.	Statement-1 : Pb ⁺⁴ compounds are stronger oxidizing agents than Sn ⁴⁺ compounds									
	and									
	Statement-2 : The higher oxidation states for the group 14 elements are more stable for the heavier members of the group due to 'inert pair effect' .									
	(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.									
	(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1.									
	(C) Statement-1 is True, Statement-2 is False.									
	(D) St	atement-1 is False,	Statement-2 is	True.						
25.	Match each of the diatomic molecules in Column I with its property / properties in Column II.									
						[JEE 2009]				
	(Column I			Column II					
	(A) I	B ₂		(P)	Paramagnetic					
	(B) N ₂		(Q)	undergoes oxidation						
	(C) (O_2^-		(R)	Undergoes reduction					
	(D) (0 ₂		(S)	Bond order ≥ 2					
				(T)	Mixing of 's' and `p' orbit	als				
26.	The n	nitrogen oxide(s) that	contain(s) N-N	l bond(s	s) is (are)		[JEE 2009]			
	(A) N ₂	20 20	(B) N ₂ O ₃		(C) N ₂ O ₄	(D) N ₂ O ₅				
27.	In the	e reaction					[JEE 2009]			
	$2X + B_2H_6 \longrightarrow [BH_2(X)_2]^+ [BH_4]^-$									
	the amine(s) X is (are)									
	(A) NI	H ₃	(B) CH ₃ NH ₂		(C) (CH ₃) ₂ NH	(D) (CH ₃) ₃ N				
28.	The s	pecies having pyram	nidal shape is				[JEE 2010]			
	(A) SC	D ₃	(B) BrF ₃		(C) SiO ₃ ²⁻	(D) OSF ₂				
29.	Assuming that Hund's rule is violated, the bond order and magnetic nature of the diatomic molecule B_2 is [JEE 2010]									
	(A) 1 and diamagnetic			(B) 0 and diamagneti	ic					
	(C) 1	and paramagnetic			(D) 0 and paramagne	(D) 0 and paramagnetic				
30	In allene (C_3H_4), the type(s) of hybridisation of the carbon atoms is (are) [JEE 2012									
	(A) sp and sp ³ (C) only sp ²				(B) sp and sp ² (D) sp ² and sp ³					
31	Which	ny sp h ordering of comp	ounds is accord	ling to	the decreasing order of th	e oxidation state	of nitrogen-			
01	(A) HNO NO NH CI N (B) HNO NO N NH CI									
	(C) HNO., NH.Cl. NO. N. (D) NO. HNO. NH.Cl. N									
32	The s	[JEE 2012]								
	(A) Tr	rigonal bipyramidal	(B) Square r	olanar	(C) tetrahedral	(D) see-saw	·			
Explai	n the	following.								
1.	Give reason carbon oxygen bond lengths in formic acid are 1.23E & 1.36 E and both the carbon oxygen									
 Sumplein the first LE of each or store is master that the thet of human store is the state of human store is store in the state of human store is the state of human store is store in the store in the store in the store is store in the store in the store in the store in the store is store in the store in th							[JEE 88]			
Z.	Expla: secon	in the first I.E. of ca d I.E.	roon atom is g	reater t	nan that of boron atom wh	ereas the reverse	IS true for the [JEE '89]			

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3.	The experimentally determined N–F bond length in NF_3 is greater than the sum of single bond co							d covalent radii	
	of N & F. Explain.							[JEE '95]	
4.	Explain the difference in the nature of bonding in LiF & LiI.							[JEE '96]	
5.	Give reasons fo	Give reasons for the following in one or two sentences only.						[JEE '99]	
	(a) $BeC1_2$ can	be easily	hydroly	ed		(b) CrO ₃ is	an acid anhydride	
Arran	ge as directed.								
1.	N_2 , O_2 , F_2 , Cl_2 in increasing order of bond dissociation energy.							[JEE '88]	
2.	CO_2 , N_2O_5 SiO ₂ , SO ₃ is the increasing order of acidic character.							[JEE '88]	
3.	HOCI, HOCIO ₂ , HOCIO ₃ , HOCIO in increasing order of thermal stability.								[JEE '88]
4.	The decreasing order of acid strength of ClOH, BrOH, IOH.							[JEE '97]	
5.	Arrange in order of increasing radii , Li ⁺ , Mg ²⁺ , K ⁺ , Al ³⁺							[JEE '97]	
6.	Arrange $BeSO_4$, $MgSO_4$, $CaSO_4$, $SrSO_4$ in order of decreasing thermal stability.							[JEE '97]	
7.	Decreasing order of the O-O bond length present in them						[JEE 2004]		
	O_2 , KO_2 and O_2 [AsF ₄]								
Subje	ctive								
1.	The number of water molecule(s) directly bonded to the metal centre in $CuSO_a.5H_2O$ is							[JEE 2009]	
2.	Based on VSEPR theory, the number of 90 degree F–Br–F angles in BrF ₅ is							[JEE 2010]	
3.	The value of n in the molecular formula $Be_nAl_2Si_6O_{18}$ is							[JEE 2010]	
4.	The total number of diprotic acids among the following is							[JEE 2010]	
	H ₃ PO ₄	H_2SO_4		H ₃ PO ₃		H ₂ CC)	$H_2S_2O_7$	
	H ₃ BO ₃	H_3PO_2	Н	$_{2}$ CrO ₄		H_2SO	3		
5.	Among the follo	owing, the	e numbe	r of eler	nents sł	nowing	only one 1	non-zero oxidation state is	[JEE 2010]
	O, Cl,	F,	N,	P,	Sn,	Tl,	Na,	Ti	
6.	The difference	in the o	kidation	number	s of the	e two ty	pes of su	Iphur atoms in $Na_2S_4O_6$ i	is.[JEE 2011]

PRI	EVIOUS YEARS	5 QUESTIONS		ANSWER K	ΈΥ		EXERCISE-5 [B]				
	1 . (B)	2 . (D)	3. (B)	4 . (A)	5. (B)	6 . (A)	7. (A)				
	8. (B)	9. (B)	10. (A)	11 . (A)	12 . (A)	13 . (B)	14. (C)				
	15. (A)	16. (B)	17 . (D)	18. (D)	19. (D)	20. (A)	21. (C)				
	22. (D)	23. (C)	24 . (C)								
	25. (A) \rightarrow P,Q,R,T ; B \rightarrow Q,R,S,T ; (C) \rightarrow P,Q,R ; (D) \rightarrow P,Q,R,S										
	26. A,B,C	27 . B,C	28. (D)	29 . (A)	30 . (B)	31 . (B)	32. (D)				
•	• <u>Arrange as directed :</u>										
	1. $F_2 < Cl_2$	$< O_2 < N_2$		2 . SiO ₂ < C	2. $SiO_2 < CO_2 < N_2O_5 < SO_3$						
	3. HOCl <	$HClO_2 < HCl$	$O_3 < HClO_4$	4. HOCl >	4. HOCl $>$ HOBr $>$ HOI						
	5. $Al^{3+} < M$	$g^{2+} < Li^+ < K$	+	6 . SrSO ₄ >	6. $SrSO_4 > CaSO_4 > MgSO_4 > BeSO_4$						
	7. $\text{KO}_2 > \text{O}_2 > \text{O}_2$ [AsF ₄]										
•	<u>Subjective</u>	e Questior	<u>15</u>								
	1 . 4	2. 0	3. 3	4 . 6	5 . 2	6. 5					

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