



# CHEMISTRY

## BOOKS - A2Z CHEMISTRY (HINGLISH)

# CHEMICAL BONDING AND MOLECULAR STRUCTURE

Lattice Energy, Ionic, Covalent And Coordinate  
Bonds

1.  $NO_2$  and  $N_2O_4$  are two forms of nitrogen dioxide. One exists in gaseous state while other

in liquid state. The nature of  $NO_2$  and  $N_2O_4$  forms are

A. both are paramagnetic

B. both are diamagnetic

C.  $NO_2$  is paramagnetic while  $N_2O_4$  is diamagnetic

D.  $NO_2$  is diamagnetic while  $N_2O_4$  is paramagnetic

**Answer: C**



**Watch Video Solution**

2. Which among the following elements has the tendency to form covalent compounds?

A. Ba

B. Be

C. Mg

D. Ca

**Answer: b**



**Watch Video Solution**

3. Among  $KO_2$ ,  $AlO_2^-$ ,  $BaO_2$  and  $NO_2^+$  unpaired electron is present in :

A.  $NO_2^+$  and  $BaO_2$

B.  $KO_2$  and  $AlO_2^-$

C.  $KO_2$  only

D.  $BaO_2$  only

**Answer: c**



**Watch Video Solution**



4. The strongest bond is

A.  $Na - Cl$

B.  $Cs - Cl$

C. both (a) and (b)

D. None

**Answer: A**



**Watch Video Solution**

5. The valency of C in  $CO_3^{2-}$  is

A. 2

B. 3

C. 4

D. -3

**Answer: C**



**Watch Video Solution**

**6. Which combination will give the strongest ionic bond?**

A.  $Na^+$  and  $Cl^-$

B.  $Mg^{2+}$  and  $Cl^-$

C.  $Na^+$  and  $O^{2-}$

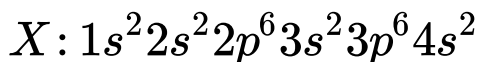
D.  $Mg^{2+}$  and  $O^{2-}$

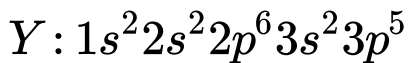
**Answer: D**



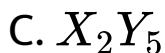
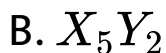
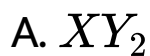
**Watch Video Solution**

7. Two elements  $X$  and  $Y$  have following electronic configurations.





The expected compound formed by combination of X and Y will be expressed as

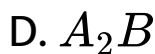
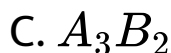
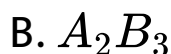
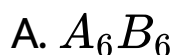


**Answer: A**



**Watch Video Solution**

8. An atom of an element  $A$  has three electron in its outer shell and  $B$  has six electron in outermost shell. The formula of the compound formed between these two will be



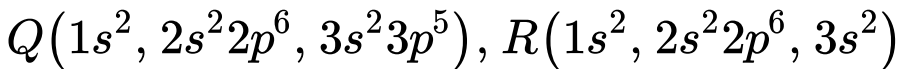
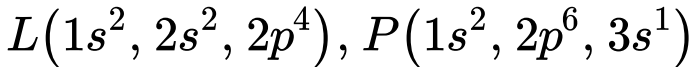
**Answer: B**



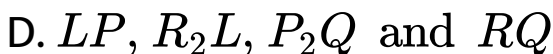
**Watch Video Solution**

9. The electronic configuration of four elements

$L$ ,  $P$ ,  $Q$  and  $R$  are given in brackets



The formula of ionic compounds that can be formed between elements are



**Answer: C**



**Watch Video Solution**

**10.** The electronic structure of four elements *A, B, C, D* are

(a)  $1s^2$  (b)  $1s^2, 2s^2, 2p^2$

(c)  $1s^2, 2s^2, 2p^5$  (d)  $1s^2, 2s^2 2p^6$

The tendency to form electrovalent bond is largest in

A. A

B. B

C. C

D. D

**Answer: C**

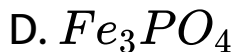
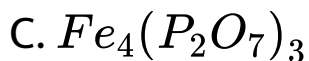
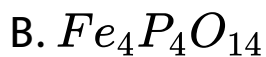


**Watch Video Solution**

11. Chemical formula for calcium pyrophosphate is  $Ca_2P_2O_7$ . The formula for ferric pyrophosphate will be

A.  $Fe_3(P_2O_7)_3$





**Answer: C**



**Watch Video Solution**

**12.** Out of the following which compound will have electrovalent bonding

A. Ammonia

B. Water

C. Calcium chloride

D. Chloromethane

**Answer: C**



**Watch Video Solution**

13. For  $NaCl$ , lattice energy  
=  $-186kcal/mol$ , the solvation energy of  
 $Na^+$  and  $Cl$  are  $-97$  and  $-85kcal/mole$   
respectively. Therefore for  $NaCl(s)$

A. enthalpy of solution is exothermic and  
magnitude equal to  $4kcal / mol$

B. enthalpy of solution is exothermic and  
magnitude equal to  $4368kcal / mol$

C. enthalpy of solution is endothermic and  
magnitude equal to  $4kcal / mol$

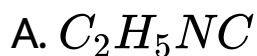
D. enthalpy of solution is endothermic and  
magnitude equal to  $368kcal / mol$

**Answer: C**



**Watch Video Solution**

14. The compound which contains both covalent and coordinate bond is



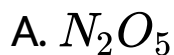
D. None of these

**Answer: A**



**Watch Video Solution**

15. Which of the following contains a coordinate covalent

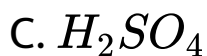


**Answer: A**



**Watch Video Solution**

16. The compound containing coordinate bond is



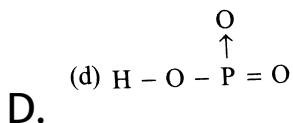
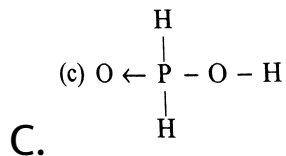
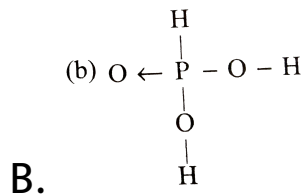
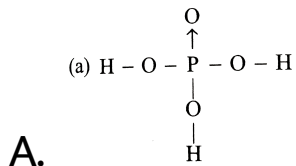
D. All of these

**Answer: D**



**Watch Video Solution**

17. The structure of orthophosphoric acid is

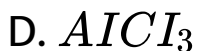


**Answer: A**



**Watch Video Solution**

18. Which of the following have both polar and non-polar bonds?



**Answer: b**



**Watch Video Solution**



**19.** Blue vitriol has

- A. Ionic bond
- B. Coordinate bond
- C. Hydrogen bond
- D. All the above

**Answer: D**



**Watch Video Solution**

20. The number of ionic, covalent and coordinate bonds in  $NH_4Cl$  are respectively

A. 1,3 and 1

B. 1,3 and 2

C. 1,2 and 3

D. 1,1 and 3

**Answer: A**



**Watch Video Solution**

21. The bonds present in  $N_2O_3(g)$  are

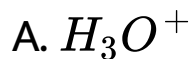
- A. only ionic
- B. covalent and coordinate
- C. only covalent
- D. covalent and ionic

**Answer: b**



**Watch Video Solution**

22. Which of the following does not contain a coordinate bond?



**Answer: c**



**Watch Video Solution**

**23.** Lattice energy of an ionic compound depends upon :

A. Charge on the ions only

B. Size of the ions only

C. Packing of the ions only

D. Charge and size of the ions

**Answer: D**



**Watch Video Solution**

# Formal Charge, Resonance And Polarity Of Covalent Bond (Fajans Rule)

1. In the cyanide ion, the formal negative charge is on :

A. C

B. N

C. Both C and N

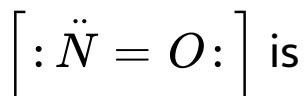
D. Resonate between C and N

**Answer: B**



Watch Video Solution

2. The formal charge of the O-atom in the ion



A. -2

B. +1

C. -1

D. 0

**Answer: D**



Watch Video Solution

3. Which of the following is insoluble in water

A.  $\text{AgF}$

B.  $\text{AgI}$

C.  $\text{KBr}$

D.  $\text{CaCl}_2$

**Answer: B**



**Watch Video Solution**



4. A compound with the maximum ionic character is formed from

A.  $Na$  and  $F$

B.  $Cs$  and  $F$

C.  $Cs$  and  $I$

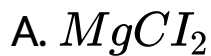
D.  $Na$  and  $Cl$

**Answer: B**



**Watch Video Solution**

5. Which of the following has the highest ionic character?



**Answer: C**



**Watch Video Solution**

6. Which of the following compounds has the maximum nature?

A.  $LiCl$

B.  $NaCl$

C.  $KCl$

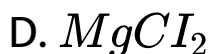
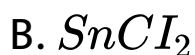
D.  $CsCl$

**Answer: A**



**Watch Video Solution**

7. Among the following the maximum covalent character is shown by the compound

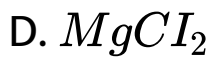
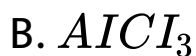


**Answer: C**



**Watch Video Solution**

8. Which of the following has covalent bond



**Answer: B**



**Watch Video Solution**

9. Polarization is the distortion of the anion by an adjacently placed cation. Which of the following statement is correct?

A. Maximum polarization is brought about by a cation of high charge

B. Maximum polarization is brought about by a cation of low radius

C. A large cation is linkely to bring about a large degree of pollarization

D. A small anion is likely to undergo a large degree of polarization

**Answer: A**



**Watch Video Solution**

**10.** Maximum covalent character is associated with the compound

A.  $NaI$

B.  $MgI_2$

C.  $AlCl_3$

D.  $AlI_3$

**Answer: D**



**Watch Video Solution**

11. Among  $LiCl$ ,  $RbCl$ ,  $BeCl_2$  and  $MgCl_2$  the compound with the greatest and least ionic character respectively are

A.  $LiCl$  and  $RbCl$

B.  $RbCl$  and  $BeCl_2$



C.  $RbCl$  and  $MgCl_2$

D.  $MgCl_2$  and  $BeCl_2$

**Answer: B**



**Watch Video Solution**

12.  $LiF$  is the least soluble among the fluorides of alkali metals, because

A. smaller size  $Li$  imparts significant covalent character in  $LiF$

- B. the hydration energies of  $Li^+$  and  $F^-$  are quite higher
- C. lattice energy of  $LiF$  is quite higher due to the smaller size of  $Li^+$  and  $F^-$
- D.  $LiF$  has strong polymeric network in solid

**Answer: C**



**Watch Video Solution**

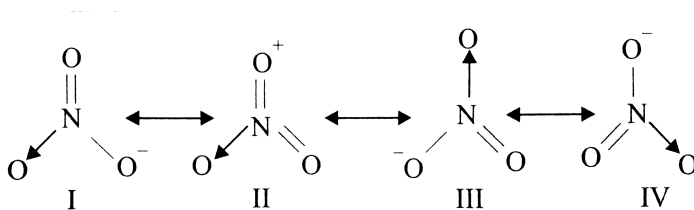
13.  $SaCl_4$  is a covalent liquid because

- A. electron clouds of the  $Cl^-$  ions are weakly polarized to envelop the cation
- B. electron clouds of the  $Cl^-$  ions are strongly polarized to envelop the cation
- C. its molecules are attracted to one another by strong van der Waals forces
- D. So shown inert pair effect

**Answer: B**



14. Which of the following Lewis structure does not contribute in resonance?



A. I

B. II

C. III

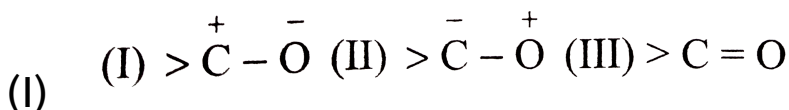
D. IV

**Answer: B**

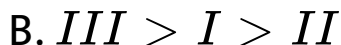


**Watch Video Solution**

15. Carbonyl group has following resonating structures



The correct order of stability of these structures is



C.  $I > III > II$

D.  $III > II > I$

**Answer: B**



**Watch Video Solution**

**16.** Point out incorrect statement about resonance

A. Resonance structures, should have equal energy

B. In resonance structures, the constituent atoms should be in the same position

C. In resonance structures, there should not be the same number of the electron pairs

D. Resonance structures, should differ only in the location of electron around the constituent atoms.

**Answer: C**



**Watch Video Solution**

17. In compound  $O_2SC(NH_2)_2$ . The geometry around the  $S$ ,  $N$  and number of resonating structure are respectively

A. trigonal planar, trigonal pyramidal and three

B. tetrahedral pyramidal and two

C. trigonal planar, tetrahedral and three

D. linear pyramidal and three

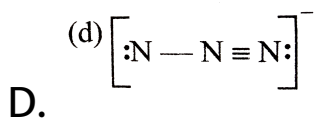
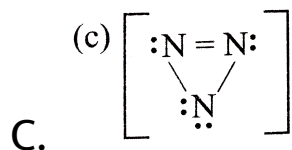
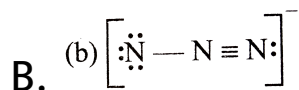
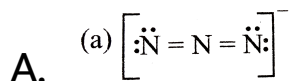
**Answer: A**



**Watch Video Solution**



18. Which of the following is the most acceptable resonating structure of  $N_3^-$ ?

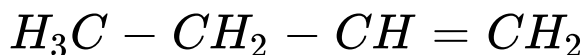
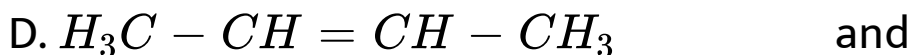
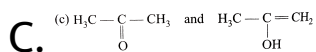
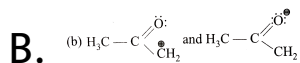
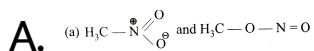


**Answer: C**



**Watch Video Solution**

19. Which of the following pair constitute resonance structure?



Answer: b



Watch Video Solution

20. Which of the following statement about resonance energy is wrong?

A. The difference in energy of the resonance hybrid and the most stable contributing structure (having least energy) is called resonance energy

B. The difference in energy of the resonance hybrid and the most stable contributing

structure (having higher energy) is called  
resonance energy

C. The difference in energy of the  
experimental and calculated enthalpies  
(bond enthalpy, formation or combustion  
or hydrogenation) is called resonance  
energy

D. Resonance energy is the amount of energy  
by which the compound is stable

**Answer: b**





21. Aqueous solution of two compounds  $M_1 - O - H$  and  $M_2 - O - H$  are prepared in two different beakers . If electronegativity of  $M_1 = 3.4$ ,  $M_2 = 1.2$ ,  $O = 3.5$  and  $H = 2.1$ , then the nature of two solution will be respectively

A. Acidic, basic

B. acidic acidic

C. basic, acidic

D. basic, basic

**Answer: a**



**Watch Video Solution**

**22.** Which of the following statement (*s*) is (are) true ? .

A.  $CaCl_2$  is more covalent than  $NaCl$

B.  $HF$  is more polar than  $HBr$

C.  $HF$  is less polar than  $HBr$

D. Chemical bond formation takes place when the forces of attraction overcome the forces of repulsion

**Answer: c**



**Watch Video Solution**

**23.** In the anion  $\text{HCOO}^-$ , the carbon-oxygen bonds are found to be of equal length. This is due to :

A. The anion  $\text{HCOO}^-$  has two resonating structure

B. The anion is obtained by removal of a proton from the acid molecule

C. Electronic orbitals of carbon are hybridised

D. The  $\text{C} = \text{O}$  bond is weaker than the  $\text{C} - \text{O}$  bond

**Answer: A**



**Watch Video Solution**



24. A metal, M from chlorides in its +2 and +4 oxidation states. Which of the following statements about these chlorides is correct?

A.  $MCl_2$  is more easily hydrolysed than



B.  $MCl_2$  is more volatile than  $MCl_4$

C.  $MCl_2$  is more soluble in anhydrous



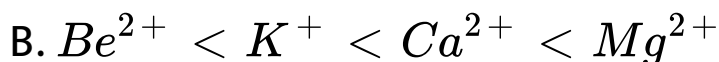
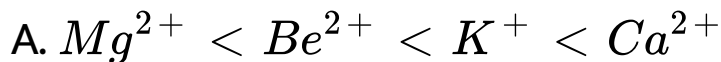
D.  $MCl_2$  is more ionic than  $MCl_4$

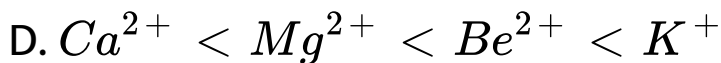
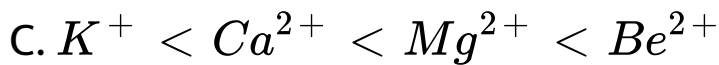
**Answer: D**



**Watch Video Solution**

**25.** The charge /size ratio of a cation determines its polarizing power. Which one of the following sequences represents the increasing order of the polarising power of the cationic species ,  $K^+$  ,  $Ca^+$  ,  $Mg^{2+}$  ,  $Be^{2+}$  ?





**Answer: C**



**Watch Video Solution**

**26.** The correct statement for the molecule  $CsI_3$  is

A. It is a covalent molecule

B. It contains  $Cs^+$  and  $I_3^-$

C. It contains  $Cs^{3+}$  and  $I^{-}$  ions

D. It contains  $Cs^{+}$ ,  $I^{-}$  and  $I_2$  molecule

**Answer: B**



**Watch Video Solution**

## Dipole Moment

1. Which pair of molecules will have permanent dipole moment for both members ?

A.  $NO_2$  and  $O_3$

B.  $SiF_4$  and  $CO_2$

C.  $SiF_4$  and  $NO_2$

D.  $NO_2$  and  $CO_2$

**Answer: A**



**Watch Video Solution**

2. The molecule which has zero dipole moment is

A.  $CH_2Cl_2$

B.  $BF_3$

C.  $NF_3$

D.  $ClO_2$

**Answer: B**



**Watch Video Solution**

3. A diatomic molecule has dipole moment of  $1.2D$ . If the bond distance is  $1\text{\AA}$  what percentage of covalent in the molecule is

A. 12% of e

B. 19 % of e

C. 25 % of e

D. 29 % of e

**Answer: C**



**Watch Video Solution**

4. The electronegativity difference between two atoms A and B is 2, then percentage of covalent character in the molecule is

A. 54 %

B. 40 %

C. 23 %

D. 72 %

**Answer: a**

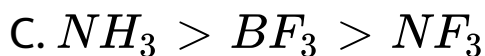


**Watch Video Solution**

5. Which one of the following arrangements of molecules is correct on the basis of their dipole moments?

A.  $BF_3 > NH_3 > NF_3$





**Answer: d**



**Watch Video Solution**

6. The electronegativity of  $H$  and  $Cl$  are 2.1 and 3.0 respectively. The correct statement ( $s$ ) about the nature of  $HCl$  is/are:

A. 17% ionic

B. 83 % ionic

C. 50 % ionic

D. 100 % ionic

**Answer: a**



**Watch Video Solution**

7. The order of increasing polarity is

*HCl*, *CO<sub>2</sub>*, *H<sub>2</sub>O* and *HF* molecules is

A. *CO<sub>2</sub>*, *HCl*, *H<sub>2</sub>O*

B.  $HF$ ,  $H_2O$ ,  $HCl$ ,  $CO_2$

C.  $CO_2$ ,  $HF$ ,  $H_2O$

D.  $CC_2$ ,  $HF$ ,  $H_2O$ ,  $HC$

**Answer: A**



**Watch Video Solution**

**8.** Out of the following which has highest dipole moment?

A. 2, 2-dimethyl propane

B. trans – 2- pentene

C. cis – 3 – hexen

D. 2, 2, 3, 3 – tertamethyl butane

**Answer: c**



**Watch Video Solution**

9. For the formation of covalent bond, the different in the value of electronegativities should be

A. Equal to or less than 1.7

B. More than 1.7

C. 1.7 or more

D. None of these

**Answer: a**



**Watch Video Solution**

**10.** Which of the following molecules will show dipole moment?

A. Methane

B. Carbon tetrachloride

C. chloroform

D. Carbon dioxide

**Answer: C**



**Watch Video Solution**

11. Which bond angle  $\theta$  would result in the maximum dipole moment for the triatomic  $YXY$ ?

A.  $\theta = 90^\circ$

B.  $\theta = 120^\circ$

C.  $\theta = 150^\circ$

D.  $\theta = 180^\circ$

**Answer: a**



**Watch Video Solution**

**12.** Carbon tetrachloride has no net dipole moment because of

A. Its planar structure

B. Its regular tetrahedral structure

C. Similar sizes of carbon and chlorine atoms

D. Similar electron affinities of carbon and chlorine

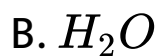
**Answer: B**



**Watch Video Solution**

**13.** Pick out of molecule which has zero dipole moment?





**Answer: C**

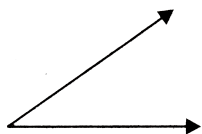


**Watch Video Solution**

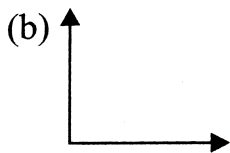
**14. Which has maximum dipole moment?**

(a)

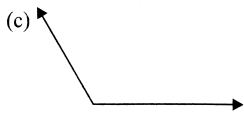
A.



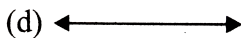
B.



C.



D.



**Answer: A**



**Watch Video Solution**

15. The dipole moment of  $HBr$  is  $1.6 \times 10^{-30} cm$  and interatomic spacing is  $1\text{\AA}$ .

The % ionic character of  $HBr$  is

A. 7

B. 10

C. 15

D. 27

**Answer: b**



**Watch Video Solution**

**16.** In a pole molecule , the ionic is  $4.8 \times 10^{-10}$  esu. If the inter distance is  $1\text{\AA}$  unit, then the dipole moment is

A. 41.8 debye

B. 4.18 debye

C. 4.8 debye

D. 0.48 debye

**Answer: C**



**Watch Video Solution**

**17.** Which of the following will have zero dipole moment?

A. 1, 1 dichloroethylene

B. cis -1, 2 dichloroethylene

C. trans -1, 2 dichloroethylene

D. None of these

**Answer: C**



**Watch Video Solution**

**18.**  $BF_3$  and  $NF_3$  both molecules, are covalent, but  $BF_3$  is non - polar and  $NF_3$  pole. Its reason is

A. In uncombined state boron is metal and nitrogen 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

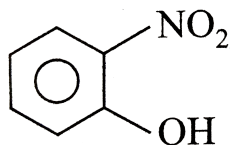
D.  $BF_3$  is planar whereas  $NF_3$  is pyramidal

**Answer: D**

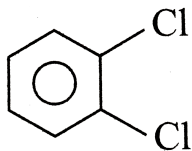


**Watch Video Solution**

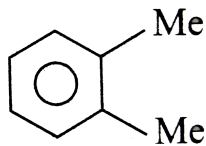
19. Which of the following is the correct order of dipole moment?



(I)



(II)



(III)

A.  $I > II > III$

B.  $II > I > III$

C.  $III > I > II$

D.  $III > II > I$

Answer: A



Watch Video Solution

20. Arrange the following compounds in order of increasing dipole moment .

Toluene (*I*) m-dichlorobenzene (*II*)

o-dichlorobenzene (*III*) . P-dichlorobenzene (*IV*) .

A. I lt IV lt II lt III

B. IV lt I lt II lt III

C. IV lt I lt III lt II

D. IV lt II lt I lt III

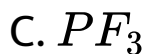
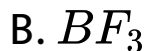
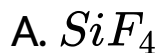


**Answer: b**



**Watch Video Solution**

**21.** Of the following molecules the one which has permanent dipole moment is:

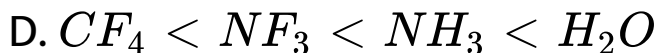
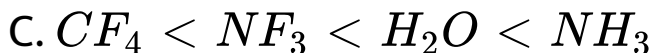
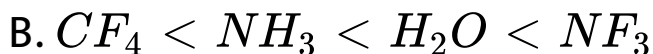
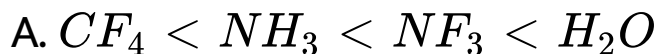


Answer: c



Watch Video Solution

22. Increasing order of dipole moment is

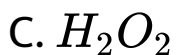


Answer: d



Watch Video Solution

23. Which contains both polar and non-polar bonds ? .

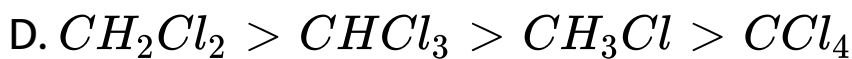
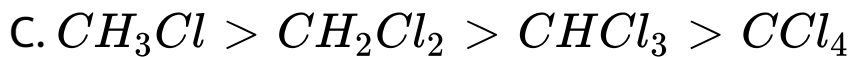
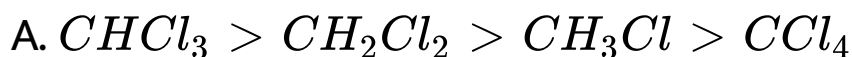


Answer: c



Watch Video Solution

24. The correct sequence of dipole moment among the chlorides of methane is



Answer: a



Watch Video Solution

25. The geometry of  $H_2S$  and its dipole moment are :

A. angular and non -zero

B. angular and zero

C. linear and non -zero

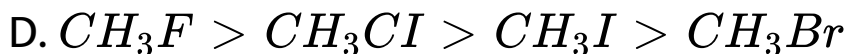
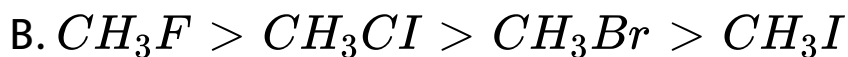
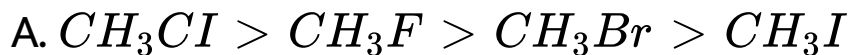
D. linear and zero

**Answer: a**



**Watch Video Solution**

26. Which of the following has been arranged in order of decreasing dipole moment?



Answer: a



Watch Video Solution

27. Which of the following has the least dipole moment?



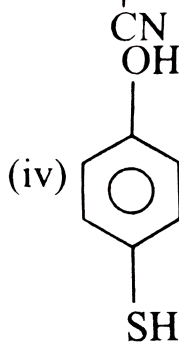
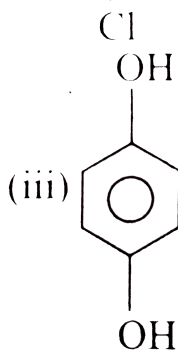
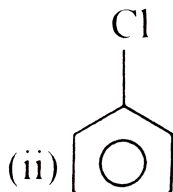
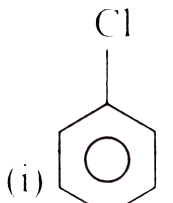
**Answer: B**



**Watch Video Solution**

28. Which of the following molecules significant

$\mu \neq 0$ ?



A. Only (i)

B. (i) and (ii)

C. Only (iii)



D. (iii) and (iv)

**Answer: D**



**Watch Video Solution**

## Valence Bond Theory (Vbt)

1.  $BF_3$  and  $NF_3$  both molecules, are covalent, but  $BF_3$  is non - polar and  $NF_3$  is polar. Its reason is

A. Boron is a solid and nitrogen is a gas in free state

B.  $BF_3$  is planar but  $NF_3$  is pyramidal in shape

C. Boron is a metalloid while nitrogen is a non-metal

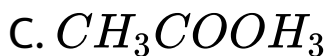
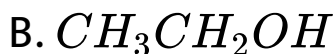
D. Atomic size of boron is smaller than that of nitrogen

**Answer: b**



**Watch Video Solution**

2. In which of the following species, is the underlined carbon has  $sp^3$ -hybridisation ?

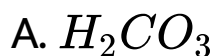


Answer: b



Watch Video Solution

3. Among the following the compounds , the one that is polar and has central atom with  $sp^2$  hybridisation is



**Answer: a**



**Watch Video Solution**

4. The bond between two identical non-metal atoms has a pair of electrons:

A. unequally shared between the two

B. transferred fully from one atom to another

C. with identical spins

D. equally shared between them

**Answer: d**



**Watch Video Solution**

5. Which of the following will provide the most efficient overlap?

A.  $s - s$

B.  $s - p$

C.  $sp^2 - sp^2$

D.  $sp - sp$

**Answer: D**



**Watch Video Solution**

6. The number and type of bonds between two carbon atoms in  $CaC_2$  are:

- A. one sigma ( $\sigma$ ) and one pi ( $\pi$ ) bonds
- B. one sigma ( $\sigma$ ) and two pi ( $\pi$ ) bonds
- C. one sigma ( $\sigma$ ) and one half pi ( $\pi$ ) bonds
- D. one sigma ( $\sigma$ ) bonds

**Answer: b**



**Watch Video Solution**

7. Which is not true according to *VBT*?

A. A covalent bond is formed by the overlapping of orbitals with unpaired electron of opposite spins

B. A covalent bond is formed by the overlapping of orbitals with unpaired electron of same spins

C. The greater the extent of overlapping the strong is the bond



D. Overlapping takes place only in the direction of maximum electron density of the orbital

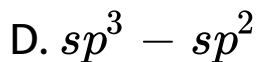
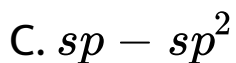
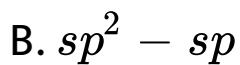
**Answer: B**



**Watch Video Solution**

8. The hybridisation of  $C$  atoms in  $(C - C)$  single-bond of  $H - C \equiv C - CH = CH_2$  is :

A.  $sp^3 - sp^3$



**Answer: b**



**Watch Video Solution**

**9. Number of sigma bonds in  $P_4O_{10}$  is :**

A. 6

B. 7

C. 17

D. 16

**Answer: D**



**Watch Video Solution**

**10.** The bond in the formation of fourine molecule will be

A. Due to  $s - s$  overlapping

B. Due to  $s - p$  overlapping

C. Due to  $p - p$  overlapping

D. Due to hybridization

**Answer: C**



**Watch Video Solution**

**11. Which of the following are wrong?**

A.  $SH_6$  and  $BiCl$  do not exist

B. There are two  $p\pi - d\pi$  bonds in  $SO_3$

C.  $SeF_4$  and  $CH_4$  are tetrahedral ion

D.  $I_3^\ominus$  is a linear molecule with  $sp^3d$

hybridization

**Answer: C**



**Watch Video Solution**

12. Which of the following overlaps gives a  $\sigma$  bond with  $x$  as internuclear axis?

A.  $p_z$  and  $p_z$

B.  $s$  and  $p_z$

C.  $s$  and  $p_x$

D.  $s$  and  $p_y$

**Answer: C**



**Watch Video Solution**

**13.** Which of the statement is correct about  $SO_2$

?

A. Two  $\sigma$  , two  $\pi$  and no lone pair of  
electrons

B. two  $\sigma$  and one  $\pi$

C. two  $\sigma$  , two  $\pi$  and one lone pair

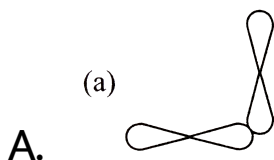
D. none of these

**Answer: C**

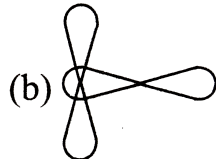


**Watch Video Solution**

**14.** Which p-orbitals overlapping would give the strongest bond?



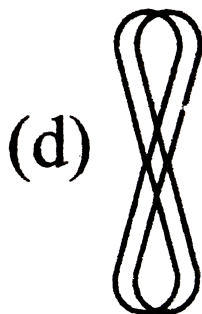
B.



C.



D.



**Answer: C**



**Watch Video Solution**

15. Ratio of  $\sigma$  and  $\pi$  bonds is maximum in



A. naphthalene

B. tetracyano methane

C. enolic form of urea

D. equal

**Answer: C**



**Watch Video Solution**

**16. Which of the following is True statement?**

A. 

B. In  $C_2H_2(CN)_2$  there are six  $\sigma$  bonds

C. In  $C_2H_6$  all  $C$  are  $sp^2$  hybridized

D. In  $C_3O_2$ , all the carbon are in  $sp$   
hybridisation

**Answer: d**



**Watch Video Solution**

17.  $HCN$  and  $HNC$  molecules have equal  
number of

- A. lone pair and  $\sigma$  bonds
- B.  $\sigma$  bonds and  $\pi$  bonds
- C.  $\pi$  bonds and lone pair
- D. lone pairs,  $\sigma$  bonds and  $\pi$  bonds

**Answer: D**



**Watch Video Solution**

**18. Allyl cyanide has**

- A. 9 sigma bonds and 4 pi bonds

B. 9 sigma bonds, 3 pi bonds and 1 lone pair

C. 8 sigma bonds and 5 pi bonds

D. 8 sigma bonds, 3 pi bonds

**Answer: B**



**Watch Video Solution**

19.  $Mg_2C_1$  reacts with water forming propyne

$C_3^{4-}$  has

A. two sigam and two pi bonds

B. three sigma and one pi bonds

C. two sigma and one pui bonds

D. two sigma anf three pi bonds

**Answer: a**



**Watch Video Solution**

**20.** The strength of bonds by overlapping of atomic orbitals is in order

$$\text{A. } s - s > s - p > p - p$$

B.  $s - s > s - p > s - p$

C.  $s - p > s - s > p - p$

D.  $p - p > s - s > s - p$

**Answer: A**



**Watch Video Solution**

**21. Effective overlapping will be shown by:**

A. (a)  $\oplus\ominus + \oplus\ominus$

B. (b)  $\left(\frac{\oplus}{\ominus}\right) + \left(\frac{\ominus}{\oplus}\right)$

C. (c)  $\oplus\ominus + \ominus\oplus$

D. All the above

**Answer: C**



**Watch Video Solution**

22. Main axis of diatomic molecule is  $z$ , molecular orbitals  $p_x$  and  $p_y$  overlap to form, which of the following orbital?

A.  $\pi$ - molecular orbital

B.  $\sigma$ - molecular orbital

C.  $\delta$ - molecular orbital

D. no bond will form

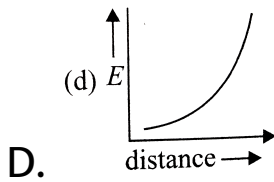
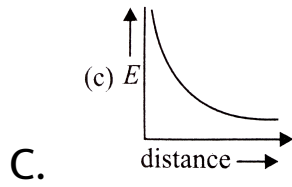
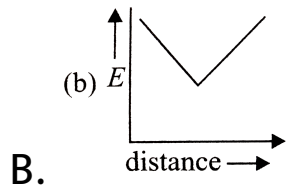
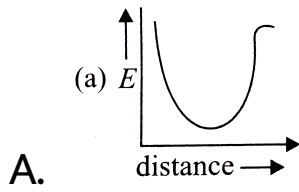
**Answer: A**



**Watch Video Solution**

**23.** Which plot best represents the potential energy ( $E$ ) of two hydrogen atoms as they approach one another to form a hydrogen molecule?





**Answer: a**



**Watch Video Solution**

24. A: tetracyanomethane, B: Carbon dioxide, C: Benzene, D: 1, 3butadiene

Ratio of  $s$  and  $p$  bond is in order

A.  $A = B < C < D$

B.  $A = B < D < C$

C.  $A = B = C = D$

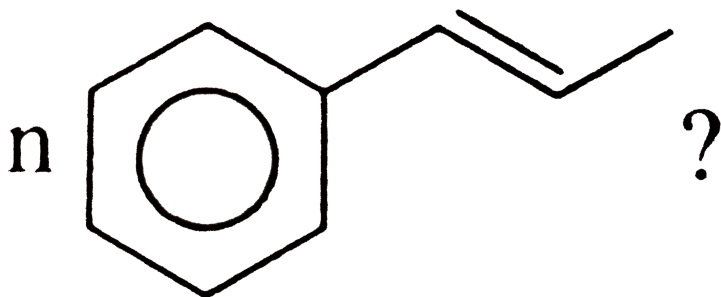
D.  $C < D < A < B$

**Answer: a**



**Watch Video Solution**

25. How many bonds are there in



A. 13

B. 23

C. 20

D. 26

**Answer: B**



Watch Video Solution

26. How many  $\sigma$  – and  $\pi$  – *bond* are there in salicycle acid?

A.  $10\sigma, 4\pi$

B.  $16\sigma, 4\pi$

C.  $18\sigma, 2\pi$

D.  $16\sigma, 2\pi$

**Answer: B**



Watch Video Solution

27. The ratio of  $\sigma$  and  $\pi$  bond in benzene is

A. 2

B. 6

C. 4

D. 8

**Answer: C**



**Watch Video Solution**

28. The enolic form of acetone contains:

A.  $9\sigma$ ,  $1\pi$  bond and 2 lone pairs

B.  $8\sigma$ ,  $2\pi$  bond and 2 lone pairs

C.  $10\sigma$ ,  $1\pi$  bond and 1 lone pairs

D.  $9\sigma$ ,  $2\pi$  bond and 1 lone pairs

**Answer: a**



**Watch Video Solution**

**29. Which cannot be explained by *VBT*?**

A. Overlapping

B. Bond formation

C. Paramagnetic nature of oxygen

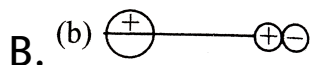
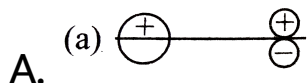
D. Shapes of molecules

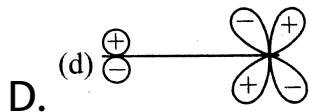
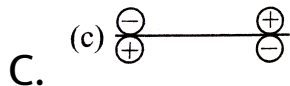
**Answer: c**



**Watch Video Solution**

**30. Which of the following leads to bonding?**





**Answer: B**

 [Watch Video Solution](#)

## Vsepr Theory And Hybridisation

1. In which of the following molecules /ions , are all the bonds not equal ?



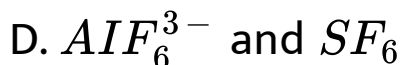
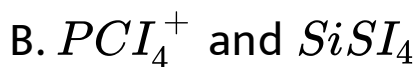
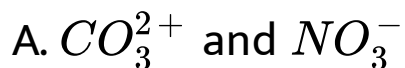


**Answer: B**



**Watch Video Solution**

2. In which of the following pairs, the two species are not isostructural?



**Answer: C**



**Watch Video Solution**

**3. The structure of  $IF_7$  is**

A. square pyramidal

B. trigonal bipyramidal

C. octahedral

D. pentagonal bipyramidal

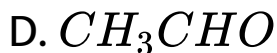
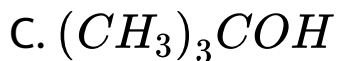
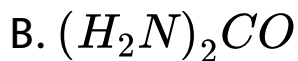
**Answer: D**



**Watch Video Solution**

4. The compounds in which  $C$  uses its  $sp^3$ -hybrid orbitals for bond formation are:

A.  $HCOOH$



**Answer: c**



**Watch Video Solution**

5. One hybridization of one  $s$  and one  $p$  orbital we get

A. two mutually perpendicular orbitals

B. two orbitals at  $180^\circ$

C. four orbitals directed tetrahedrally

D. three orbitals in a plane

**Answer: b**

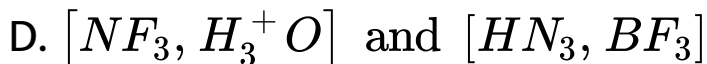
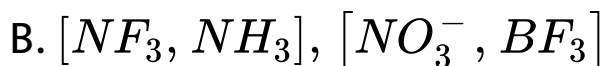


**Watch Video Solution**

**6.** Among the following species, identify the isostuctural pairs



A.  $[NF_3, NO_3^-]$  and  $[BF_3, H_3^+ O]$



**Answer: c**



**Watch Video Solution**

7. The structure of  $XeOF_4$  is

A. tetrahedral

B. square pyramidal

C. square planar

D. octahedral

**Answer: B**



**Watch Video Solution**

**8. The hybridization of sulphur is:**

A.  $sp$

B.  $sp^3$

C.  $sp^2$

D.  $dsp^2$

**Answer: C**



**Watch Video Solution**

9. In which of the following molecules, the type of hybridization changes when

A.  $NH_3$  combines with  $H^+$

B.  $AlH_3$  combines  $H^-$

C. in both cases



D. in none of the above

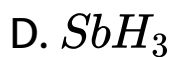
**Answer: b**



**Watch Video Solution**

**10.** The species in which the central atom uses  $sp^2$  hybrid orbital in its bonding is:





**Answer: C**



**Watch Video Solution**

**11.** The molecule that has linear structure is:



**Answer: A**



**Watch Video Solution**

**12.** The  $CI - C - CI$  angle in 1, 1, 2, 2, tetrachloroethane and tetrachloromethane respectively will be about:

A.  $120^\circ$  and  $109.5^\circ$

B.  $90^\circ$  and  $109.5^\circ$

C.  $109.5^\circ$  and  $90^\circ$

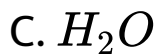
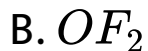
D.  $109.5^\circ$  and  $120^\circ$

**Answer: a**



**Watch Video Solution**

**13.** In the following which central atom has different hybridisation than others.

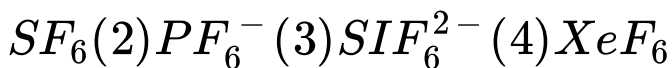


Answer: d



Watch Video Solution

14. Which of the following have undistorted octahedral structures:(1)



Select the correct answer using the codes given below

A. 2, 3 and 4

B. 1, 3 and 4

C. 1, 2 and 3

D. 1, 2 and 4

**Answer: c**



**Watch Video Solution**

**15.** The molecule which has pyramidal shapes is:

A.  $PCl_3$

B.  $SO_2$

C.  $CO_3^{2-}$

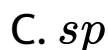
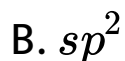
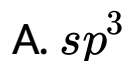


**Answer: A**



**Watch Video Solution**

**16.** The type of hybrid orbitals used by the chlorine atom in  $\text{ClO}_2^-$  is



D. None of these

**Answer: A**



**Watch Video Solution**

17. Molecular shapes of  $SF_4$ ,  $CF_4$  and  $XeF_4$  are:

A. the same with 2, 0 and 1 lone pair of electrons



B. the same with 1, 1 and 1 lone pair of electrons

C. different with 0, 1 and 2 lone pair of electrons

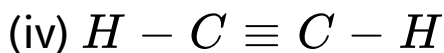
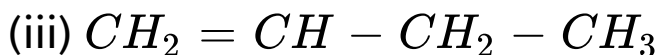
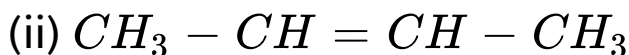
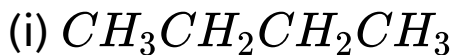
D. different with 1, 0 and 2 lone pair of electrons

**Answer: D**



**Watch Video Solution**

**18.** In which of the following compounds carbon atom undergoes hybridisation of more than one type



A. (iii) and (iv)

B. (i) and (iv)

C. (ii) and (iii)

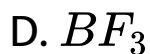
D. Only (ii)

Answer: c



Watch Video Solution

19. Which one of the following molecules is planar?



Answer: D



Watch Video Solution

20. The molecule which possesses both  $sp^3$  and  $sp^3d^2$  hybridisation is

A. solid  $PCl_5$

B. gaseous  $PCl_5$

C.  $PCl_4$

D.  $PCl_6$

**Answer: A**



**Watch Video Solution**

**21.** Which one of the following compounds has  $sp^2$  hybridization?



**Answer: B**



**Watch Video Solution**

**22. Which of the following have linear shapes?**



**Answer: b**



**23.** A molecule  $XY_2$  contains two  $\sigma$  bonds two  $\pi$  bond and one lone pair of electrons in the valence shell of  $X$ . The arrangement of lone pair as well as bond pairs is

- A. square pyramidal
- B. Linear
- C. Trigonal planer
- D. Unperdictable

**Answer: c**



**Watch Video Solution**

**24.** The maximum number of  $90^\circ$  angles between bond pair -bond pair of electron is observed in :

A.  $sp^2d^2$  hybridisation

B.  $sp^2d$  hybridisation

C.  $dsp^2$  hybridisation

D.  $dsp^3$  hybridisation



**Answer: A**



**Watch Video Solution**

**25.** The correct order of hybridisation of the central atom in the following species

$NH_3$ ,  $[PtCl_4]^{2-}$ ,  $PCl_5$  and  $BCl_3$  is :

A.  $dsp^2$ ,  $dsp^3 sp^2$  and  $sp^3$

B.  $sp^3$ ,  $dsp^2 sp^2 d$  and  $sp^2$

C.  $dsp^2$ ,  $sp^2$ ,  $sp^3 dp^3$

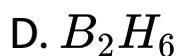
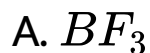
D.  $dsp^2$ ,  $sp^3$ ,  $sp^2 dsp^3$

Answer: b



Watch Video Solution

26. Which of the following has a 3 centred 2 electron bond?

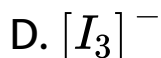


Answer: d



Watch Video Solution

27. Which species has the maximum number of lone pair of electrons on the central atom ?



**Answer: D**



**Watch Video Solution**

**28.** Among  $CIF_3$ ,  $BF_3$  and  $NH_3$  molecules the one with non-planar geometry is

A.  $CIF_3$

B.  $NH_3$

C.  $BF_3$

D. None of these

Answer: b



Watch Video Solution

29. Specify the coordination geometry around and the hybridisation of  $N$  and  $B$  atoms in 1:1 complex of  $BF_3$  and  $NH_3$ .

A.  $N$  tetrahedral,  $sp^3$ ,  $B$ : tetrahedral,  $sp^3$

B.  $N$  pyramidal,  $sp^3$ ,  $B$ : pyramidal,  $sp^3$

C.  $N$  pyramidal,  $sp^3$ ,  $B$ : planar,  $sp^2$

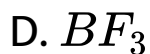
D.  $N$  pyramidal,  $sp^3$ ,  $B$ : tetrahedral,  $sp^3$

**Answer: A**



**Watch Video Solution**

**30.** Which of the following molecules planer  
planar geometry?



**Answer: d**



**Watch Video Solution**

**31.** The two types of bonds present in  $B_2H_6$  are covalent and \_\_\_\_\_.

A. Three centre bond

B. Hydrogen bond

C. Two centre bond

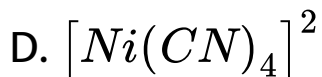
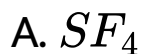
D. None of the above

**Answer: a**



**Watch Video Solution**

**32. Which has regular tetrahedral geometry ?**

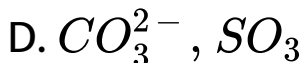
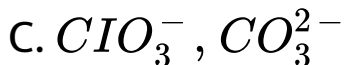
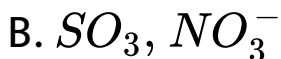
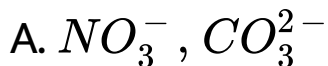
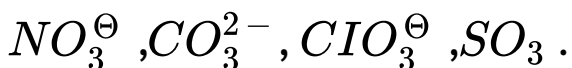


**Answer: B**





33. Which of the following are isoelectronic and iso-structural ?



Answer: a



Watch Video Solution

34. The percentage s-character of the hybrid orbitals in methane , ethene are respectively

A. 25, 33, 50

B. 25, 50, 75

C. 50, 75, 100

D. 10, 20, 40

Answer: a



Watch Video Solution

35. Among the compounds  $BF_3$ ,  $NCI_3$ ,  $H_2S$ ,  $SF_4$  and  $BeCl_2$ , identify the ones in which the central atom has the same type of hybridisation

A.  $BF_3$  and  $NCI_3$

B.  $H_2S$  and  $BeCl_2$

C.  $BF_3$ ,  $NCI_3$  and  $H_2S$

D.  $NCI_3$  and  $H_2S$

**Answer: d**



Watch Video Solution

36. Total number of lone pair of electrons in

$XeOF_4$  is :

A. 0

B. 1

C. 2

D. 3

**Answer: B**



Watch Video Solution

**37.** Indicate the incorrect statement:

A. An 'sp' hybrid orbital is not lower in energy than both s-and p-orbitals

B.  $2sp$  and  $2p$  orbitals of carbon can be hybridized to yield two new more stable orbitals

C. Effect hybridisation is not possible with orbitals of widely different energies

D. The concept of hydration has a greater significance in the  $VB$  theory of localised orbitals than in the  $MO$  theory

**Answer: b**



**Watch Video Solution**

**38.** Which of the following molecule contains one pair of non-bonding electrons?

A.  $CH_4$

B.  $NH_3$

C.  $H_2O$

D.  $HF$

**Answer: b**



**Watch Video Solution**

**39.** The hybridisation of the central atom will change when

A.  $NH_3$  combined with  $H^+$

B.  $H_3BO_2$  combined with  $OH$

C.  $NH_3$  or  $msNH_2$

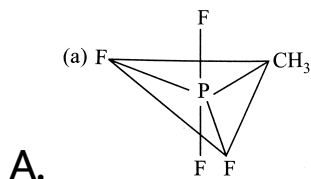
D.  $H_2O$  combines with  $H^+$

**Answer: b**

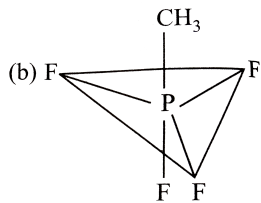


**Watch Video Solution**

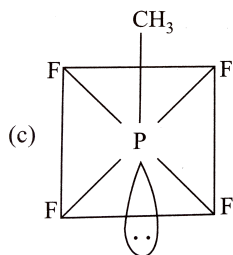
**40.** Which of the following is most stable



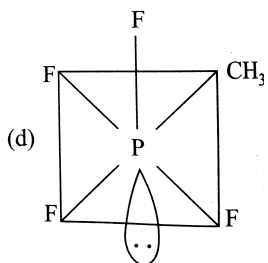




B.



C.



D.

Answer: a



Watch Video Solution

41. The states of hybridisation of boron and oxygen atoms in boric acid ( $H_3BO_3$ ) are respectively :

A.  $sp^3$  and  $sp^3$

B.  $sp^2$  and  $sp^3$

C.  $sp^3$  and  $sp^2$

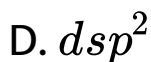
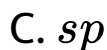
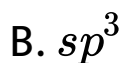
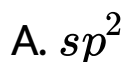
D.  $sp^2$  and  $sp^2$

**Answer: b**



**Watch Video Solution**

42. Sulphur reacts with chlorine in 1 : 2 ratio and forms X hydrolysis of X gives a sulphure compound Y. What is the hybridisation state of central atom in the compound?



**Answer: b**



**Watch Video Solution**

43. In  $XeF_2$ ,  $XeF_4$  and  $XeF_6$ , the number of lone pair of electrons on  $Xe$  are respectively :

A. 2, 3, 1

B. 1, 2, 3

C. 4, 1, 2

D. 3, 2, 1

**Answer: D**



**Watch Video Solution**

44. The species having pyramidal shapes is



Answer: d



Watch Video Solution

45. The shapes of  $XeO_2F_2$  molecule is

A. trigonal bipyramidal

B. square planar

C. tetrahedral

D. see-saw

**Answer: D**



**Watch Video Solution**

**46.** The pair of species having identical shape of both species :

A.  $BF_3$ ,  $PCl_3$

B.  $PF_5$ ,  $IF_5$

C.  $BF_4$ ,  $SF_4$

D.  $XeF_2$ ,  $CO_2$

**Answer: d**



**Watch Video Solution**

**Molecular Orbital Theory**

1. A simplified application of  $MO$  theory to the hypothetical molecule  $OF$  would give its bond order as:

- A. 2
- B. 1.5
- C. 1.0
- D. 0.5

**Answer: B**



**Watch Video Solution**



2. During the formation of a molecular orbital from atomic orbital , the electron density is :

- A. not zero in the nodal plane
- B. maximum in the nodal plane
- C. zero in the nodal plane
- D. zero on the surface of the lobe

**Answer: C**



**Watch Video Solution**

### 3. According to *MO* Theory

A.  $O_2^+$  is paramagnetic and bond order is greater than  $O_2$

B.  $O_2^+$  is paramagnetic and bond order is less than  $O_2$

C.  $O_2^+$  is diamagnetic and bond order is less than  $O_2$

D.  $O_2^+$  is diamagnetic and bond order is more than  $O_2$

Answer: a



Watch Video Solution

4. If z-axis is the molecular axis, then  $\pi$  – molecular orbitals are formation by the formed by the overlap of

A.  $s + p_z$

B.  $p_s + p_z$

C.  $p_z + p_z$

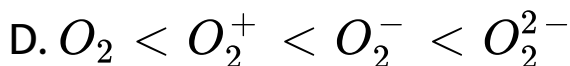
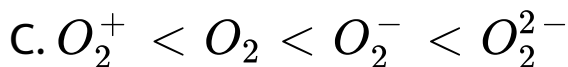
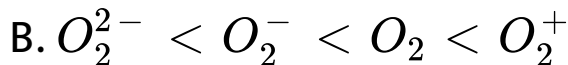
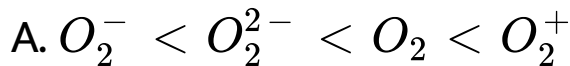
D.  $p_x + p_x$

Answer: D



Watch Video Solution

5. Bond order of  $O_2$ ,  $O_2^-$ ,  $O_2^+$  and  $O_2^{2-}$  is in order



**Answer: B**



**Watch Video Solution**

6. Which of the following pairs have identical value of bond order?



**Answer: A**



**Watch Video Solution**

7. The common feature of the species  $N_2^{2-}$ ,  $O_2$  and  $NO^-$  are

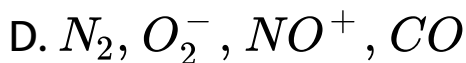
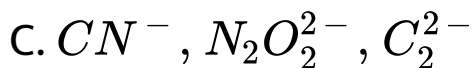
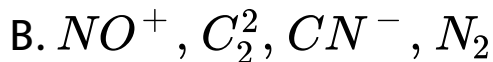
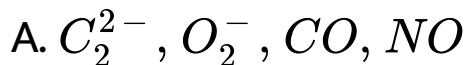
- A. bond order three and isoelectronic
- B. bond order two and isoelectronic
- C. bond order three but not isoelectronic
- D. bond order two but not isoelectronic

**Answer: B**



**Watch Video Solution**

8. Which one of the following constitutes a group of the isoelectronic species ?

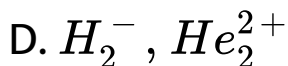
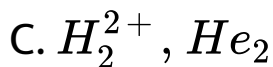
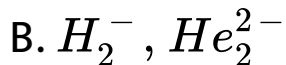
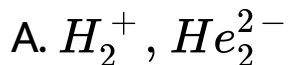


Answer: B



Watch Video Solution

9. In the of the following pairs of molecules /ions both the species are not likely to exist?



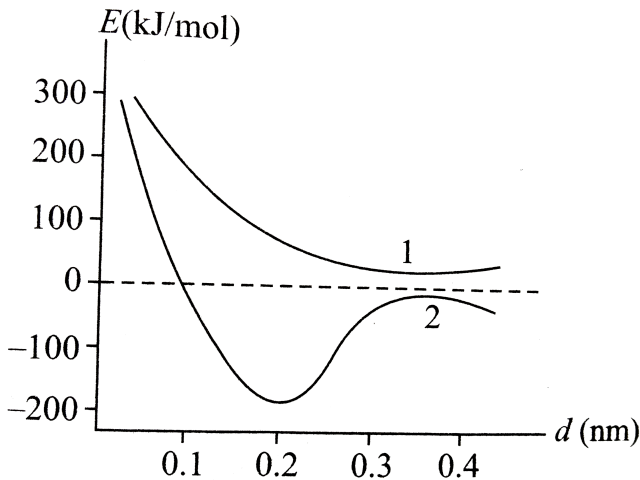


Answer: c



Watch Video Solution

10. Consider the given figure showing the formation of  $H_2^+$  ion depending on internuclear distance versus potential energy of the system.



- A. Curve -1 represents the most stable state of the system for  $H_2^+$  ion
- B. Curve -2 represents the most stable state of the system for  $H_2^+$  ion
- C. Curve-1 indicates that the molecular hydrogen ion is formed
- D. Curve-2 represent the energy level of the antibonding region

**Answer: b**



**Watch Video Solution**

11. Which of the following is paramagnetic?



**Answer: A**



**Watch Video Solution**

12.  $N_2$  and  $O_2$  are converted into monocations,  $N_2^+$  and  $O_2^+$  respectively. Which of the following is wrong?

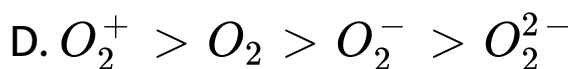
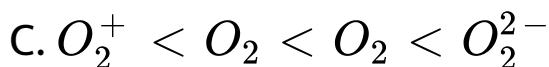
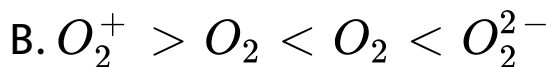
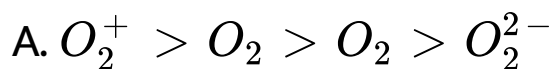
- A. In  $N_2^+$ ,  $N - N$  bond order weakens
- B. In  $O_2^+$ , the  $O - O$  bond order increases
- C. In  $O_2^+$  paramagnetism decreases
- D.  $N_2^+$  becomes diamagnetic

**Answer: d**



**Watch Video Solution**

13. Which of the following order is correct for the bond dissociation energy of  $O_2$ ,  $O_2^-$  and  $O_2^{2-}$ ?



**Answer: a**



**Watch Video Solution**

14. Which of the following statement is incorrect?

A. Among  $O_2^+$ ,  $O_2$  and  $O_2^-$ , the stability decreases as  $O_2^+ > O_2 > O_2^-$

B.  $He_2$  molecule does not exist as the effect of bonding and anti-bonding orbitals molecular orbital of  $O_2$ .

C.  $C_2$ ,  $O_2^{2-}$  and  $Li_2$  are diamagnetic

D. In  $F_2$  molecule, the energy of  $\sigma_{2pz}$  is more than  $\pi_{2px}$  and  $\pi_{2py}$

Answer: d



Watch Video Solution

15. Which of the following statement is incorrect?

A. During  $N_2^+$ , formation , one electron is removed from than bonding molecular orbital of  $N_2$ .

B. During  $N_2^+$ , formation , one electron is removed from the antibonding molecular

orbital of  $O_2$ .

C. During  $O_2^+$ , formation, one electron is added to the bonding molecular orbital of  $O_2$ .

D. During  $CN^-$ , formation, one electron is added to the bonding molecular orbital of  $CN$ .

**Answer: C**



**Watch Video Solution**



16.  $S_1$ : The *HOMO*  $\in F_2is\pi \cdot 2p_s = \pi \cdot 2p$ ,  
molecular orbitals

$S_2$ : Bond order of  $O_2$  is more than  $O_2^+$ .

$S_3$ :  $NO^+$  is more stable than  $N_2^+$

$S_4$ :  $C_2$  is more stable than  $C_2^+$

State in order whether  $S_1, S_2, S_3, S_4$  are true or  
false.

A. *FFFT*

B. *F T T*

C. *FIFT*

D. *FF T*

Answer: d



Watch Video Solution

17. The nodal plane is the pi -bond of ethene is located in :

A. the molencular plane

B. a plane parallel to the molecular plane

C. a plane parpondicular to the molecular

plane which bisects the carbon  $\sigma$ -bondat

right angle

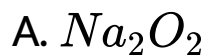
D. a plane perpendicular to the molecular plane which contains the carbon  $\sigma$ -bond

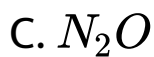
**Answer: a**



**Watch Video Solution**

**18.** Among the following , the paramagnetic compound is :



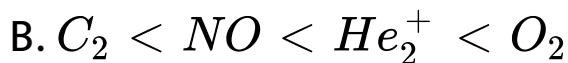
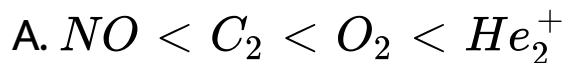


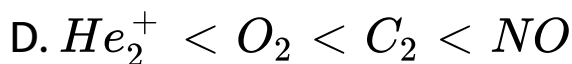
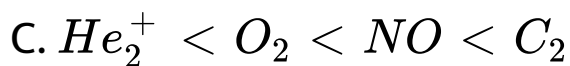
**Answer: D**



**Watch Video Solution**

**19.** Which of the following option with respect to increasing bond dissociation energies is correct?





**Answer: d**



**Watch Video Solution**

**20.** Write the molecular orbital electron distribution of oxygen ( $O_2$ ) Specify its bond order and magnetic property

Fill in the blanks

When  $N_2$  goes to  $N_2^+$ , the  $N - N$  bond

distance \_\_\_ and when  $O_2$  goes to  $O_2^{\oplus}$  the  $O - O$  bond distance \_\_\_\_ .

- A. increase, decrease
- B. decrease, increase
- C. increased in both the cases
- D. decreased in both the cases

**Answer: a**



**Watch Video Solution**

21. The cyanide ion  $CN$  and  $N_2$  are isoelectronic, but in contrast to  $CN^-$ ,  $N_2$  is chemically inert, because of

A. low bond energy

B. absence of bond polarity

C. unsymmetrical electron distribution

D. presence of more of electron in bonding orbitals

**Answer: b**



**Watch Video Solution**

22. Which of the following compounds is paramagnetic?

A.  $CO$

B.  $NO$

C.  $O_2^{2-}$

D.  $O_3$

**Answer: B**



**Watch Video Solution**



23. The number of antibonding electron pairs in  $O_2^{2-}$  molecular ion on the basis of molecular orbital theory is

A. 4

B. 3

C. 2

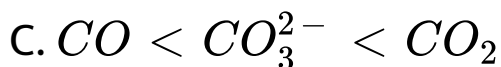
D. 5

**Answer: a**



**Watch Video Solution**

24. The correct order of decreasing  $C - O$  bond length of (I)  $CO$ , (II)  $CO_3^{2-}$  (III)  $CO_2$  is .



Answer: d



Watch Video Solution

25. The bond length the species

$O_2$ ,  $O_2^+$  and  $O_2^-$  are in the order of

A.  $O_2 > O_2 > O_2^-$

B.  $O_2^+ > O_2^- > O_2$

C.  $O_2 > O_2^+ > O_2^-$

D.  $O_2^- > O_2 > O_2^+$

**Answer: A**



**Watch Video Solution**

**26.** In a metallic crystal the .

A. Valence electrons remain within the fields  
of influence of their own kernels

B. Kernels as well as the electrons move  
rapidly

C. Valence electrons are localized between  
the two kernels

D. Valence electrons constitute a sea of  
mobile electrons

Answer: d



Watch Video Solution

27. The common features among the species  $CN^-$ ,  $CO$  and  $NO^+$  are :

- A. bond order three and isoelectronic
- B. bond order three and weak ligands
- C. bond order two and  $\pi$  acceptors
- D. isoelectronic and weak field ligands

**Answer: A**



**Watch Video Solution**

**28.** The nodal plane in the pi -bond of ethene is located in :

A. A plane parallel to the molecular plane

B. The molecular plane

C. a plane perpendicular to the molecular plane which bisects the  $(C - C)\sigma$ -bond at right angle

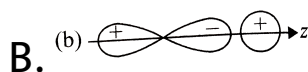
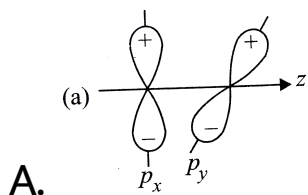
D. a plane perpendicular to the molecular plane which contains the  $(C - C)\sigma$ -bond

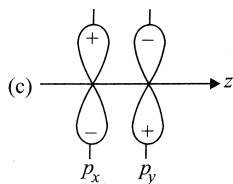
**Answer: B**



**Watch Video Solution**

**29.** Which of the following is a zero overlap which leads to non-bonding?





C.

D. All

**Answer: A**

 **Watch Video Solution**

**30.** The least stable ion among the following is

A.  $Li^-$

B.  $Be^-$



C.  $B^-$

D.  $C^-$

**Answer: b**

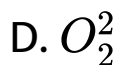
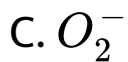


**Watch Video Solution**

**31.** Which of the following molecular species has unpaired electron(s) ? .

A.  $N_2$

B.  $F_2$



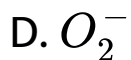
**Answer: c**



**Watch Video Solution**

**32.** Among the following species, which has the minimum bond length?



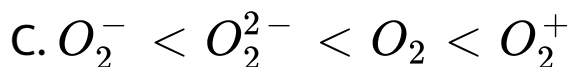
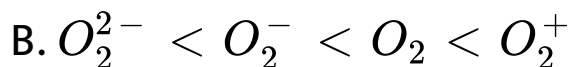
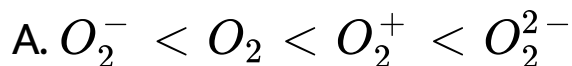


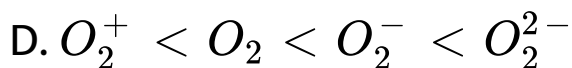
**Answer: b**



**Watch Video Solution**

**33.** The correct order of bond strength is :





**Answer: B**



**Watch Video Solution**

**34.** The bond order in  $NO$  is 2.5, while that in  $NO^+$  is 3 Which statement is true ?

A. Bond length is unpredictable

B. Bond length in  $NO$  is greater than in

$NO^+$

C. Bond length in  $NO^+$  is equal to than in

$NO$

D. Bond length in  $NO^+$  is greater than in

$NO$

**Answer: B**



**Watch Video Solution**

**35.** The species having bond order different from that in  $CO$  is .

A.  $NO$

B.  $NO^+$

C.  $CN^-$

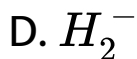
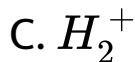
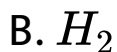
D.  $N_2$

**Answer: A**



**Watch Video Solution**

**36.** Which one of the following species is diamagnetic in nature ?



**Answer: b**



**Watch Video Solution**

**37.** Assuming that Hund's rule is violated the bond order and magnetic nature of the diatomic molecule  $B_2$  is

- A. 1 and diamagnetic
- B. 0 and diamagnetic
- C. 1 and paramagnetic
- D. 0 and paramagnetic

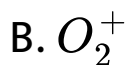
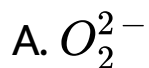
**Answer: A**



**Watch Video Solution**

**38.** Which of the following species exhibits the diamagnetic behaviour ?



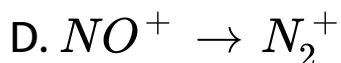
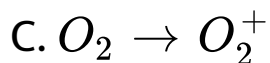
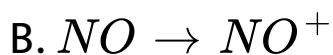
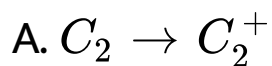


**Answer: a**



**Watch Video Solution**

**39.** In which of the following ionisation processes, the bond order has increased and the magnetic behaviour has changed ?



**Answer: B**



**Watch Video Solution**

**40.** Which one of the following pairs of species have the same bond order ?

A.  $CN$  and  $NO^+$

B.  $CN^-$  and  $CN^+$

C.  $O_2^-$  and  $CN^-$

D.  $NO^+$  and  $CN^-$

**Answer: b**



**Watch Video Solution**

**41.** Assuming  $2s, 2p$  mixing is NOT operative ,  
the paramagnetic species among the following  
is

A.  $Be_2$

B.  $B_2$

C.  $C_2$

D.  $N_2$

**Answer: c**



**Watch Video Solution**

**42.** Stability of the species  $Li_2, Li_2^-, Li_2^+$

increases in the order of

A.  $Li_2 < Li_2^+ < Li_2^-$

B.  $Li_2^- < Li_2^+ < Li_2$

C.  $Li_2 < Li_2^- < Li_2^+$

D.  $Li_2^+ < Li_2 < Li_2^+$

**Answer: b**



**Watch Video Solution**

**Force Of Attraction**

1. Give the decreasing order of melting points of the following  $NH_3$ ,  $PH_3$ ,  $(CH_3)_3N$  Explain

(b) In which molecule is the van der Waals force likely to be the most important in determining the m.pt and b.pt for  $ICI$ ,  $Br_2$ ,  $HCl$ ,  $H_2S$ ,  $CO$

.

A.  $CO$

B.  $H_2S$

C.  $Br_2$

D.  $HCl$

**Answer: c**



**Watch Video Solution**

2. Which one among the following does not have the hydrogen bond ?

A. phenol

B. liquid  $NH_3$

C. Water

D.  $HCl$

**Answer: D**



**Watch Video Solution**

**3. Which of the following has highest viscosity?**

A. Glycerol

B. Glycol

C. Ethanol

D. Water

**Answer: a**





4. Molecular size of  $ICI$  and  $Br_2$  is nearly same but *b. pt.* of  $ICI$  is about  $40^\circ$  higher than  $BR_2$

. This is due to :

A.  $ICI$  bond is stronger than  $Br - Br$  bond

B.  $I. E. \text{ of } I < I. E. \text{ of } Br$

C.  $ICI$  is polar while  $Br_2$  is non-polar

D.  $I$  has larger size than  $Br$

**Answer: c**



5.  $H_2O$  has higher boiling point than  $H_2S$

because

A.  $H_2S$  is a smaller molecule and hence

more closely packed

B. the bond angle of  $H_2O$  is more than  $H_2S$

and hence  $H_2O$  molecule are more tightly

packed

C. the intermolecular hydrogen bonding in liquid  $H_2O$

D. the latent heat of vaporisation is higher for  $H_2O$  than for  $H_2S$

**Answer: C**



**Watch Video Solution**

6. Number of  $H -$  bonds formed by a water molecule is:

A. 2

B. 4

C. 3

D. 1

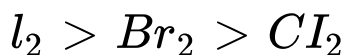
**Answer: B**



**Watch Video Solution**

7. At ordinary temperature and pressure chlorine is a gas bromine a liquid and iodine a solid. This is due to the fact that

A. the specific heat is in the order



B. the intermolecular force in molecules of chlorine are the weakest and those in iodine are the strongest

C. the order of density is  $I_2 > Br_2 > Cl_2$

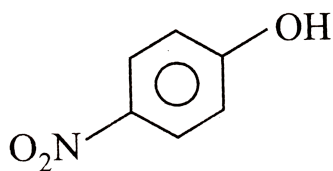
D. the order of stability is  $I_2 > Br_2 > Cl_2$

**Answer: b**



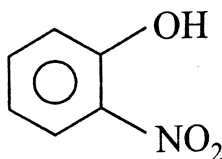
**Watch Video Solution**

8. Of the two compounds shown below , the vapour pressure of B at a particular temperature is



(A)

and



(B)

A. higher than that of A

B. lower than that of A

C. same as that of A

D. depends on the amount and size of vessel

**Answer: A**



Watch Video Solution

9. Which one of the following has intramolecular H-bonding ?

A.  $H_2O$

B. o-Nitrophenol

C. HF

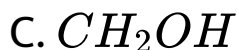
D.  $CH_3OH$

**Answer: B**



Watch Video Solution

10. In which of the following molecular the intermolecular force is of the type induced dipole induced dipole ?



**Answer: a**



**Watch Video Solution**



11.  $KF$  combines with to form  $KHF_2$ . The compound contains the species :

A.  $K^+$ ,  $F^-$  and  $H^+$

B.  $K^+$ ,  $F^-$  and  $HF$

C.  $K^+$  and  $[HF_2]^-$

D.  $[KHF]^-$  and  $F^-$

**Answer: c**



**Watch Video Solution**

12. Which contains strongest H-bond ?

A. O - H...S

B. S - H...O

C. F - H...F

D. F - H...O

**Answer: C**



**Watch Video Solution**

13. B.P of  $H_2O(100^\circ C)$  and  $H_2S(\equiv 42^\circ C)$  is explained by

A. van der waals force

B. Covalent bond

C. Hydrogen bond

D. Ionic bond

**Answer: c**



**Watch Video Solution**

14. Ethyl alcohol ( $C_2H_5OH$ ) has higher boiling point than dimethyl ether ( $CH_3 - O - CH_3$ ) although the molecular weight of both are same .

- A. Hydrogen bonding in ethanol
- B. Hydrogen bonding in dimethyl ether
- C.  $CH_3$  group in ethanol
- D.  $CH_3$  group in dimethyl ether

**Answer: A**



**Watch Video Solution**

15. Which of the following exhibits the weakest intermolecular forces?

A. He

B. HCl

C.  $NH_3$

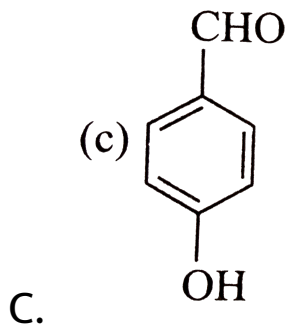
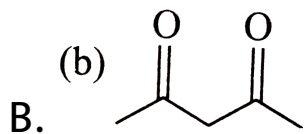
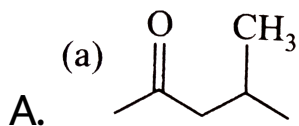
D.  $H_2O$

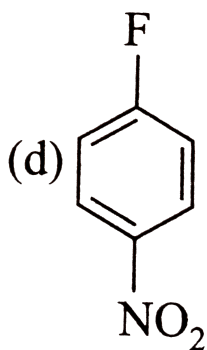
**Answer: a**



**Watch Video Solution**

16. In which of the following species intermolecular H-bonding can be exhibited in the equation solution ?



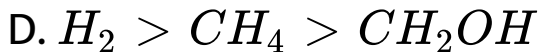
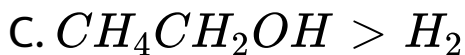
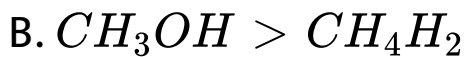


**Answer: b**

 [Watch Video Solution](#)

17. On the basis of intermolecular force predict the correct order of decreasing boiling point of the compound ?





**Answer: b**



**Watch Video Solution**

**18.** Among  $NH_3$ ,  $PH_3$ ,  $AsH_3$  and  $SbH_3$  the one with highest boiling point is

A.  $NH_3$  because of lower molecular weight



B.  $SbH_3$  because of higher molecular weight

C.  $PH_2$  because of H-bonding

D.  $AsH_3$  because of lower molecular weight

**Answer: b**



**Watch Video Solution**

**19.** Which of the following statement is true ?

A. Hf is less polar than HBr

B. Absolutely pure water does not contain any ions

C. Chemical bond formation takes place when force of attraction overcomes the force of repulsion

D. In convection transfer of electrons takes place

**Answer: c**



**Watch Video Solution**

20. An ether is more volatile than alcohol having same molecular formula. This is due to :

- A. Intermolecular H-bonding in ethers
- B. Intermolecular H-bonding in alcohols
- C. Dipolar character of ethers
- D. Resonance character in alcohols

**Answer: b**



**Watch Video Solution**

21. Among the following mixture dipole-dipole as the major interaction is present is

A. Benzene and carbon tetrachloride

B. Benzene and ethanol

C. Acetone and acetone

D. HCl and water

**Answer: c**



**Watch Video Solution**

22. Which of the following hydrogen bonds is the strongest ?

A. O -H- N

B. F- H-F

C. O-H-O

D. O-H-F

**Answer: b**



**Watch Video Solution**

# Bond Enthalpy, Bond Angle And Bond Length

1. Indicate the type of bond angle presents in



A.  $90^\circ$

B.  $90^\circ$ ,  $120^\circ$

C.  $90^\circ$ ,  $180^\circ$

D.  $90^\circ$ ,  $120^\circ$ ,  $180^\circ$

**Answer: A**



**Watch Video Solution**

2. The bond energy (in  $\text{kcal mol}^{-1}$ ) of a  $C - C$  single bond is approximately

A. 1

B. 10

C. 100

D. 1000

**Answer: C**



**Watch Video Solution**

3. The correct increasing bond angle among  $BF_3$ ,  $PF_3$  and  $ClF_3$  follow the order

A.  $BF_3 < PF_3, ClF_3$

B.  $PF_3 < BF_3, ClF_3$

C.  $ClF_3 < PF_3, BF_3$

D. All have equal bond angle

**Answer: C**



**Watch Video Solution**



4. The bond energies in  $NO$ ,  $NO^+$ ,  $NO^-$  follow the order

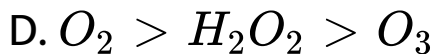
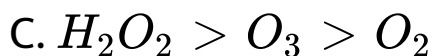
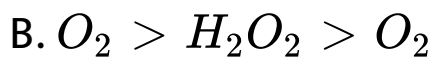
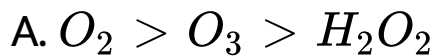


**Answer: A**



**Watch Video Solution**

5. The correct order of O - O bond length in  $O_2$ ,  $H_2O_2$  and  $O_3$  is

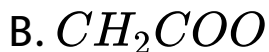


**Answer: C**



**Watch Video Solution**

6. Among the species  $CO_2$ ,  $CH_3COO'$ ,  $CO$ ,  $CO_3^{2-}$   $HCHO$  which has the weakest carbon-oxygen bond



**Answer: d**



**Watch Video Solution**

7. In the series ethane, ethylene and acetylene the  $C - H$  bond energy is

- A. The same in the these compounds
- B. Greater in ethane
- C. Greater in ethylene
- D. Greater in acethayene

**Answer: d**



**Watch Video Solution**

8. As the p - character increases the bond angle in hybrid orbital formed by a and atomic orbitals

A. Decreases

B. increases

C. Doubles

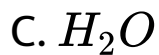
D. Remains unchanged

**Answer: A**



**Watch Video Solution**

9. Which of the least bond angle ?

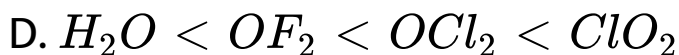
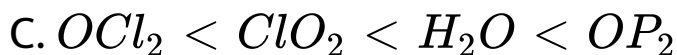
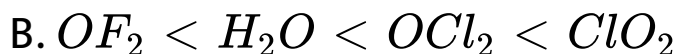
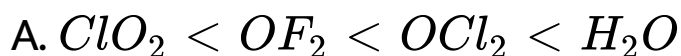


**Answer: C**



**Watch Video Solution**

10. Which of the following sequence represents the correct increasing order of bond angle in the given molecules ?



**Answer: B**



**Watch Video Solution**

11. The correct order of decreasing bond angle is



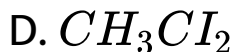
**Answer: B**



**Watch Video Solution**



12. In which of the following compound all the bond angles are same



Answer: a



Watch Video Solution

13. Consider the following molecules :



I III II IV

Arrange these molecules in increasing order of bond angles

A.  $I < II < III < IV$

B.  $IV < III < II < I$

C.  $I < II < IV < III$

D.  $I < IV < III < I$

**Answer: B**



14. Consider the following statement(s)



(i) Which X dimerises bond angle decreases

(ii) Which Y dimerises bond angle increases

(iii) In X - Y molecule C - C bond length is less than that in Y - Y molecule

(iv) Bond angle in X is greater than in Y Pick the correct statement(s)

A. II, III

B. I,II,III

C. I,IV

D. II,III,IV

**Answer: a**



**Watch Video Solution**

**15.** Percentage of p- character in each orbital of certain atom used bonding in  $NH_3$  is

A. 25 %

B. 75 %

C. More than 75 %

D. 33.3 %

**Answer: C**



**Watch Video Solution**

**16.** The ONO angle is maximum in :

A.  $HNO_3$

B.  $NO_2^+$



**Answer: b**



**Watch Video Solution**

**17.** Arrange the following in order of decreasing

N - O bond length  $NO_2^-$ ,  $NO_2^+$ ,  $NO_3^-$





**Answer: b**



**Watch Video Solution**

**18.** The highest amount of s-character is observed in :



C.  $N - H$  bond in  $H_2NNH_2$   
(Hydrazine)

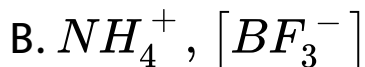
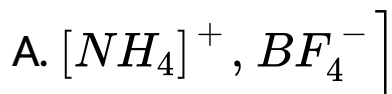
D.  $N - H$  bond in  $HN = NH$   
(Diazene)

**Answer: D**

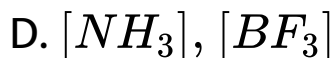
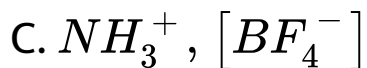


**Watch Video Solution**

**19.** In which of the following pairs , bond angle is  $109^\circ 28'$  ?







**Answer: A**



**Watch Video Solution**

**20.** Which among the following has smallest bond angle ?



C.  $SO_2$

D.  $H_2O$

**Answer: a**



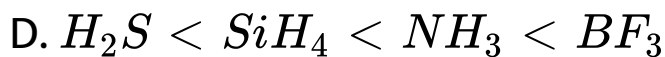
**Watch Video Solution**

**21.** The correct order of bond strength is

A.  $H_2S < NH_3 < BF_3 < SiH_4$

B.  $NH_3 < H_2S < SiH_4 < BF_3$

C.  $H_2S < NH_3 < SiH_4 < BF_3$



**Answer: C**



**Watch Video Solution**

**22.** The decreasing values of bond angles from  $NH_3(106^\circ)$  to  $SbH_3(101^\circ)$  down the group 15 of the periodic table is due to :

A. Decreasing electronegativity

B. Increasing lp-lp repulsion

C. Increasing p-orbital character in  $sp^3$

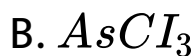
D. Decreasing  $lp - bp$  repulsion

**Answer: A**



**Watch Video Solution**

**23.** The molecule having smaller bond angle is



**Answer: C**



**Watch Video Solution**

## Section B - Assertion Reasoning

**1. Assertion** Ionic compounds tend to be non-volatile

**Reasoning** Intermolecular forces in these compounds are weak .

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: a**



**Watch Video Solution**

2. Assertion : Bond order can assume any value number including zero.

Reason :Higher the bond order ,shorter is bond length and greater is bond energy.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: b**



**Watch Video Solution**

**3. Assertion :** Water is liquid but  $H_2S$  is a gas.

**Reason :** Oxygen is paramagnetic.

A. If both assertion and reason are true and

the reason is the correct explanation of



the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: b**



**Watch Video Solution**

4. Assertion: The first ionisation energy of  $Be$  is greater than that of  $B$ .

Reason: 2p-orbital is lower in energy than 2s-orbital.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: c**



**Watch Video Solution**

5. Assertion :  $\sigma$ -bond is strong while  $\pi$ -bond is a weak bond.

Reason : Atoms rotate freely about  $\pi$ -bond.

A. If both assertion and reason are true and the reason is the correct explanation of

the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: c**



**Watch Video Solution**

6. Assertion :  $H_2O_2$  is non – ionic compound.

Reason : The  $O - O$  bond length in  $H_2O_2$  is shorter than that of  $O_2F_2$ .

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: b**



**Watch Video Solution**

7. Assertion :  $B_2$  molecule is paramagnetic.

Reason : The highest occupied molecular orbital is of  $\sigma$  type.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: c**



**Watch Video Solution**

**8. Assertion :**First ionization energy is lower than oxygen.

Reason :Across a period effective charge decreases.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.



**Answer: b**



**Watch Video Solution**

**9. Assertion (A):** F-F bond in  $F_2$  molecule is weak.

**Reason (B):** F atom is small in size.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: d**



**Watch Video Solution**

**10. Assertion :**The S-S-S bond in  $S_8$  molecule is  $105^\circ$ .

**Reason :** $S_8$  has V-shape.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: c**



**Watch Video Solution**

**11. Assertion :** Bond order for CO is more than bond order in CO whereas bond order in  $N_2^-$  is less than  $N_2$  whereas both are isoelectronic.

**Reason :** Both are same bond order.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: c**



**Watch Video Solution**

**12.** Assertion :  $N_2O$  is represented by (i)  $N = N = O$  and (ii)  $N = N \rightarrow O$  but the latter is more stable.

Reason : From (ii) shown resonance.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: c**



**Watch Video Solution**

**13.** Assertion (A): Lithium chloride is predominantly covalent compound.

Reason (R ): electronegativity difference between Li and Cl is small.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: c**



**Watch Video Solution**

**14.** Assertion :  $CaF_2$  is solution in water but  $CaI_2$  not.

Reason :  $CaF_2$  is soluble in water but  $CaI_2$ .

A. If both assertion and reason are true and the reason is the correct explanation of



the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: d**



**Watch Video Solution**

**15. Assertion :**  $O_3$  and  $NO_2^-$  are isoelectronic.

**Reason :** Bond angle of  $O_3$  and  $NO_2^-$  are  $118.8^\circ$  and  $115^\circ$  respectively.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: b**



**Watch Video Solution**

**16.** Assertion :  $NO_2$  is readily dimerised to  $N_2O_4$

Reason :  $NO_2$  has one unpaired electron and two such electron with opposite spin in two  $NO_2$  molecules form bond between two N-atoms readily.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: a**



**Watch Video Solution**

17. Assertion : Both  $Cu^+$  and  $Na^+$  have almost same radii.

Reason :  $Cu^+$  possesses more power to polarise an anion.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: b**

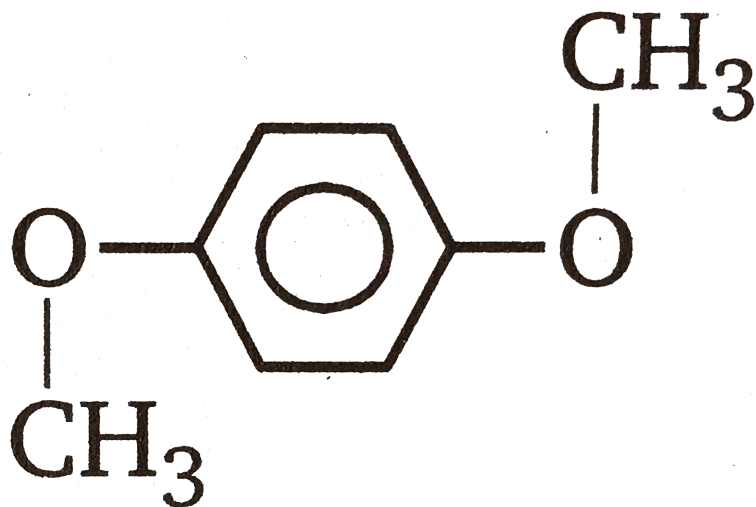


**Watch Video Solution**

**18.** Statement : p-dimethoxy benzene is polar molecule .

Explanation : The two methoxy groups . At para

positions are located as



A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: c**



**Watch Video Solution**

**19. Statement :** The lattice energy of silver halids

is  $AgF > AgCl > AgBr > AgI$ .

**Explanation :**  $AgF$  is water soluble .



A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: b**



**Watch Video Solution**

20. Assertion : In  $CH_3NCO$ , the angles  $C - N - C$  and  $N - C - O$  are not identical

Reason :N- atom has a pair of electrons which is involved to  $p\pi - d\pi$  delocalisation whereas  $C -$  atom does not have lone pair of electrons.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: c**



**Watch Video Solution**

**21. Assertion :** In  $IOF_4^-$  a single lone pair is present on an iodine atom trans to oxygen to have minimum repulsion between the  $I = O$  and the lone pair of electrons.

Reason : The VSEPR model consider double and triple bonds to have slightly greater repulsive effect than single bonds because of the repulsive effective  $\pi$  electrons

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: a**



**Watch Video Solution**

**22.** Assertion : Molecular having different hybridisation can have same shape.

Reason :The shape of a molecule does not depend on the hybridisation but it depends on the energy factor.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: a**



**Watch Video Solution**

**23.** Assertion :  $SO_2$ ,  $NO_3^-$  and  $CO_3^{2-}$  are isoelectronic as well as isostructural species.

Reason : The d and f-orbital do not shield the nuclear charge very effectively. Therefore there is significant reduction in the size of the ions, just after d or f orbital have been completely filled.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: d**



**Watch Video Solution**

**24.** Assertion : Carbon has unique ability to form  $p\pi - p\pi$  multiple bonds with itself and with



other atomic of small size and high electronegativity.

Reason : Heavier elements of group 14<sup>th</sup> do not form  $p\pi - p\pi$  bonds because their atomic orbitals are too large and diffuse to have effective sideways overlapping.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: b**

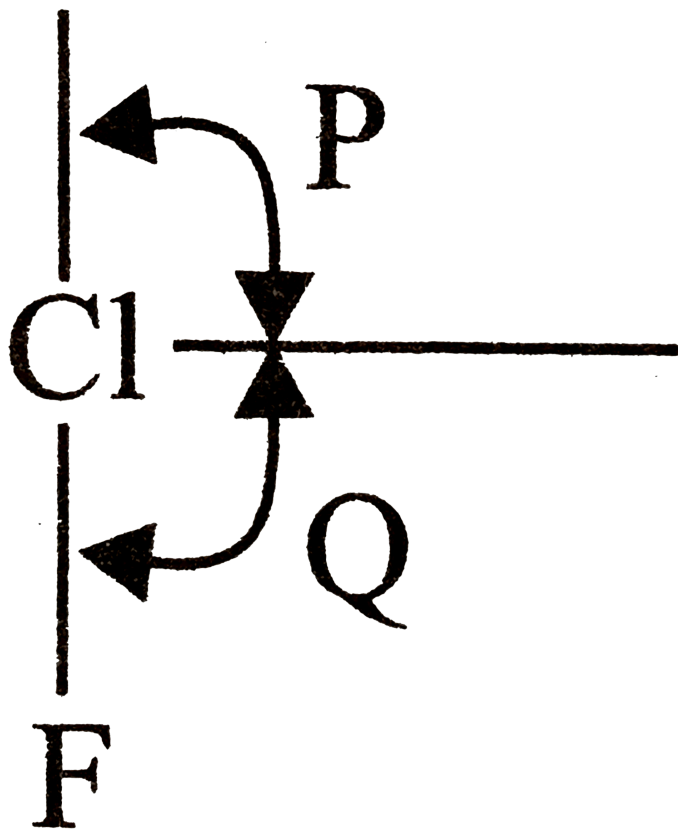


**Watch Video Solution**

25.

Assertion

:



F bond

angle  $p$  is equal to the bond angle  $Q$  but not precisely equal to  $90^\circ$ .

Reason :The molecule is T- shapes and there is repulsion between lone pairs of electrons.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: a**



**Watch Video Solution**

**26.** Assertion : Elemental nitrogen exist as a diatomic molecule and phosphours as tetratomic molecule.

Reason :Nitrogen does not have vacant d-orbital wheras phosphorus have vacant d-orbital.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: b**



**Watch Video Solution**

27. Assertion : Amongst the oxo acids of halogens, HOCl, HOBr and HOI , the HOI is the most acidic acid.

Reason :The conjugate base stability is  $ClO > BrO > IO$ .

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: d**



**Watch Video Solution**

**28.** Assertion : Aluminium chloride in acidified aqueous solution from octahedral

$[Al(H_2O)_6]^{3+}$  ion.

Reason : In  $[Al(H_2O)_6]^{3+}$  complex ion the  $3d$



orbital of Al are involved and the hybridisation state of Al is  $sp^3d^2$ .

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: a**



**Watch Video Solution**

**29.** Assertion : A molecule of Buckminsterfullerene exhibits aromatic character.

Reason : All the carbon atoms undergo  $sp^2$  hybridisation. Each carbon atom forms three sigma bonds with other three carbon atoms. The remaining electron at each carbon is delocalised in molecular orbitals.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: a**



**Watch Video Solution**

**30. Assertion :** The double bond in  $C_2$  molecule consider of both  $\pi$  bonds

**Reason :** Four electrons are presents in two  $\pi$  bonding molecule orbital in  $C_2$

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: a**



**Watch Video Solution**

**31.** Assertion : To obtain effective  $p\pi - p\pi$  overlap, the size of the de-orbital must be similar to the  $p -$  orbital so the chlorine  $p\pi - p\pi$  bonding is strongest in their oxoanions.

Reason :On moving period from left to right in the periodic table, the nuclear charge is increased and more  $s$  and  $p$ -electrons are added. Since these  $s$  – and  $p$  – electron shield the nuclear charge incompletely, the size of the atom and that of the  $d$  – orbital decreases .This leads to progressively stronger  $p\pi - d\pi$  bonding.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

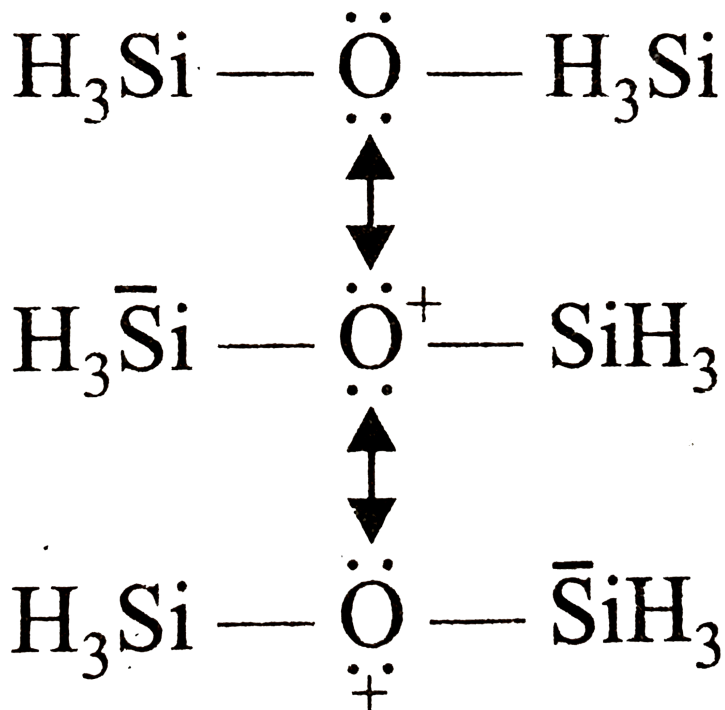
**Answer: a**



**Watch Video Solution**

**32.** Assertion :dimethyl ether and disilyl ether both readily form complexes with trimethyl

borane.



Reason :

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.



B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: d**



**Watch Video Solution**

**33.** Assertion : Solubility of  $\text{LiI}$  is more than that of  $\text{LiBr}$ .

Reason :LiI has more lattice energy and more hydration energy in comparison is LiBr.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: c**



**Watch Video Solution**

**34.** Assertion :  $Al^{3+}$  forms more ionic compound in comparison to  $Ga^{3+}$  with identical anion.

Reason :  $r_{Al^{3+}}$  and  $z_{eff}$  of  $Ga^{3+}$  is more than that of  $Al^{3+}$ .

A. If both assertion and reason are true and the reason is the correct explanation of

the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: a**



**Watch Video Solution**

**35.** Assertion :  $NF_3$  has tendency to act as a donor molecule.

Reason : The highly electronegative F atoms attract electron and these moments partly cancel the moment from the lone pair.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: a**



**Watch Video Solution**

**36.** Assertion : Ortho boric acid crystal are hard and cannot be broken easily into the powder form.

Reason :In the solid state  $B(OH)_3$  units are

hydrogen bonded together into two dimensional sheets.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: d**



**View Text Solution**

**37. Assertion :** The crystal structures of  $NaHCO_3$  and  $KHCO_3$  both show intermolecular hydrogen bonding but are different.

**Reason :** In  $NaHCO_3$  the  $HCO_3$  ions are linked together through intermolecular hydrogen bond into an infinite chain while in



$KHCO_3HCO_3^-$  ions form dimeric anions through intermolecular hydrogen bonds.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: a



Watch Video Solution

## AIPMT/ NEET Questions

1. Main axis of diatomic molecule is  $z$ , molecular orbitals  $p_x$  and  $p_y$  overlap to form, which of the following orbital?

A.  $\pi$ -molecular orbital

B.  $\sigma$ -molecular orbital

C.  $\delta$ -molecular orbital

D. No bond will be formed.

**Answer: a**



**Watch Video Solution**

2. In  $X - H \cdots Y$ , both X and Y are electronegative elements

A. Electron density on X will increase and on H will decrease

B. In both electron density will decrease

C. In both electron density will increase

D. Electron density will decrease on  $X$  and  
will increase on  $H$

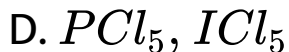
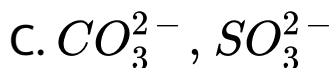
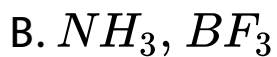
**Answer: a**



**Watch Video Solution**

**3. Which of the following two are isostructural ?**

A.  $XeF_2, IF_2^-$



**Answer: a**



**Watch Video Solution**

4. In which of the following bond angle is maximum





**Answer: b**



**Watch Video Solution**

5. Which of the following molecule forms linear polymeric structure due to H-bonding ?



B. HF

C.  $H_2O$

D.  $NH_3$

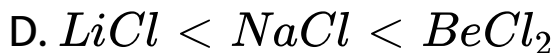
**Answer: b**



**Watch Video Solution**

**6.** The correct order of increasing covalent character is :

A.  $NaCl < LiCl < BeCl_2$



**Answer: a**



**Watch Video Solution**

7. In which of the following  $p\pi - d\pi$  bonding is observed ?







**Answer: b**



**Watch Video Solution**

**8.** In  $NO_3^-$  ion, the number of bond pair and lone pair of electrons on N-atom are :

A. 2, 2

B. 3, 1

C. 1, 3

D. 4, 8

**Answer: d**



**Watch Video Solution**

9. Which of the following statement is not correct for sigma and pi- bonds formed between two carbon atoms ?

A. Sigma -bond determines the direction between carbon atoms but a pi-bond has no primary in this regard

B. Sigma -bond is stronger than a pi- bond

C. Bond energies of sigma and pi-bond are of the order of  $264\text{kJ/mol}$  and  $347\text{kJ/mol}$ , respectively

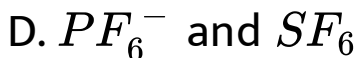
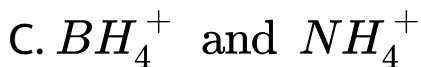
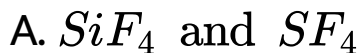
D. Free rotation of atoms about a sigma – bond is allowed but not in case of a pi – bond.

Answer: c



Watch Video Solution

10. Among the following the pair in which the two species are not isostuctural is



Answer: a



Watch Video Solution

11.  $H_2O$  is dipolar, whereas  $BeF_2$  is not. It is because

A. The electronegativity of  $F$  is greater than that of  $O$

B.  $H_2O$  involves hydrogen bonding whereas  $BeF_2$  is a discrete molecule

C.  $H_2O$  is linear and  $BeF_2$  is angular

D.  $H_2O$  is angular and  $BeF_2$  is linear

**Answer: d**



**Watch Video Solution**

**12.** In an octahedral structure , the pair of d orbitals involved in  $d^2sp^2$  hybridization is

A.  $d_{x^2 - y^2}$ ,  $d_{z^2}$

B.  $d_{xz}$ ,  $d_{x^2 - y^2}$

C.  $d_{z^2}$ ,  $d_{xz}$

D.  $d_{xy}$ ,  $d_{yz}$

**Answer: a**



**Watch Video Solution**

**13.** In a regular octahedral molecule  $MX_6$  the number of  $X - M - X$  bonds at  $180^\circ$  is

A. 3

B. 2

C. 6

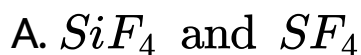
D. 4

**Answer: A**



**Watch Video Solution**

**14.** Among the following the pair in which the two species are not isostuctural is





D.  $PF_6^-$  and  $SF_6$

**Answer: c**



**Watch Video Solution**

**15.** In  $BrF_3$  molecule, the lone pairs occupy equatorial positions to minimize

A. lone pair-bond pair repulsion only

B. bond pair-bond pair repulsion only

C. lone pair-bond pair repulsion and lone pair-lone pair repulsion

D. lone pair-lone pair repulsion only

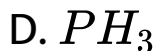
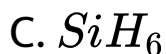
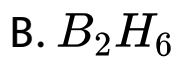
**Answer: c**



**Watch Video Solution**

**16.** Which of the following is the electron-deficient molecule?

A.  $C_2H_6$

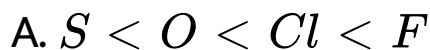


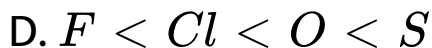
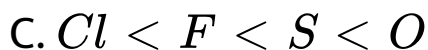
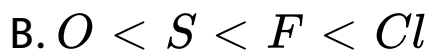
**Answer: B**



**Watch Video Solution**

17. Which one of the following arrangements represents the correct order of electron gain enthalpy of the given atomic species?





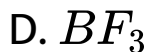
**Answer: b**



**Watch Video Solution**

**18.** Which molecule has trigonal planar geometry?



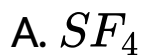


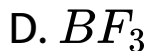
**Answer: D**



**Watch Video Solution**

**19.** The molecule having permanent dipole moment is





**Answer: d**



**Watch Video Solution**

**20. Which is expected to show paramagnetism ?**



C.  $CO_2$

D.  $SiO_2$

**Answer: a**



**Watch Video Solution**

**21.** The electronegativity difference between  $N$  and  $F$  is greater than that between  $N$  and  $H$  yet the dipole moment of  $NH_2$  ( 1.5 D) is larger than that of  $NF_3$ (0. 2D). This is because :

A. In  $NH_3$  the atomic dipole and bond dipole are in the same direction, whereas in  $NF_3$  these are in opposite directions

B. In  $HN_3$  as well as  $NF_3$  the atomic dipole and bond dipole are in opposite directions

C. In  $HN_3$  the atomic dipole and bond dipole are in the opposite direction, whereas in  $NF_3$  these are in the same direction



D. In  $NH_3$  as well as  $NF_3$  the atomic dipole and bond dipole are in same direction

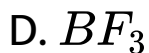
**Answer: a**



**Watch Video Solution**

**22.** In which of the following molecules all the bonds are not equal ?



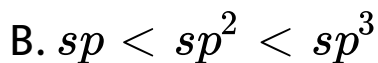
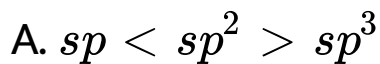


**Answer: c**



**Watch Video Solution**

**23.** The correct order of electronegativity regarding the hybrid orbitals of carbon is :



C.  $sp > sp^2 < sp^3$

D.  $sp > sp^2 > sp^3$

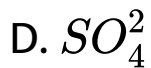
**Answer: d**



**Watch Video Solution**

**24.** Which of the following species has a linear shape ?





**Answer: a**



**Watch Video Solution**

**25.** Which of the following is not isostructural with  $SiCl_4$  ?





**Answer: c**



**Watch Video Solution**

**26.** Which of the following is not a correct statement ?

A. Every  $AB_2$  molecule does in fact has square pyramid structure.

B. Multiple bonds are always shorter than corresponding single bonds.

C. The electron deficient molecule can act as Lewis acids.

D. The canonical structures have no real existence.

**Answer: a**



**Watch Video Solution**

27. Which one of the following orders is not correct in accordance with the property stated against is ?

A.  $F_2 > Cl_2 > Br_2 < I_2$ : Electronegativity

B.  $F_2 > Cl_2 > Br_2 < I_2$ : Bond

disassociation energy

C.  $F_2 > Cl_2 > Br_2 < I_2$ : oxidising power

D.  $HI > HBr > HCl < HF$ : Acidic

property in water

**Answer: b**



Watch Video Solution

28. The number of unpaired electrons in a paramagnetic diatomic molecule of an element with atomic number 16 is :

A. 4

B. 1

C. 2

D. 3

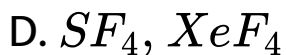
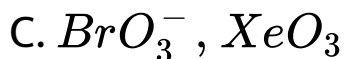
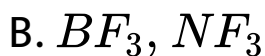
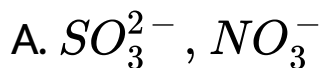
**Answer: c**





Watch Video Solution

29. Which of the following pair are isostructural ?

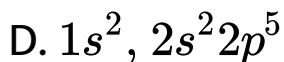
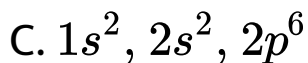
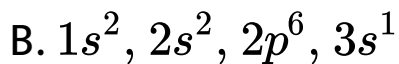
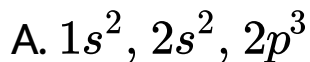


Answer: c



Watch Video Solution

30. The element having lowest ionisation energy among the following is

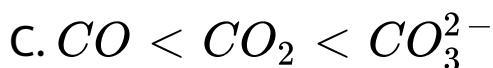
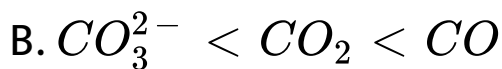
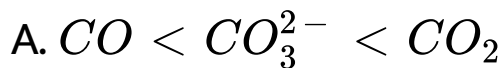


**Answer: b**



**Watch Video Solution**

31. The correct order of decreasing  $C - O$  bond length of (I)  $CO$ , (II)  $CO_3^{2-}$  (III)  $CO_2$  is .

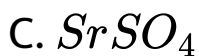
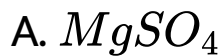


Answer: c



Watch Video Solution

32. Which of the following possesses maximum hydration energy ?



**Answer: a**



**Watch Video Solution**

33. The angular shape of ozone molecule ( $O_3$ ) consists of

A. 1 sigma and 2 pi bonds

B. 2 sigma and 2 pi bonds

C. 1 sigma and 1 pi bonds

D. 2 sigma and 1 pi bonds

**Answer: D**



**Watch Video Solution**

34. Decreasing order of bond angle of

$(NO_2^{\oplus}, NO_2, NO_2^{\ominus})$  is

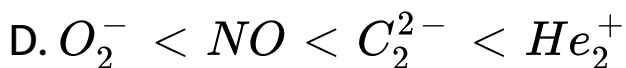
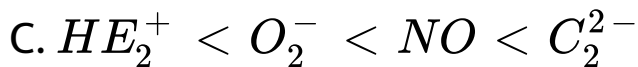
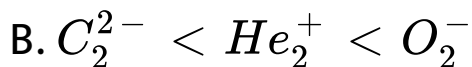
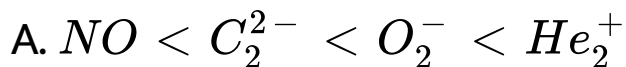


**Answer: a**



**Watch Video Solution**

35. Four diatomic species are listed in different sequence .Which of these represent the correct order of their increasing bond order?



**Answer: c**



**Watch Video Solution**

36. The correct order of decreasing second ionisation enthalpy of  $Ti(22)$ ,  $V(23)$ ,  $Cr(24)$  and  $Mn(25)$  is

A.  $V > Mn > Cr > Ti$

B.  $Mn > Cr > Ti > V$

C.  $Ti > V > Cr > Mn$

D.  $Cr > Mn > V > Ti$

Answer: d



Watch Video Solution



37. What is the dominant intermolecular forces or bond that must be overcome in converting liquid  $CH_3OH$  to gas ?

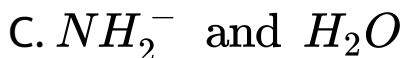
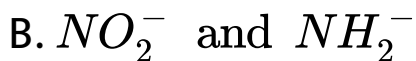
- A. Landon dispersion force
- B. Hydrogen bonding
- C. Dipole-dipole interaction
- D. Covalent bonds

**Answer: B**



**Watch Video Solution**

38. In which of the following molecular/ions  $BF_2$ ,  $NO_2^-$ ,  $NH_2$  and  $H_2O$  the correct atom is  $sp^2$  hybridized ?

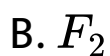


**Answer: a**



**Watch Video Solution**

39. Which of the following is the strongest oxidising agent?

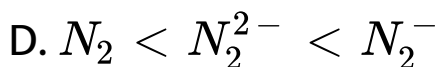
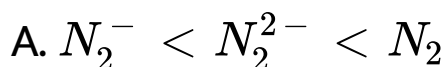


Answer: b



Watch Video Solution

40. According to MO theory which of the following lists makes the nitrogen species in terms of increasing bond order?

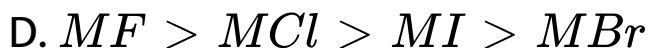
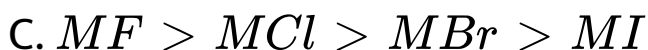
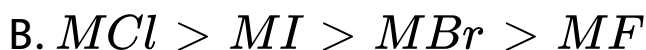


**Answer: c**



**Watch Video Solution**

41. In the case of alkali metals, the covalent character decreases in the order.

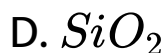
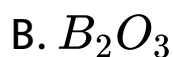


**Answer: a**



**Watch Video Solution**

42. Which of the following oxides is not expected to react with sodium hydroxide ?

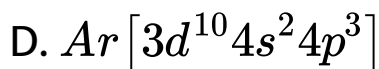
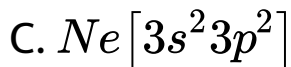
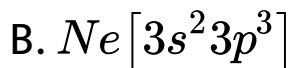
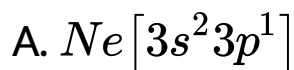


**Answer: c**



**Watch Video Solution**

43. Amongst the following elements (whose electronic configuration is given below) the one having highest ionization energy is

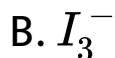


**Answer: b**



**Watch Video Solution**

44. In which one of the following species, the central atom has the type of hybridization which is not the same as that present in other three?



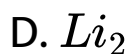
**Answer: c**



**Watch Video Solution**



45. Which of the following species does not exist under normal condition ?

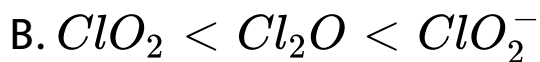


**Answer: b**



**Watch Video Solution**

46. The correct order of increasing bond angle in the following species is

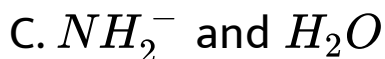
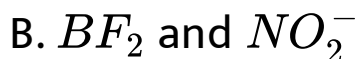
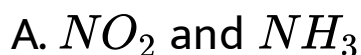


Answer: d



Watch Video Solution

47. In which of the following pairs of molecule/ions, the central atom has  $sp^2$  hybridization?

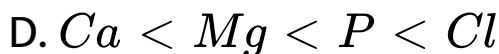
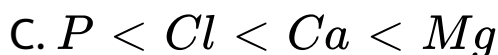
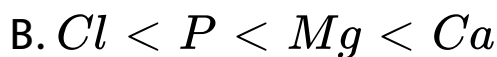
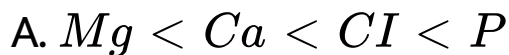


**Answer: b**



**Watch Video Solution**

48. Among the following Ca, Mg, P and Cl the order of increasing atomic radius is



Answer: b



Watch Video Solution

49. Among the following which has the highest cation to anion size ratio ?

A. CsI

B. CsF

C. LiF

D.  $NaF$

**Answer: b**



**Watch Video Solution**

50. In which of the following molecule , the central atom does not have  $sp^2$  hybridization ?



**Answer: b**



**Watch Video Solution**

51. How many bridging oxygen atoms are presents in  $P_4O_{10}$  ?

A. 6

B. 4

C. 2

D. 5

**Answer: a**



**Watch Video Solution**

52. Some of the properties of the two species  $\text{NO}_2^-$  and  $\text{H}_3\text{O}$  are described below which one of them is correct ?

A. Dissimilar in hybridization for the central atom with different atom

B. Isostructural with the same hybridization for the central atom

C. Isostructural with the difference hybridization for the central atom



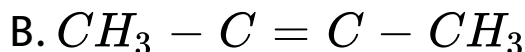
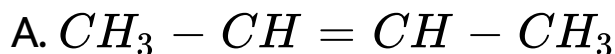
D. Similar in hybridization for the central atom with different structure.

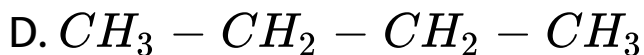
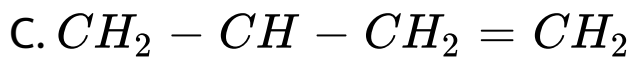
**Answer: a**



**Watch Video Solution**

**53.** Considering the state of hybridization of carbon atomic, find out the molecule among the following which is linear ?





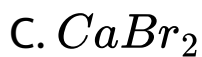
**Answer: b**



**Watch Video Solution**

**54.** Which of the following compounds has the lowest melting point ?



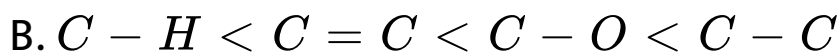
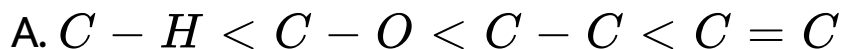


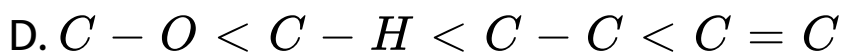
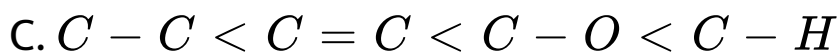
**Answer: d**



**Watch Video Solution**

**55.** The correct order of increasing bond length of C - H, C - O, C - C and C = C is





**Answer: b**



**Watch Video Solution**

**56.** For the four successive transition elements (Cr, Mn, Fe, and Co), the stability of +2 oxidation state will be there in which of the following order ?

(*At. Nos. Cr = 24, Mn = 25, Fe = 26, Co = 27*)

A.  $Cr > Mn > Co > Fe$

B.  $Mn > Fe > Cr > Co$

C.  $Fe > Mn > Co > Cr$

D.  $Co > Mn > Fe > Cr$

**Answer: b**



**Watch Video Solution**

57. Which of the two ions from the list given have the geometry that is explained by the

same hybridization of orbitals

$NO_2^-$ ,  $NO_3^-$ ,  $NH_2^-$ ,  $NH_4^+$ ,  $SCN^-$ ?

A.  $NO_2^-$  and  $NH_2^-$

B.  $NO_2^-$  and  $NO_3^-$

C.  $NH_4^+$  and  $NO_3^-$

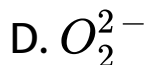
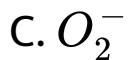
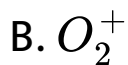
D.  $SCN^-$  and  $NH_2$

**Answer: b**



**Watch Video Solution**

58. Which of the following has the minimum bond length ?

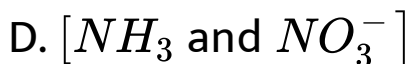


**Answer: B**



**Watch Video Solution**

59. Which of the following pairs is isostructural (i.e having the same shape and hybridization ?



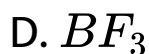
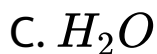
Answer: b



Watch Video Solution



60. Which of the following species contains three bond pair and one lone pair around the central atom ?



**Answer: b**



**Watch Video Solution**

61. The pair of species with the same bond order is :

A. NO, CO

B.  $N_2$ ,  $O_2$

C.  $O_2^{2-}$ ,  $B_2$

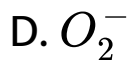
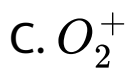
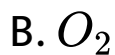
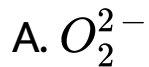
D.  $O_2^+$ ,  $NO^+$

**Answer: C**



**Watch Video Solution**

62. The correct order of bond strength is :



**Answer: D**



**Watch Video Solution**

**63.** Identify the wrong statement in the following ?

A. Atomic radius of the element increases as one moves down the first group of the periodic table

B. Atomic radius of the element decreases as one moves across from left to right in the 2nd periodic table

C. Atomic isoelectronic species the smaller the positive charge on the cation , the

smaller is the ionic radius

D. Amongst isoelectronic species, the greater the negative charge on the anion, the larger is the ionic radius.

**Answer: c**

 [Watch Video Solution](#)

**64.** In the conversion of  $O_2 \rightarrow O_2^-$

electron enter in which molecular orbital?

A.  $\pi^*$  orbital

B.  $\pi$  orbital

C.  $\sigma^*$  orbital

D.  $\sigma$  orbital

**Answer: A**



**Watch Video Solution**

**65.** Which one of the following does not correctly represent the correct order of the property indicated against it ?

A.  $Ti < V < Cr < Mn$ : increasing number of oxidation states

B.  $Ti^{3+} < V^{3+} < Cr^{3+} < Mn^{3+}$ :

increasing magnetic moment

C.  $Ti < V < Cr < Mn$ : increasing melting points

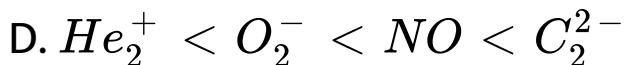
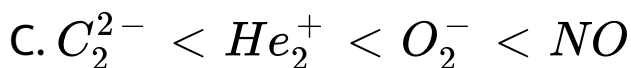
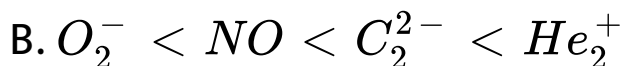
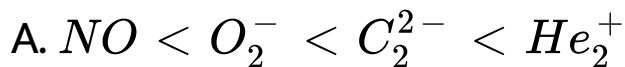
D.  $Ti < V < Mn < Cr$ : increasing 2nd ionization enthalpy.

**Answer: c**



**Watch Video Solution**

**66.** Four diatomic species are listed in different sequence .Which of these represent the correct order of their increasing bond order?



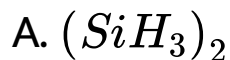
**Answer: D**



**Watch Video Solution**



67. Which of the following is electron deficient ?



Answer: b



Watch Video Solution

68. Which one of the following molecules contains no  $\pi$  - bond ?

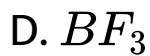
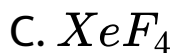
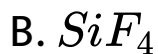
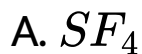


**Answer: a**



**Watch Video Solution**

69. Which of the following is a polar molecule ?



**Answer: a**



**Watch Video Solution**

70. Which of the following is paramagnetic ?



**Answer: a**



**Watch Video Solution**

**71.  $XeF_2$  is isostructure with**





**Answer: a**



**Watch Video Solution**

72. Dipole-induced dipole interaction are present in which of the following pairs



B.  $HCl$  and  $He$  atoms

C.  $SiF_4$  and  $He$  atoms

D.  $H_2O$  and alcohol

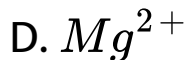
**Answer: b**



**Watch Video Solution**

**73.**  $Be^{2+}$  is isoelectronic with which of the following ions ?

A.  $H^+$



**Answer: b**



**Watch Video Solution**

**74.** Which of the following molecules has the maximum dipole moment ?



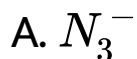


**Answer: c**



**Watch Video Solution**

**75.** Which of the following species has plane triangular shape ?





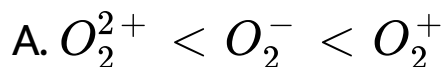


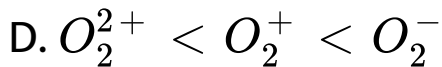
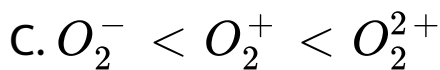
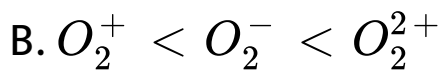
**Answer: b**



**Watch Video Solution**

**76.** The correct bond order in the following species is



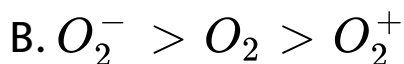
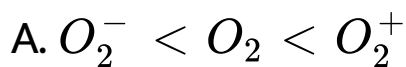


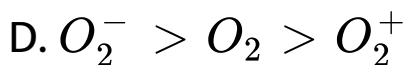
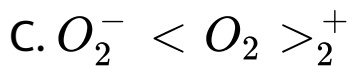
**Answer: c**



**Watch Video Solution**

**77. The correct order of bond strength is :**



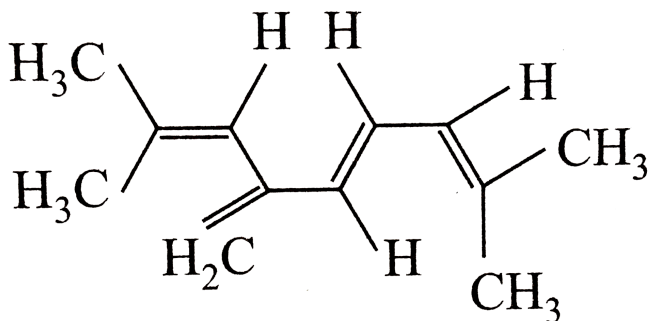


Answer: a



Watch Video Solution

78. The total number of  $\pi$  bond electrons in the following structure is



A. 12

B. 16

C. 4

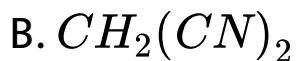
D. 8

**Answer: d**



**Watch Video Solution**

**79.** Which of the following species contains equal number of pi and pi bonds ?

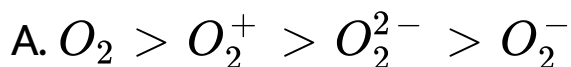


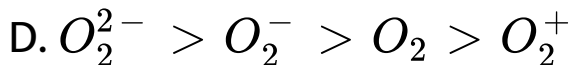
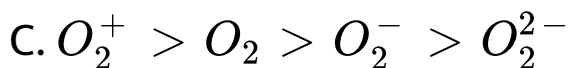
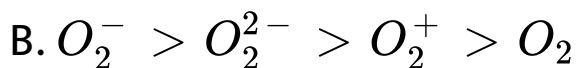
**Answer: d**



**Watch Video Solution**

**80.** Bond order of  $O_2$ ,  $O_2^-$  and  $O_2^{2-}$  is in order



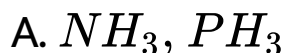


**Answer: c**



**Watch Video Solution**

**81.** In which of the following pairs , both the species are not isostructural ?



B.  $XeF_4$ ,  $XeO_4$

C.  $SiCl_4$ ,  $PCl_4$

D. Diamond, silicon carbide

**Answer: b**



**Watch Video Solution**

**82.** Predicted the correct order among the following

A. lone pair -line pair gt bond pair - bond gt

lone pair - lone pair

B. lone pair -lone pair gt lone pair - bond

pair gt bond pair - bond pair

C. lone pair -lone pair gt bond pair - bond

pair gt lone pair - bone pair

D. bond pair -bond pair gt lone pair - bond

pair gt lone pair - lone pair

**Answer: b**



**Watch Video Solution**



83. Consider the molecules  $CH_4$ ,  $NH_3$  and  $H_2O$  which of the given statement is false ?

A. The  $H - C - H$  bond angle in  $CH_4$  is larger than the  $H - N - H$  bond angle in  $NH_4$

B. The  $H - C - H$  bond angle in  $CH_4$  is the  $H - N - H$  bond angle in  $NH_4$  and the  $H - O - H$  bond in  $H_2O$  are all greater than  $90^\circ$

C. The  $H - O - H$  bond angle in  $H_2O$  is larger than the  $H - C - H$  bond angle is  $CH_4$

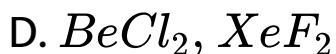
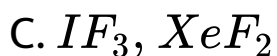
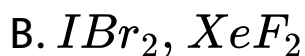
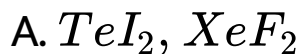
D. The  $H - O - H$  bond angle in  $H_2O$  is smaller than the  $H - N - H$  bond angle is  $NH_3$

**Answer: c**



**Watch Video Solution**

84. Which of the following pairs of compound is isoelectronic and isostructure ?



Answer: b



Watch Video Solution

85. The species, having bonds angle of  $120^\circ$  is

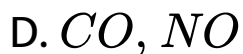
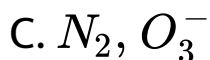
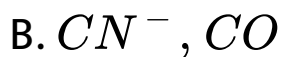
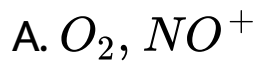


**Answer: c**



**Watch Video Solution**

86. Which of the following pairs of species have the same bond order ?

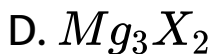
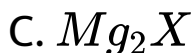
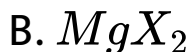
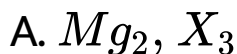


Answer: d



Watch Video Solution

87. Magnesium reacts with an element (X) is forms a ionic compound .If the ground state electron configuration of (X) is  $1s^22s^22p^2$  , the simple formula for the compound is



**Answer: d**



**Watch Video Solution**

88. Consider the following species

$CN^-$ ,  $CN^-$ ,  $NO$  and  $CN^+$ .

Which one of these will have the highest bond order?

A.  $NO$

B.  $CN^-$

C.  $CN^+$

D.  $CN$

Answer: b



Watch Video Solution

89. The number of lone pairs of electrons present on the central atom of  $ClF_3$  is

A. one

B. two

C. four

D. three

Answer: b

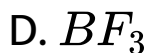
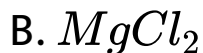


Watch Video Solution



## AIMS Questions

1. Which of the following is an electrovalent linkage ?



**Answer: b**



Watch Video Solution

2. Which one is the electron deficient compound

?

A.  $ICl$

B.  $NH_3$

C.  $BCl_3$

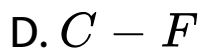
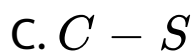
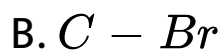
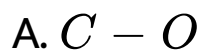
D.  $PCl_3$

**Answer: c**



Watch Video Solution

3. Which of the most covalent ?



**Answer: c**



**Watch Video Solution**

4. The number of electrons shared by each outermost shell of  $N_2$  is

A. 2

B. 3

C. 4

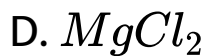
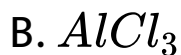
D. 5

**Answer: b**



**Watch Video Solution**

5. Which of the following has covalent bond

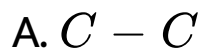


**Answer: d**



**Watch Video Solution**

**6. Strongest bond is**



B.  $C - H$

C.  $C - N$

D.  $C - O$

**Answer: c**



**Watch Video Solution**

7. The compound containing coordinate bond is

A.  $O_3$

B.  $SO_3$

C.  $H_2SO_4$

D. All of these

**Answer: d**



**Watch Video Solution**

**8. Which molecules has zero dipole moment ?**

A.  $H_2O$

B.  $CO_2$

C.  $HF$

D.  $HBr$

**Answer: b**



**Watch Video Solution**

9. Which bond angle  $\theta$  would result in the maximum dipole moment for the triatomic  $YXY$ ?

A.  $\theta = 90^\circ$

B.  $\theta = 120^\circ$

C.  $\theta = 150^\circ$



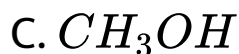
D.  $\theta = 180^\circ$

**Answer: a**



**Watch Video Solution**

**10.** Which of the following is the most polar?



Answer: c



Watch Video Solution

11. Which of the following has zero dipole moment ?



**Answer: b**



**Watch Video Solution**

**12.** If the electron pair forming a bond between two atoms and B is not in the center then the bond is ?

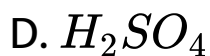
- A. single bond
- B. polar bond
- C. none- polar bond
- D.  $\pi$  – bond

Answer: d



Watch Video Solution

13. Which of the following is a polar compound ?



**Answer: a**



**Watch Video Solution**

**14.** In which of the following there exists a  $p\pi - p\pi$  bonding

- A. Diamond
- B. Graphite
- C. Dimethyl amine
- D. Trisilylamine

**Answer: D**



**Watch Video Solution**

**15.** Which of the following statement is not correct ?

A. Hybridization is the mixing of atomic orbitals period their combiting into molecules

B.  $sp^2$  hydrid orbital are formed from two p atom orbital and one s orbital

C.  $d^2 sp^2$  hybrid orbital are direction towards  
the comens of a regular octredron

D.  $dsp^3$  hybrid orbitals are all at  $90^\circ$  to one  
another

**Answer: d**



**Watch Video Solution**

**16.** Noble gases have compleately filled valance  
shall i.e.  $m^2 sp^2$  exceps He (i.e) .Noble gases are  
monoomic under normal conductions .Law

boiling point of the lighter noble gases are due to weak van der Waals forces between the atoms and absence of any intermolecular interactions.  $Xe$  reacts with  $F_2$  to give a series of fluorides:  $XeF_2$ ,  $XeF_4$ ,  $XeF_6$ , and  $XeF_3$ . On complete hydrolysis,  $XeF_6$  gives  $XeF_3$ .

Structure of  $XeF_4$  is

- A. linear
- B. pyramidal
- C. tetrahedral
- D. square planar



Answer: d



Watch Video Solution

17. The molecule of  $CO_2$  has  $180^\circ$  bond angle it  
one be explained on the basic of

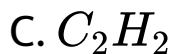
- A.  $sp^3$  hybridisation
- B.  $sp^2$  hybridisation
- C.  $sp$  hybridisation
- D.  $d^2 sp^3$  hybridisation

**Answer: c**



**Watch Video Solution**

**18.** Which of the following compounds the one having linear structure is

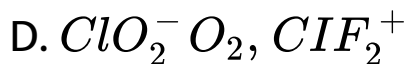
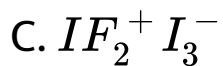
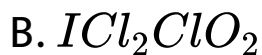
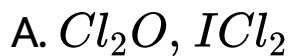


Answer: c



Watch Video Solution

19. The isoelectronic pair is

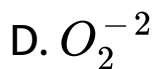
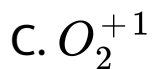
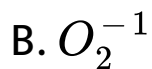


Answer: d



Watch Video Solution

20. Bond order of  $O_2$ ,  $O_2^-$  and  $O_2^{2-}$  is in order

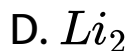


**Answer: c**



Watch Video Solution

21. Which of the following does not exist on the basis of molecule orbital theory ?

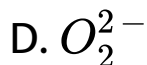
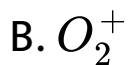


**Answer: C**



**Watch Video Solution**

22. Which of the following species have maximum number of unpaired electrons ?



**Answer: a**



**Watch Video Solution**

**23.** Give reason in one or two sentences for the following: 'o-nitrophenol is steam volatile, whereas p-nitrophenol is not'.

A. Resonance

B. Hyperconjugation

C. Hydrogen bonding

D. Steric hindrance

**Answer: C**



**Watch Video Solution**

24. Water has high heat of vaporisation due to ?

A. covalent bonding

B. H- bonding

C. ionic bonding

D. none of the above

**Answer: b**



**Watch Video Solution**



25. Why is ice less denser than water and what kind of attractive force must be overcome to melt ice?

A. hydrogen bonding interactions

B. dipole- dipole interactions

C. dipole-induced dipole interactions

D. induced dipole-induced dipole interactions

**Answer: A**



**Watch Video Solution**

26. Ethyl alcohol ( $C_2H_5OH$ ) has higher boiling point than dimethyl ether ( $CH_3 - O - CH_3$ ) although the molecular weight of both are same .

- A. hydrogen bonding in ethanol
- B. hydrogen bonding in dimethyl ether
- C.  $CH_3$  group in ethanol
- D.  $CH_3$  group in dimethyl ether

**Answer: A**



Watch Video Solution

27. Which one is the highest melting halide ?

A. NaCl

B. NaBr

C. NaF

D. NaI

**Answer: C**



Watch Video Solution

**28.** In the formation of a molecule by an atom ?

A. attractive forces operate

B. repulsive forces operate

C. both attractive and repulsive forces  
operate

D. none of these

**Answer: C**



**Watch Video Solution**

29. Which of the following exhibits the weakest intermolecular forces?

A. He

B. HCl

C.  $NH_3$

D.  $H_2O$

**Answer: a**



**Watch Video Solution**

30.  $H_2O$  is dipolar, whereas  $BeF_2$  is not. It is because

A. electronegativity of F is greater than that of O

B.  $H_2O$  involves H-bonding, whereas  $BeF_2$  is a discrete molecule

C.  $H_2O$  is angular and  $BeF_2$  is linear

D.  $H_2O$  is linear and  $BeF_2$  is angular.

**Answer: C**



31. Which is incorrect regarding S and P mixing (along Z axis.) ?

A. Nodal plane(s) present in ABMO

B. Nodel plane is absent in BMO

C. MO formed may have highest energy than parent AO

D. *MO* formed are aysmmetric

Answer: B



Watch Video Solution

## Assertion - Reasoning Questions

1. Assertion : Sulphuric acid is more viscous than water.

Reason : Concentrated Sulphuric acid has a greater affinity for water.

A. If both assertion and reason are true and the reason is a true explanation of the assertion.



B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. if assertion is false but reason is true.

**Answer: b**



**Watch Video Solution**

2. Assertion : The dipole moment helps to predict whether a molecule is polar or non-

polar.

Reason : The dipole moment helps to predict geometry of molecule.

A. If both assertion and reason are true and the reason is a true explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. if assertion is false but reason is true.

**Answer: a**



**Watch Video Solution**

**3. Assertion :** Water is a good solvent for ionic compounds but poor one for covalent compounds.

**Reason :**Hydrogen energy of ions releases sufficient energy to overcome lattice energy and break hydrogen bonds in water, while covalent bonded compound interact so weakly that even

van der Waals force between molecules of covalent compounds cannot be broken.

A. If both assertion and reason are true and the reason is a true explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

**Answer: a**



**Watch Video Solution**

**4. Assertion :** The atoms in a covalent molecule are said to share electrons, yet some covalent molecule are polar.

**Reason :** In a polar covalent molecule , the shared electron spend more time on the average near one of the atoms .

A. If both assertion and reason are true and the reason is a true explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. if assertion is false but reason is true.

**Answer: a**



**Watch Video Solution**

5. Assertion : All F - S - F angle in  $SF_4$  are greater than  $90^\circ$  but less than  $180^\circ$ .

Reason :The lone pair -bond pair repulsion is weaker than bond pair -bond pair repulsion

A. If both assertion and reason are true and the reason is a true explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. if assertion is false but reason is true.

**Answer: c**



**Watch Video Solution**

**6. Assertion :** Both  $\pi(2p_x)$  and  $\pi^*(2p_x)$  MO's

have one nodal plane each

**Reason :** All MO's formed by side way overlapping

of  $2p$ -orbital have one nodal plane



A. If both assertion and reason are true and the reason is a true explanation of the assertion.

B. If both assertion and reason are true but reason is not the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. if assertion is false but reason is true.

**Answer: B**



**Watch Video Solution**

## Section D - Chapter End Test

1. if assertion is false but reason is true.

A. Changes from  $sp^3$  to  $sp^2$

B. Remain unchanged

C. Changes from  $sp^3$  to  $sp^3d$

D. Changes from  $sp^3$  to  $sp$

**Answer: b**



**Watch Video Solution**

2.  $PCl_5$  exists but  $NCl_5$  does not because

A. Nitrogen has no vacant 2-d orbital

B.  $NCl_3$  is unstable

C. N-atom is much smaller than P

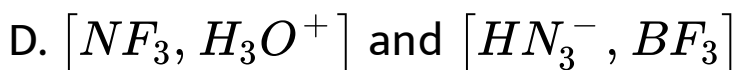
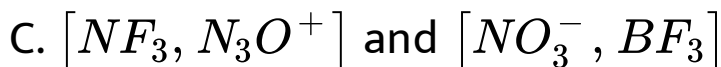
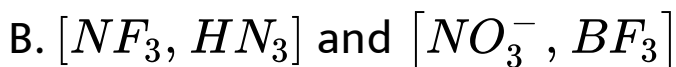
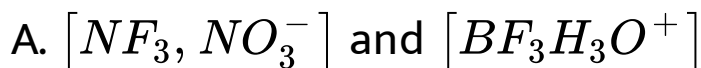
D. Nitrogen is highly inert

**Answer: A**



**Watch Video Solution**

3. Among the following species, identify the isostuctural pairs



**Answer: C**



**Watch Video Solution**

4. The bond order in  $CO_2^{2-}$  ion between C - O is

A. Zero

B. 0.88

C. 1.33

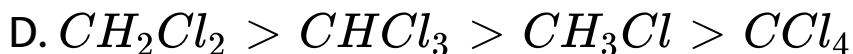
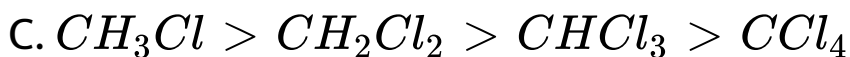
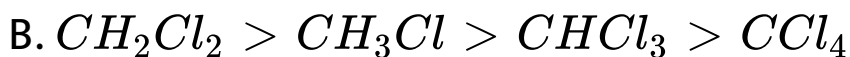
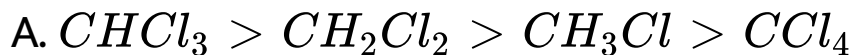
D. 2

**Answer: c**



**Watch Video Solution**

5. The order of dipole moment of the following molecules is

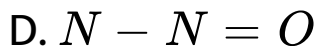
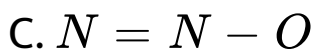
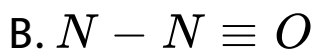
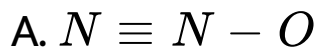


**Answer: d**



**Watch Video Solution**

6. Which of the following resonating structure of  $N_2O$  is the most contributing ?



**Answer: a**



**Watch Video Solution**

7. Number of  $H -$  bonds formed by a water molecule is:

A. 4

B. 3

C. 2

D. 1

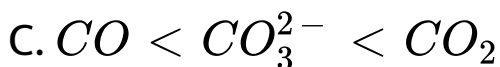
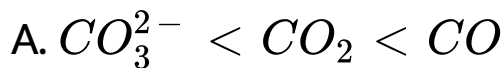
**Answer: a**



**Watch Video Solution**



8. The correct order of decreasing  $C - O$  bond length of (I)  $CO$ , (II)  $CO_3^{2-}$  (III)  $CO_2$  is .

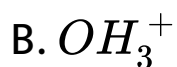
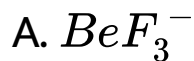


**Answer: d**



**Watch Video Solution**

9. In which of the following the central atom does not use  $sp^2$  hybrid orbitals in its bonding



**Answer: a**



**Watch Video Solution**

10. The number of S - S bonds in sulphur trioxide times  $S_3O_9$  is

A. Three

B. Two

C. One

D. Zero

**Answer: d**



**Watch Video Solution**

11. Bonds presents in  $CuSO_4 \cdot 5H_2O$  is

- A. Electrovalent and covalent
- B. Electrovalent and coordinate
- C. Electrovalent, covalent and coordinate
- D. Covalent and coordinate

**Answer: c**



**Watch Video Solution**

12. From the following which group of elements easily forms cation

A. F,Cl,Br

B. Li,Na,K

C. O,S,Se

D. *N, P, As*

**Answer: b**



**Watch Video Solution**

13. The high following points and insolubility in organic solvents of sulphanic acid are due to its .....structure

A. Simple ionic

B. Bipolar ionic

C. Cubic

D. Hexagonal

**Answer: b**



**Watch Video Solution**

14. On analysis, a certain compound was found to contain iodine and oxygen in the ratio of 254g of iodine and 80g of oxygen. The atomic mass of iodine is 127 and that of oxygen is 16. Which of the following is the formula of the compound?

A. IO

B.  $I_2O$

C.  $I_5O_2$

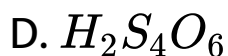
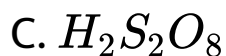
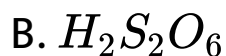
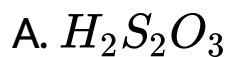
D.  $I_2O_5$

**Answer: d**



**Watch Video Solution**

**15.** The acid having O - O bond is



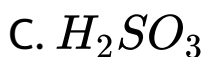
**Answer: c**





Watch Video Solution

16. Which of the following does not have a coordinate bond ?



Answer: d



Watch Video Solution

17. Which bond angle  $\theta$  would result in the maximum dipole moment for the triatomic  $YXY$ ?

A.  $\theta = 90^\circ$

B.  $\theta = 120^\circ$

C.  $\theta = 150^\circ$

D.  $\theta = 180^\circ$

**Answer: a**



**Watch Video Solution**

18. In a polar molecule , the ionic charge is  $4.8 \times 10^{-10}$  esu. If the interatomic distance is  $1\text{\AA}$  unit, then the dipole moment is

A. 41.8 debye

B. 4.18 debye

C. 4.8 debye

D. 0.48 debye

**Answer: c**



**Watch Video Solution**

19. If the electron pair forming a bond between two atoms and B is not in the center then the bond is ?

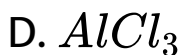
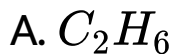
- A. Single bond
- B. Polar bond
- C. None- polar bond
- D.  $\pi$  – bond

**Answer: b**



**Watch Video Solution**

20. Which of the following have both polar and non-polar bonds?



**Answer: b**



**Watch Video Solution**

21. In which of the following there exists a  $p\pi - p\pi$  bonding

A. Diamond

B. Graphite

C. Dimethyl amine

D. Trisilylamine

**Answer: d**



**Watch Video Solution**

22. Number of bond in  $SO_2$

A. Two  $\sigma$  and two  $\pi$

B. Two  $\sigma$  and one  $\pi$

C. Two  $\sigma$ , two  $\pi$  and one lone pair

D. None of these

**Answer: c**



**Watch Video Solution**

23. As the p - character increases the bond angle in hybrid orbital formed by a and atomic orbitals

A. Decreases

B. Increases

C. Doubles

D. Remains unchanged

**Answer: a**



**Watch Video Solution**



24. In an octahedral structure , the pair of d orbitals involved in  $d^2 sp^2$  hybridization is

A.  $d_{x^2}, d_{xz}$

B.  $d_{xy}, d_{yz}$

C.  $d_{x^2 - y^2}, d_{z^2}$

D.  $d_{xz}, d_{x^2 - y^2}$

**Answer: c**



**Watch Video Solution**

25. Among the compounds  $BF_3$ ,  $NCl_3$ ,  $H_2S$ ,  $SF_4$  and  $BeCl_2$ . Identify the ones in which the central atom has the same type of hybridisation.

A.  $BF_3$  and  $NCl_3$

B.  $H_2S$  and  $BeCl_2$

C.  $NCl_3$  and  $H_2S$

D.  $NCl_3$  and  $BeCl_2$

**Answer: C**



**Watch Video Solution**

26. The molecule of  $CO_2$  has  $180^\circ$  bond angle it one be explained on the basic of

- A.  $sp^3$  hybridisation
- B.  $sp^2$  hybridisation
- C.  $sp$  hybridisation
- D.  $d^2sp^3$  hybridisation

**Answer: c**



**Watch Video Solution**

27.  $H_2O$  is dipolar, whereas  $BeF_2$  is not. It is because

A.  $H_2O$  is linear and  $BeF_2$  is angular

B.  $H_2O$  is angular and  $BeF_2$  is linear

C. The electronegativity of F is greater than that of O

D.  $H_2O$  involves hydrogen bonding whereas  $BeF_2$  is a discrete molecule

**Answer: b**



**Watch Video Solution**

**28.** Assertion : Crystals of hydrated calcium sulphate gypsum ( $CaSO_4 \cdot 2H_2O$ ) are soft easily cleaved.

Reason : Crystals anhydrous calcium sulphate (anhydride:  $CaSO_4$ ) are hard and very difficult to cleave.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true and the reason is the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. if assertion is false but reason is true.

**Answer: b**



**Watch Video Solution**

**29.** Assertion : Fluorine( $F_2$ ) is gas white iodine ( $I_2$ ) is solid at room temperature.

Reason :A large molecule or heavy atom is more polarizable and has larger dispersion forces because it has many electrons some of which are less tightly held and are farther from the nucleus.

A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true and the reason is the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. if assertion is false but reason is true.

**Answer: a**



**Watch Video Solution**

**30.** Statement : The molecule cis-1-chloropropene is more polar than trans-1-chloropropene .

Explanation : The magnitude of resultant vector in chloropropene is non-zero.



A. If both assertion and reason are true and the reason is the correct explanation of the assertion.

B. If both assertion and reason are true and the reason is the correct explanation of the assertion.

C. If assertion is true but reason is false.

D. if assertion is false but reason is true.

**Answer: d**



**Watch Video Solution**

