CHEMISTRY

BOOKS - MARVEL CHEMISTRY (HINGLISH)

NATURE OF CHEMICAL BOND

Mcqs

1. The maximum number of covalent bonds by which the two atoms can be bonded to each other is

A. Four

B. Two

C. Three

D. One

Answer: c

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2. The bond formation in atoms is due the fact that atoms

A. acquire higher energy

B. get their energy lowered

C. change their positions

D. none of them

Answer: b

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3. The bond fomation between atoms takes place due to the fact .

A. they can gain two electrons in the valence shell

B. they can gain electrons in the valence shell

C. they acquire stability by lowering of energy

D. they acquire stability by increasing their energy

Answer: c

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4. An atom X has three valance electrons and atom Y has six valence electrons . The coompound formed

between them will have the formula

A. X_2Y_6

B. XY_2

C. X_2Y_3

D. X_3Y_2

Answer: c

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5. Point out the false statement

A. A molecule represents a more stable state as compared to individual atom

B. Carbon tetrechloride is a non-polar molecular

C. Ionic compounds genergally have low m.p. and b.p.

D. Anhydrous $AlCl_3$ is covalent subtance

Answer: c

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6. Electronegativity values of elements help in predicting :

A. strength of bond formed by them

B. polarity of the molecules

C. size of the molecules

D. valency of the elements

Answer: b

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7. The compound XY is formed by transfer of an electron from X to Y then

A. X is divalent

B. Y is divalent

C. The compound XY is covalent

D. The compound XY is electrovalent

Answer: d

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8. The ionic compound is made up of

A. neutrel atoms

B. neutral molecules

C. electrically charged atoms or group of atoms

D. electrically charged molecules

Answer: c

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9. An ionic compound A^+B^- is most likely to be formed when :

A. ioniczation enthalpy of A is higt and electron gain enthalpy of B is low

B. ionization enthalpy of A is low and electron gain enthalpy of B is high

C. Ionic compounds genergally have low m.p. and b.p.

D. ionization enthalpy of A and electron gain enthalpy of B is low

Answer: b

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10. Which of the followings is/are an ionic compound ?

A. KI

B. Water

C. CH_3Cl_3

D. Both a and b

Answer: a

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11. The compound which does not contain ionic bond is

A. NaOH

B. Na_2S

C. HCl

D. NaH

Answer: c

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12. Ionic compounds generally have

A. high m.p. and non-direction bonds

B. low m.p. and directional bonds

C. high m.p. and direction bonds

D. high m.p. and low b.p.

Answer: a

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13. Born-Haber cycle is used to determine

A. Electrongatively

B. Lattice energy

C. Both the these

D. None of these

Answer: b

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14. A true covalent bond is formed by

A. transfer of electrons from one atom to other

B. mutual sharing of electrons

C. one-sided sharing of electrons

D. Any of the above three processes

Answer: B

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15. which of the followings is not a characteristic of a characteristic of a covalent compound ?

A. It has low melting and boiling point

B. They are generally soluble in water

C. They have no definite geometry

D. Both (b) and (c)

Answer: d

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16. The molecule which contains ionic as well as covalent bond, is

A. $C_2H_4Cl_2$

B. CH_3I

C. KCN

D. H_2O_2

Answer: c

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17. A covalent bond may be formed by

A. s-s-overlap

B. s-p overlap

C. p-p overlap

D. All the three

Answer: d

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18. The dative bond is prsent in

A. NH_3

B. SO_3

C. PCl_5

D. BF_3

Answer: b

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

A. SO_2

B. NHO_3

C. H_2SO_4

D. NHO_2

Answer: d

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20. Which has a covalent both ?

A. CH_3

B. $SnCl_4$

C. NaH

D. $MgCl_2$

Answer: b

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21. The compound which contains both ionic and covalent bonds is

A. NH_4

B. H_2

C. KCN

D. KCL

Answer: a

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22. The type of bonding in HCl molecule is

A. Pure covalent

B. Polar covalent

C. Highly polar

D. Hydrogen bondiing

Answer: b

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23. Most favourable conditions for inoic bonding are .

A. low charge on ions , large cations , large anions

B. low charge on ions , large cations , small anions

C. high charge on ions , large cations , small anions

D. high charge on ions , small cation, large anions

Answer: b

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24. Which of the following pairs will form the most stable ionic bond ?

A. Na and Cl

B. Mg and F

C. Li and F

D. H_2O

Answer: b

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25. Bonding in ferric chloride is

A. Covalent

B. Ionic

C. Co-ordinate

D. None of the above

Answer: a

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26. Sodium chloride is an ionic compound whereas hydrogen chloride is Mainly covalent because

A. Sodium is less reactive

B. Hydrogen is non-metal

C. Hydrogen chloride is a gas

D. Electronegativity difference in the case of hydrogen and chlorine is less then 2.1

Answer: b

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27. The formal charges on the three O atoms in the O_3 molecule are

A. 0,0,0

B. 0,0,-1

C. 0,0,+1

D. 0,+,1,-1

Answer: d

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28. In the electronic structure of H_2SO_4, the total number of unshared electrons is

A. 20

B. 16

C. 12

D. 8

Answer: b

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29. How many electrons are used in bonding the Lewis structure of $C_2O_4^{2-}$ (oxalate) ion ?

A. 22

B. 20

C. 18

D. 14

Answer: d

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30. Which of the following does not contain any coordinate bond ?

A. H_3O^+

B. NH_4^+

C. HF_2^-

D. BF_4^-

Answer: c

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31. The compound containing coordinate bond is

A. H_2SO_4

B. O_3

C. SO_3

D. All the three

Answer: d

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32. Which type of bond is not present in HNO_2 molecule?

A. Covalent

B. Co-ordinate

C. Ionic

D. Ionic as well as co-ordinate

Answer: d

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33. The octer rule is not valid for the molecule .

A. CO_2

B. H_2O

C. O_2

D. CO

Answer: d

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34. Sulphuric acid molecule contains

A. Only covalent bonds

B. Covalent and ionic bonds

C. Covalent and coordinate bonds

D. Covalent , ionic and co-ordinate bonds

Answer: B

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

A. $-0.75, 0.6$

B. $-0.75, 1.0$

C. $-0.75, 1.25$

D. $-3, 1.25$

Answer: c

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

A. 2

B. 3

C. 4

D. 5

Answer: b

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37. The number of electrons that are paired in oxygen molecule is

A. 16

B. 12

C. 14

D. 8

Answer: c

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38. A pair of compounds which has odd electrons in the group NO, CO, CIO, N_2, SO_2 and O_3 are

A. NO and ClO_2

B. CO and SO_2

C. ClO_2 and CO

D. SO_2 and O_3

Answer: a

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39. Debye , the unit of dipole moment is related to the SI unit of dipole moment

A. 1D = 1 cm

B. $1D = 3.335 \times 10^{-30} Cm$

C. $1Cm = 3.33 \times 10^{-30} D$

D. $1D = 10cm$

Answer: b

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40. Bond ,or der is defined as

A. difference of number of electrons in the bonding MO and in antibonding MO

B. half of the value of (a)

C. difference in the number of valance electrons

of the two combining toms

D. half of the value of (c)

Answer: b

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41. The bond order of super oxide ion O_2^{2-} is

A. 2.5

B. 1.5

C. 2

D. 1.0

Answer: d

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42. Which of the following has the smallest bond length ?

A. O_2

B. N_2

C. Cl_2

D. HCl

Answer: b

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43. According to Fazan rule, the covalent bond is favoured by :

A. small cation and large anion

B. small cation and small anion

C. large cation and large anion

D. large cation and small anion

Answer: A

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44. The bond order depends on the number of electrons in the bonding and antibonding orbitals. Which of the following statement is/are correct about bond order ?

A. cannot be a negative quantity

B. has always an integral value

C. can assume any value ,positive , negative

integral or fractional , including zero

D. is a non-zere quantity

Answer: a

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45. Dipole moment is highest for:

A. $CHCl_3$

B. CH_4

C. CHF_3

D. CCl_4

Answer: c

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46. The compound in which the distance between the two adjacent carbon atoms is largest is :

A. benzene

B. ethene

C. butane

D. ethyne

Answer: c

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47. Which one of the following is the correct order of interactions ?

A. Covalent $<$ hydrogen bonding $<$ van der waals' $<$ dipole-dipole .

B. Van der waals' $<$ hydrogen bonding $<$ dipole-dipole $<$ covalent

C. Vander waals' $<$ dipole-dipole $<$ hydrogen bonding $<$ covalent

D. Dipole-dipole $<$ van waals' $<$ hydrogen bonding $<$ covalent

Answer: b

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48. Linus Pauling received the Nobel Prize for his work on

A. atomic structure

B. photosyntheis

C. chemical bonding

D. thermodynamics

Answer: c

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49. On the basis of concept of ionic potential (ϕ) , the tendency to from covalent bond in a gourp

A. increases

B. decreases

C. remains unchanged

D. shows erratic change

Answer: b

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50. Explain the important aspects of resonance with respect to the CO_3^{2-} ion.

A. three single bonds

B. two single and a double bond

C. three single bonds and one lone pair of electrons

D. two single bonds and two lone pairs of electrons

Answer: d

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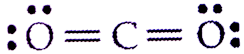
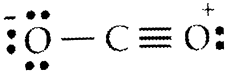
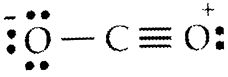
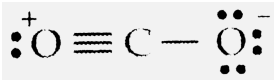
51. Which of the following resonating structures is not correct for CO_2 ?

A. 

B. 

C. 

D. 

Answer: c

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52. Which of the following is not true about resonance ?

A. The resonating structures are hypothetical

B. The unpaired electrons is various resonating structures are the same

C. Hybrid structure is less stable

D. Hybrid structure is least energetic

Answer: c

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53. Resonance structures can be written for .

A. O_3

B. NH_3

C. CH_4

D. H_2O

Answer: a

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54. In an ionic compound A^+X^- the degree of covalent bonding is greatest when

A. A^+ and X^- ions are small

B. A^+ is small and X^- is large

C. A^+ and X^- are approximately of the same size

D. X^- is small A^+ is large

Answer: b

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

A. $MgCl_2$

B. $CaCl_2$

C. $BaCl_2$

D. $BeCl_2$

Answer: c

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56. In which of the following molecules the van der Waals forces are likely to be the most important in determining the mpt. and b.pt.?

A. CO

B. H_2S

C. Br_2

D. HCl

Answer: c

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57. Which of the following is solid with highest melting point ?

A. CO_2

B. H_2S

C. SiO_2

D. He

Answer: a

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58. Which of the following hydrogen halides has a high percentage of ionic charater ?

A. HF

B. HCl

C. HBr

D. HI

Answer: d

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59. Which one of the following moleuclar has zero dipole moment ?

A. NH_3

B. $CHCl_2$

C. H_2O

D. BF_3

Answer: a

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60. Dipole moment of NF_3 is smaller than :

A. NH_3

B. CO_2

C. BF_3

D. CCl_4

Answer: a

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61. Which of the following has highest dipole moment ?

A. BF_3

B. NH_3

C. NF_3

D. B_2H_6

Answer: b

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62. The dipole moment of o, p and m-dichlorobenzene will be in the order :

A. $o > p > m$

B. $p > o > p$

C. $m > o > p$

D. $o > m > p$

Answer: d

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63. Which of the following molecule has a net dipole moment?

A. CO_2

B. CCl_4

C. NH_4

D. NF_3

Answer: c

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64. Which of the following molecular has non-zero dipole moment ?

A. PCl_5

B. BF_3

C. SO_2

D. CO_2

Answer: c

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65. The correct order of increasing covalent character of the following is

A. $SiCl_4 < AlCl_3 < CaCl_2 < KCl$

B. $KCl < CaCl_2 < AlCl_3 < SiCl_4$

C. $AlCl_3 < CaCl_2 < KCl < SiCl_4$

D. none of these

Answer: b

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66. Which of the following is not true about H_2O molecule ?

A. The molecule has $\mu = 0$

B. The molecule can act as a base

C. The subtance shows abnormally high boiling point in comparison to the hydride of other elements of oxygen group

D. The moleculae has a bent shape

Answer: a

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67. One DEBYE (D) is equal to

A. 1×10^{-4} esu cm

B. 1×10^{-18} esu cm

C. 1×10^{-10} esu cm

D. 1×10^{16} esu cm

Answer: b

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68. Which of the following pairs can form a compound with the maximum ionic character ?

A. Na, Cl

B. K, I

C. Cs, F

D. Ca, F

Answer: c

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69. Which of the following is least polar ?

A. N-H

B. C-H

C. O-H

D. H-F

Answer: b

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70. Out of $CHCl_3, CH_4$ and SF_4 the molecules having regular geometry are

A. $CHCl_3$ only

B. $CHCl_3$ and SF_4

C. CH_4 only

D. CH_4 and SF_4

Answer: c

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71. Which of the following has largest bond angle ?

A. H_2O

B. F_2O

C. Cl_2O

D. H_2S

Answer: c

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72. The molecule which has zero dipole moment is

A. CH_2Cl_2

B. BF_3

C. NF_3

D. ClO_2

Answer: b

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73. The electronegativities of F, Cl, Br, and I are $4.0, 3.0, 2.8$, and 2.5, respectively. The hydrogen halide with a high percentage of ionic character is

A. HF

B. HCl

C. HBr

D. HI

Answer: a

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74. H_2O has a net dipole moment while BeF_2 has zero dipole moment because :

A. H_2O molecule is linear while BeF_2 is bent

B. BeF_2 molecule is linear while H_2O is bent

C. Fluorine has more electronegativity than oxygen

D. Beryllium has more electronegativity then oxygen .

Answer: b

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75. Lateral overlap of p-orbitals leads to the formation of

A. π-Bond

B. Metallic bond

C. σ Bond

D. Ionic bond

Answer: a

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76. The fluorine molecules is formed by :

A. p-p orbitals (sideways overlap)

B. p-p orbitals (end-to-end overlap)

C. sp-sp orbitals

D. s-s orbitals

Answer: b

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77. The strength of bonds by 2s -2s, 2p-2p and 2p-2s overlap has the order

A. $s - s > p - p > s - p$

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

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

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

Answer: b

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78. Which of the following statement is correct?

A. A σ bond is weaker than a π bond

B. There are four coordinate bonds in the NH_4^+ ion

C. The covalent bond is directional in nature

D. HF is less polar than HCl

Answer: c

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79. In Which of the following species the bonds are non-directional ? .

A. NCl_3

B. $RbCl$

C. $BeCl_3$

D. BCl_3

Answer: b

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80. Fluorine molecule is formed by

A. the axial p-p orbital overlap

B. the side-ways p-p orbitals overpap

C. the s-s orbital overlap

D. the s-p orbital overlap

Answer: a

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81. Which of the following statement is correct

A. HF is less polar than HBr

B. A bsolutely pure water does not contain any ion

C. Chemical bond formation takes place when

forces of attraction overcome the forces of repulsion

D. in covalency , transference of electron takes place

Answer: c

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82. A hybrid orbital formed from s and p-orbital can contribute to

A. aσ bond only

B. π bond only

C. either σ or π bond

D. cannot be predicted

Answer: a

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83. N atom in NH_4^+ involves the hybridizations

A. sp

B. sp^2

C. sp^3

D. sp^3d

Answer: c

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84. Two hybrid orbitals have a bond angle of 120°. The percentage of s-character in the hybrid orbitals is nealy:

A. $25\ \%$

B. $33\ \%$

C. $50\ \%$

D. $66\ \%$

Answer: b

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85. Compound in which central atom assumes sp^3d hybridisation is

A. SO_3

B. PCl_5

C. SO_2

D. PCl_3

Answer: b

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86. The hybrid state of S in SO_3 is similar to that of

A. C in C_2H_2

B. C in C_2H_4

C. C inCH_5

D. C in CO_2

Answer: b

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87. Pair of molecules having identical geometry is

A. BF_3, NH_3

B. BF_3, AlF_3

C. BeF_2, H_2O

D. BCl_3, PCl_3

Answer: b

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88. The geometry of sp^3d^2 hybrid orbitals is

A. tetrahedral

B. pantagonal bipyramidal

C. trigonal bipyramidal

D. octahederal

Answer: d

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89. Which of the following statement is incorrect for PCl_5 ?

A. Its all P-Cl bond lengths are equal

B. It involves sp^3d hybridization

C. `It has an irregular geometry

D. Its shape is trigonal bipyramidal

Answer: a

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90. InOF_2, oxygen has hybridization of

A. sp

B. sp^2

C. sp^3

D. None of these

Answer: c

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91. The hybrid state of C atom in C_2H_2 is same as that of carbon in

A. C_2H_6

B. CO_2

C. Benzene

D. C(Diamond)

Answer: b

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92. The d-orbitals involved in sp^3d hybridisation is:

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

B. d_{xy}

C. d_{x^2}

D. d_{zx}

Answer: c

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93. Which of the following will be planar trigonal ?

A. PCl_3

B. NH_3

C. ClP_3

D. $AlCl_3$

Answer: d

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94. In a chemical change from $PCl_3 \rightarrow PCl_5$ the hybrid state of P changes from

A. sp^2 to xp^3

B. sp^3 to sp^2

C. sp^3 to sp^3d

D. sp^3 to dsp^2

Answer: c

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95. Which among the following molecules is not flat?

A. C_6H_6

B. C_2H_4

C. SO_3

D. C_2H_6

Answer: d

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96. The hybridisation of phosphorus in $POCl_3$ is the same as

A. P in PCl_3

B. S in SF_4

C. $Cl \quad \text{in} ClF_3$

D. B in BCl_3

Answer: a

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97. The d-orbitals involved in dsp^2 hybridisation is

A. d_{xy}

B. $d_z 2$

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

D. d_{xz}

Answer: c

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98. Which orbital is used by oxygen atom to form a sigma bond with other oxygen atom in O_2 molecule ?

A. pure p-orbital

B. sp^2 - hybrid orbital

C. sp^3 - hybrid orbital

D. sp -hybrid orbital

Answer: a

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99. What type of hybridzation is possible in square planer molecule ?

A. sp^3d

B. sp^3

C. dsp^2

D. sp^3d^2

Answer: c

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100. In allene structiure three carbon atoms are joined by

A. Three sigma bond and three pi bond

B. Two sigma bonds and one pi bonds

C. Two sigma bonds and two pi bonds

D. There pi bonds only

Answer: c

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101. The hybridization of S atom in SO_2 is

A. sp

B. sp^2

C. sP^3

D. sp^3d

Answer: b

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102. Which one of the following is a correct set with respect to molecule hybridization and shape ?

A. $BeCl_2$, sp^2 , linear

B. $BeCl_2$, sp^2, triangular planar

C. BCl_3, sp^2 , triangular planer

D. BCl_3, sp^3 tetrehedral

Answer: c

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103. The number of σ bond in 1-butene is

A. 8

B. 10

C. 11

D. 12

Answer: c

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104. Both sp^2 and sp^3 hybrid carbons are present in which of the following compounds ?

A. $CH_3 - CH_3$

B. $CH_2 = CH_2$

C. $CH = CH$

D. $CH_3 - CH = CH - CH_3$

Answer: d

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105. The percentage of s-character in the hybrid orbitals sp, sp^2, sp^3 follows the pattern

A. $sp^3 > sp^2 > sp$

B. $sp = sp^2 > sp^3$

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

D. $sp = sp^2 = sp^3$

Answer: c

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106. Which of the following molecule is theoretically not possible ?

A. SF

B. OF_2

C. OF_4

D. O_2F_2

Answer: c

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

A. -2

B. 3

C. 4

D. -3

Answer: c

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108. Which of the following is an example of super octet molecule ?

A. ClF_3

B. PCl_5

C. IF_7

D. All the three

Answer: d

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109. Sulphur atom in H_2SO_4 has the hybridization

A. sp^3d^3

B. sp^3d^2

C. sp^3d

D. sp^3

Answer: d

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110. Which of the following compounds is non-polar ?

A. CH_3CL

B. CH_2Cl_2

C. $CHCl_3$

D. CCl_4

Answer: d

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111. Which one of the following is a compound most likely to have a dipole moment

A. CS_2

B. CCl_2F_2

C. SO_3

D. $SnCl_4$

Answer: b

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112. Which of the following molecules will have polar bonds but zero dipole moment?

A. O_2

B. $CHCl_3$

C. CF_4

D. None of these

Answer: c

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113. Which of the following has one lone pair of electrons on the centrel atom ?

A. H_2

B. CH_4

C. NH_4^+

D. NCl_3

Answer: d

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114. The correct order of bond angles is

A. $NH_3 > H_2O > PH_3 > H_2S$

B. $NH_3 > PH_3 > H_2O > H_2S$

C. $NH_3 > H_2S > PH_3 > H_2O$

D. $PH_3 > H_2S > NH_3 > H_2O$

Answer: a

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115. The pair of molecules having identical geometry is

A. BCl_3, PCl_3

B. BF_3, NF_3

C. CCl_4, CH_4

D. $CHCl_3, CH_3Cl$

Answer: c

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116. In OF_2, the number of bond pairs and lone pairs of electrons are respectively,

A. 2,6

B. 2,8

C. 2,10

D. 2,9

Answer: b

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117. In XeF_2, XeF_4 and XeF_6 the number of lone pair of Xe is _____ respectively.

A. 2,3,1

B. 1,2,3

C. 4,1,2

D. 3,2,1

Answer: d

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118. Which of the following has the least bond angle ?

A. BeF_2

B. H_2O

C. NH_3

D. CH_4

Answer: b

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119. Two lone pairs of electron and two bond pair of electrons are presnet in

A. NH_3

B. BF_3

C. H_2O

D. CO_2

Answer: c

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120. Which of the following compounds has the samallest bond angle in its molecule ?

A. OH_2

B. SH_2

C. NH_3

D. SO_2

Answer: b

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121. Valence bod theory fails to explain

A. Monovalency of hydrogen

B. Polar natura of H-X moleucle

C. Tetravalency of carbon

D. Bivalency of oxygen

Answer: c

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122. Expected valency of Be according to valence bond theory is

A. 0

B. 2

C. 1

D. 3

Answer: a

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123. Bond angle in NH_3 molecule is

A. $109^\circ 28^\circ$

B. $107^\circ 18^\circ$

C. $104^\circ 9^\circ$

D. 90°

Answer: B

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124. Valence bond theory explains

A. concept of resonance and molecular stability

B. essential covalent character of a chemical bond

C. trivalency of boron

D. both (a) and (b)

Answer: d

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125. The number of $sp^2 - s$ sigma bonds in benzene are

A. 3

B. 6

C. 12

D. none

Answer: b

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126. Which of the following statement about repulsion between bond paris (bp) and lone pair (lp) is correct ?

A. $lp - lp > lp - lp > bp - bp$

B. $lp - bp > lp - lp > bp - bp$

C. $bp - bp > lp - bp > lp - lp$

D. Any of the three depending upon the type of molecule

Answer: a

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127. The molecule which has pyramidal shapes is:

A. PCl_3

B. SO_3

C. CO_2^{2-}

D. NO_3^-

Answer: a

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128. A lone pair of electrons in an atom implies

A. `pair of electrons

B. pair of electrons

C. a pair of electrons involved in bonding

D. a pair of valence electrons not involved in bonding

Answer: d

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129. The chemical inertness of N_2 is attributed to

A. Presence of large number of bonding electrons in comparison of antibonding electrons

B. its high heat of dissociation

C. Presence of a triple bond between nitrogen atom which makes the molecule more stable

D. all the statements are correct

Answer: d

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130. Which of the following statement is correct about the N_2 molecule ?

A. It has a bond order of 3

B. The number of unpaired electrons present in it is zero and hence it is diamagnetic

C. The order of filliing of Mos is

$$\pi(2p_x) = \pi\left(2p_y\right) = (2p_z)$$

D. All the above statements are correct

Answer: d

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131. Bond order is

A. directily related to bond length

B. inversely related to bond length

C. inversely related to bond strength

D. never fractional

Answer: B

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132. The energy of σ_{2s}, is greater than that of σ_{1s}^{*} orbital because

A. σ 2s orbitals is bigger than σ 1s orbital

B. σ 2s is a bonding orbital whereas σ 1s is an antibonding orbital

C. $\sigma 2s$ orbital has a greater value of n then σ^* 1s orbital

D. σ 2s orbitals is formed only after σ 1s

Answer: c

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133. Which of the following statements is incorrect?

A. He_2 does not exist because its bond order is zero

B. O_2, O_2^- and O^{2+} are all paramagnetic

C. Any two atomic orbitals can combine to form two molecule orbitals

D. $\pi(2p_x)$ and $\pi(2p_y)$ are degenerate molecular orbitals

Answer: c

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134. The species C_2

A. has one σ bond and one π bond

B. has both π bonds

C. has bond σ bonds

D. does not exist

Answer: b

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135. Which one is paramagnetic and has the bond order $1/2$

A. O_2^-

B. N_2^+

C. F_2

D. H_2^+

Answer: d

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136. Bond energies in NO, NO^+ and NO^- are such as

A. $NO^+ > NO > NO^-$

B. $NO > NO^+ > NO^-$

C. $NO^- > NO > NO^+$

D. $NO^+ > NO^- > NO$

Answer: a

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137. The bond length in H_2^+, H_2^- and H_2 are in the order

A. $H_2^+ > H_2 > H_2^-$

B. $H_2 > H_2^+ > H_2^-$

C. $H_2^- > H_2 > H_2^+$

D. $H_2^- > H_2^+ > H_2$

Answer: d

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138. Which of the following theory provides good explanation about the paramagnetic behaviour of oxygen ?

A. Resonance theory

B. VSEPR theory

C. Molecular orbital theory

D. Valence bond theory

Answer: c

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139. Which one of the following contains maximum number of unpaired electrons in antibonding molecular orbitals ?

A. O_2

B. O_2^{2-}

C. O_2^-

D. O_2^+

Answer: b

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140. Which of the following molecule have unpaired electrons in antibonding molecular orbitals ?

A. O_2

B. N_2

C. C_2

D. B_2

Answer: a

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141. The molecular orbital configuration of B_2 molecle is

A. $(\sigma 1s)^2(\sigma^* 1s)^2(\sigma 2s)^2(\sigma^* 2s)^2(\pi 2p_y)^1$

B. $(\sigma 1s)^2(\sigma^* 1s)^2(\sigma 2s)^2(\sigma^* 2s)^2(\sigma 2p_z)^2$

C. $(\sigma 1s)^2(\sigma^* 1s)^2(\sigma 2s)^2(\sigma^* 2s)^2(\pi 2p_x)^2$

D. $(\sigma 1s)^2(\sigma^* 1s)^2(\sigma 2s)^2(\sigma^* 2s)^2(\sigma 2p_z)^1(\pi 2p_x)^1$

Answer: a

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142. Which of the following species is paramagnetic ?

A. O_2

B. N_2

C. O_2^{-2}

D. H_2

Answer: a

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143. In the molecular orbital diagram for O_2^+ ion the highest occupied orbital is

A. σ MO orbital

B. π MO orbital

C. π^* MO orbital

D. σ^* MO orbital

Answer: c

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144. In the formation of N_2 molecule, according to M.O.T. the outermost electron goes to

A. πMO

B. sp hybrid orbital

C. σ MO

D. 2p orbital

Answer: c

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145. Which of the following species is diamagnetic ?

A. O_2^+

B. NO^+

C. NO

D. O_2

Answer: b

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146. How many bonds (bonds order) does B_2 have ?

A. 0

B. 1

C. 3

D. 2

Answer: b

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147. N_2 and O_2 are converted into mono anions, N_2^- and O_2^- respectively. Which of the following is wrong?

A. H_2^+

B. H^+

C. H

D. H^-

Answer: b

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148. Which one of the following should be most stable ?

A. H_2^-

B. H^+

C. H

D. H^-

Answer: d

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

A. 2

B. 3

C. 4

D. 5

Answer: c

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150. According to the molecular orbitals theory , O_2^+ possesses

A. Bond order 2.5

B. Three unpaired electrons

C. Diamagnetic character

D. Stability lower then O_2

Answer: a

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151. Which of the following ion does not have bond order of 2.5 ?

A. O_2^-

B. O_2^+

C. N_2^+

D. N_2^-

Answer: a

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152. Which of the following molecular orbitals has two nodal planes ?

A. $\sigma 2s$

B. $\pi 2p_y$

C. $\pi^* 2p_y$

D. $\sigma^* 2p_x$

Answer: c

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153. Which of the following is not paramagnetic ?

A. N_2^+

B. CO

C. O_2^-

D. NO

Answer: b

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154. Which of the following molecualr species has unpaired electrons ?

A. N_2

B. F_2

C. O_2^-

D. O_2^{2-}

Answer: c

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155. Paramagnetism of oxygen is explained on the basis of its electronic configuration of

A. $(2\pi_x{}^*)^1(2\pi_y{}^*)^1$

B. $(2\pi_x{}^*)^1(2p_y{}^*)^1$

C. $(2\sigma_s{}^*)^1(2\pi_y{}^*)^1$

D. $(2\sigma_s)^1(2\pi_y)^1$

Answer: b

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156. The magnetic character of oxygen molecule is same at that of

A. Nitrogen

B. Carbon

C. Peroxide ion

D. Boron

Answer: d

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157. H-Bonding is exhibited by

A. All the molecules containing H-atom

B. Molecules in which H is covalently bonded to F, O or N

C. Molecules in which two H atoms are present

D. Molecules in which H is bonded to atoms with

electronegativity greater than 2.1

Answer: d

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158. The correct order of the strength of H-bonds is :

A. $H\ldots.F > H\ldots.O > H\ldots.N$

B. $H\ldots.N > H\ldots.O > H\ldots.F$

C. $H.....O > H.....N > H.....F$

D. $H.....F > H.....N > H.....O$

Answer: a

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159. In ice, the length of H-bonds :

A. is less then that of covalent bonds

B. is greater than that of covalent bonds

C. is same as that of covalent bonds

D. can be less, greater or same as that of covalent bonds

Answer: b

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160. There is no hydrogen bonding in

A. Acetic acid

B. Ammonia

C. Ethyl alcohol

D. Diethyl ether

Answer: d

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161. Which of the following compounds has the least tendency to form hydrogen bonds between molecules?

A. HF

B. NH_3

C. HCl

D. H_2O

Answer: c

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162. The crystal lattice of ice is mostly formed by

A. ionic forces

B. covalent bonds

C. intramolecular H-bonds

D. covalent as well as H-bonds

Answer: d

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163. Intramolecular H-bonding is present in

A. o-Nitrophenol

B. Salicyladehyde

C. m-Nitrophenol

D. both (a) and (b)

Answer: d

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164. Which of the following compounds has the least tendency to form hydrogen bonds between molecules ?

A. NH_3

B. NH_2OH

C. HF

D. CH_3F

Answer: d

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165. The boiling point of water is $100^\circ C$ whereas that hydrogen sulphide is $-42^\circ C$. This can be attributed to

A. a larger bond angle in water the in hydrogen sulphide

B. smaller size of oxygen atom as compared to sulphur

C. larger ionizaiton enerby of oxygen then sulphur

D. larger tendency of H_2O to from hydrogen bonds than

H_2O

Answer: d

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166. The weakest bond among the following is

A. ionic

B. covalent

C. metallic

D. Hydrogen bondiing

Answer: d

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167. Which one is appreciably soluble in water

A. CS_2

B. C_2H_5OH

C. CCl_4

D. $CHCl_3$

Answer: b

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168. The incorrect order of decreasing boiling point is

A. $HF > HI > HBr > HCl$

B. $H_2O > H_2Te > H_2Se > H_2S$

C. $Br_2 > Cl_2 > F_2$

D. $CH_4 > GeH_4 > SiH_4$

Answer: d

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169. NH_3 has higher boiling point than expected because

A. It froms NH_4OH with water

B. It has intramolecular hydrogen bonds

C. It has intramolecular hydrogen bonds

D. Its density decreases bond on freezing

Answer: b

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170. strongest hydrogen bonding is shown by

A. Water

B. Ammonia

C. Hydorgen fluoride

D. Hydrogen sulphide

Answer: c

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171. The boiling point of $p-$ nitrophenol is higher than that of $o-$ nitrophenol because.

A. NO_2 group between p-position behaves in a different way from that at o-position

B. intramolecular hydrogen bonding exists in p-nitrophenol

C. there is intermolecular hydrogen bonding in p-nitrophenol

D. p-nitrophenol has a higher molecular weight than o-nitrophenoal

Answer: c

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172. Hydrogen bonding is maximum in

A. Ethyl chloride

B. Triethylamine

C. Ethanol

D. Diethyl ether

Answer: c

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173. Which is the weakest among the following types of bonds

A. ionic

B. covalent

C. metallic

D. H-bond

Answer: d

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174. Density of ice is less than that of water because of

A. extensive hydrogen bonding

B. crystal modification of ice

C. open porous structure of ice due to hydrogen bonding

D. different physical states of these

Answer: c

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175. In which of the following pairs hydrogen bonding is not possible ?

A. NH_3NH_3

B. CH_3OCH_3, CH_4

C. H_2, CH_3OH

D. CH_3, OH, C_2H_5OH

Answer: b

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176. The high density of water compared to ice is due to

A. H bonding interaction

B. dipole-dipole interaction

C. dipole-induced dipole interaction

D.

Answer: a

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177. Which of the following combination is not likely to form predominatly covalent bonds ?

A. Sodium and hydrogen

B. Magnesium and oxygen

C. Cesium and fluorine

D. Bromine and fluorine

Answer: c

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178. Solid NaCl is a bad conductor of electricity because

A. Solid NaCl does not contain ions

B. Solid NaCl is covalnet compund

C. Solid NaCl is contains no free electrons

D. Solid NaCl has no mobility of ion

Answer: d

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179. Which of the following substance has the highest melting point? .

A. NaCl

B. KCl

C. MgO

D. BaO

Answer: d

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180. 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: a

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181. The number of sigma (σ) and $pi(\pi)$ bonds present in a molecule of tetracyanoethene is

A. $5\sigma \quad \text{and} \quad 9\pi$

B. $5\sigma \quad \text{and} \quad 8\pi$

C. $9\sigma \quad \text{and} \quad 9\pi$

D. $9\sigma \quad \text{and} \quad 5\pi$

Answer: c

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182. In the Lewis structure of acetic acid, there are

A. 16 shared and 8 snshared electrons

B. 8 shared and 16 unshared electrons

C. 10 shared and 14 unshared electrons

D. 14 shared and 0 unshared electrons

Answer: a

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183. Covalent character is maximum in

A. NaF

B. Na_2O

C. Na_3N

D. All have equal covalent character

Answer: c

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184. Which of the following statement is correct ?

A. $FeCl_2$ is more covalent than $FeCl_3$

B. $FeCl_3$ is more covalent than $FeCl_2$

C. Both $FeCl_3$ and $FeCl_2$ are equally covalent

D. $FeCl_3$ and $FeCl_2$ do not have any covalent character

Answer: b

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185. The first four ionization energies of an element are $191, 578, 872,$ and 5962kcal. The number of valence electrons in the element is.

A. 1

B. 2

C. 3

D. 5

Answer: c

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186. A molecule may be represented by three structures having energies E_1, E_2 and E_3, respectively. The energies of theses structures follow the order $E_3 < E_2 < E_1$, respectively. If the experimental bond energy of the molecule is E_0, their resonance energy is

A. $(E_1 + E_2 + E_3) - E_0$

B. $E_0 - E_3$

C. $E_0 - E_1$

D. $E_0 - E_2$

Answer: b

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187. The boiling points of methanol, water and dimethyl ether are respectively $65^{\circ}C$, $100^{\circ}C$ and $34.5^{\circ}C$. Which of the following best explains these wide variations in b.p. ?

A. The molecular mass increases from water (18)

to methanol (32) to diethl ether (74)

B. The extent of H-bonding decreases from water

to methanol while it is absent in ether

C. The extent of intramolecular hydrogen bonding

H-bonding decreases from ether methanol to water

D. The number of H atoms per molecule increases

form water to methanol to ether

Answer: b

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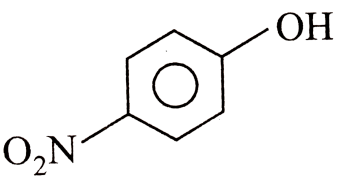
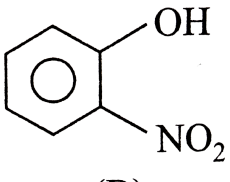
188. Of the two compounds shown below , the vapour pressure of B at a particular temperature is



(A) and



(B)

A. higher than that of A

B. lower than that of A

C. same as that of A

D. can be higher or lower depending upon the size of the vessel

Answer: a

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189. Which carbon is more electronegative ?

A. sp^3 hybridized carbon

B. sp hybridized carbon

C. sp^2 hybridizad carbon

D. The electron attracting power of C is always same irrespective of its hybrid state

Answer: b

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190. C_2H_2 is isostructural with :

A. H_2O_2

B. NO_2

C. $SnCl_2$

D. CO_2

Answer: d

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191. BF_3 and NF_3 both are covalent compounds but NF_3 is polar whereas BF_3 is non-polar. This is because :

A. Nitrogen atom is smaller than boron atom

B. N-F bond is more polar than B-F bond

C. NF_3 is pyramidal whereas BF_3 is planar triangular

D. BF_3 is electron deficient whereas NF_3 not

Answer: c

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

A. 0.54

B. 0.46

C. 0.23

D. 0.72

Answer: b

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193. If E is the total energy of the combining atomic orbitals, and E_b and E_a are the energies of the bonding and antibonding molecular orbitals formed, respectively, then

A. $E - E_1 > E_2 - E$

B. $E - E_1 < E_2 - E$

C. $E - E_1 = E_2 - E$

D. Any one of the these is possible

Answer: c

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194. The bond order in O_2^+ is the same as in :

A. N_2^+

B. CN^-

C. NO^+

D. CO

Answer: a

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195. In the formation of N_2^+ from N_2, the electron is removed from

A. a σ- orbital

B. a π- orbital

C. a σ^*- orbital

D. a π^*-orbital

Answer: a

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196. In which set of the molecules are all the species paramagnetic ?

A. B_2, O_2, N_2

B. B_2, O_2, NO

C. B_2, F_2O_2

D. B_2, O_2, Li_2

Answer: b

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197. Which of the following has zero value of dipole moment?

A. Benzene

B. Nephthalene

C. p-Dichlorbenzene

D. All the three

Answer: c

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198. A molecule has seven bond pairs around the central atom, the shape associated with the molecule is

A. heptagonal

B. octahedral

C. pentagonal pyramidal

D. pentagonal bipyramidal

Answer: d

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199. The molecule AB_n is planar with six pairs of electrons around A in the valence shell. The value of n is

A. 6

B. 2

C. 4

D. 3

Answer: c

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200. The bond angle in H_2S

A. $> NH_3$

B. Same as in $BeCl_2$

C. $> H_2Se < H_2O$

D. Same as in CH_4

Answer: c

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201. The electronic configuration of four elements are given in brackets :

$L\left(1s^2 2s^2 2p^1\right), M\left(1s^2 2s^2 2p^5\right), O\left(1s^2 2s^2 2p^6 3s^1\right), R\left(1s^2 2s^2 2p^2\right)$

The elements which would have most readily from a diatomic molecule .

A. O

B. M

C. R

D. L

Answer: b

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202. Among $LiCI, BeCI_2$ and CCI_4 the covalent bond character varies as .

A. $LiCl < BeCl_2 > BCl_3 > \mathbb{C}l_4$

B. $LiCl > BeCl_2 < BCl_3 < \mathbb{C}l_4$

C. $LiCl < BeCl_2 < BCl_3 < \mathbb{C}l_4$

D. $LiCl > BeCl_2 > BCl_3 > \mathbb{C}l_4$

Answer: c

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203. The bond between atoms of two elements with atomic number 37 and 53 respectively is :

A. Covalent

B. Ionic

C. Co-ordinate

D. Metalic

Answer: b

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204. Among the following species, identify the isostuctural pairs

$NF_3. NO_3^-, BF_3, H_3O, HN_3$

A. $[NF_3, NO^-]$ and $[BF_3, H_3O^+]$

B. $[NF_3, NH_3]$ and $[NO_3^-, BF_3]$

C. $[NF_3, H_3O^+]$ and $[NF_3^-, BF_3]$

D. $[NF_3, H_3O^+]$ and $[NH_3, BF_3]$

Answer: c

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205. in compound X all the bond angles around central atom are $109^\circ 28^\circ$ one of the following will be X ? .

A. Chloramethane

B. Carbon tetrachloride

C. Iodoform

D. Chloroform

Answer: b

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206. The structure and hybridization of $Si(CH_3)_4$ is

A. bent ,sp

B. trigonal , sp^2

C. octahedral , sp^3d

D. tetrahedral , sp^3

Answer: d

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207. An element (X) forms compounds of the formuls XCl_3, X_2O_5 and Ca_3X_2 , but does not form XCl_5. Which of the following is the element X ?

A. B

B. Al

C. N

D. P

Answer: c

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208. The compound MX_4 is tetrahedral. The number of $\angle XMX$ angles formed in the compound is

A. Three sigma bond and three pi bond

B. Four

C. Five

D. Six

Answer: d

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209. A section of the periodic table is given below with elements A , B and X, Y in two groups. Which of the bonds given is the least polar ?

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A. AX

B. AY

C. BX

D. BY

Answer: b

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210. Which bond angle, θ would result in the maximum dipole moment for the triatomic molecule XY_2 ?

A. 90°

B. 120°

C. 150°

D. 180°

Answer: a

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211. Which of the following molecules will have a peranent dipole moment ?

A. SiF_4

B. XeF_4

C. SF_4

D. BF_3

Answer: c

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212. In which one of the followig cases, breaking of covalent bond takes place ?

A. Boiling of H_2O

B. Melting of KCN

C. Boiling of CF_4

D. Melting of SiO_2

Answer: d

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213. $AICI_3$ is covalent while AIF_3 is ionic This can be justified on the basic of .

A. Valence bond theory

B. Crystal structure

C. Lettice energy

D. Fajan Rule

Answer: d

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214. Which of the following molecular species has unpaired electrons(s) ? .

A. N_2

B. F_2

C. O_2^-

D. O_2^{2-}

Answer: c

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215. Sodium chloride is an ionic compound whereas hydrogen chloride is Mainly covalent because

A. Sodium is less reactive

B. Hydrogen is non-metal

C. Hydrogen chloride is a gas

D. Electronegativity difference in the case of hydrogen and chlorine is less then 2.1

Answer: b

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216. In OF_2, the number of bond pairs and lone pairs of electrons are respectively,

A. 2,6

B. 2,8

C. 2,10

D. 2,9

Answer: b

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217. Which of the following statements 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

forces of attraction overcome the forces of repulsion

D. in covalency , transference of electron takes place

Answer: c

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218. Number of π-bonds in naphthalene is

A. 6

B. 3

C. 4

D. 5

Answer: d

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219. Maximum bond angle is present in case of

A. BBr_3

B. BCl_3

C. BF_3

D. same in all

Answer: d

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220. H_2S is a stronger acid than H_2O. Explain

A. O-H bond is stronger than S-H bond

B. O is more electronegative than sulphur

C. H-S bond is weaker than O-H bond

D. O-H bond is weaker than H-S bond

Answer: c

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221. Which of the following is diamagnetic ?

A. Superoxide ion

B. Carbon molecule

C. Unipositive ion of nitrogen molecule

D. Oxygen molecule

Answer: b

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222. Which of the following compounds has the samallest bond angle in its molecule ?

A. OH_2

B. SH_2

C. NH_3

D. SO_2

Answer: b

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223. Which one of the following is the correct set with respect to molecule, hybridization and shape ?

A. $BeCl_2$, sp^2 , linear

B. $BeCl_2$, sp^2, triangular planar

C. BCl_3, sp^2 , triangular planer

D. BCl_3, sp^3, tetrahedral

Answer: c

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224. In a regular octahedral molecule MX_6 the number of $X - M - X$ bonds at 180° is

A. three

B. two

C. six

D. four

Answer: a

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225. 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

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226. The maximum number of 90° angles between bond pair-bond pair of electrons is observed in

A. dsp^3 hybridisation

B. sp^3d hydridisation

C. dsp^2 hybridisation

D. sp^3d^2 hybridisation

Answer: d

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227. Which carbon is more electronegative ?

A. sp^2 hybridized carbon

B. sp hybridized carbon

C. sp^2 hybridized carbon

D. always same irrespective of its hybrid state

Answer: b

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228. The correct order regarding the electronegativity of hybrid orbitals of carbon is ?

A. $sp < sp^2 sp^3$

B. $sp < sp^2 < sp^3$

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

D. $sp < sp^2 sp^3$

Answer: d

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

A. AlF_3

B. NF_3

C. ClF_3

D. BF_3

Answer: c

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230. IF_5 has the following hybridisation

A. d^2sp^3

B. dsp^3

C. sp^3d

D. sp^3d^2

Answer: d

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231. Which of the following reprsents the Lewis structure of N_2 molecule ?

A. 

B. 

C. 

D. 

Answer: a

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232. The energy of hydrogen bond is of the order of

A. 4 KJ mol^{-1}

B. 40 KJ mol^{-1}

C. 400 KJ mol^{-1}

D. 4000 KJ mol^{-1}

Answer: c

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233. The bond lengths and bond angles in the molecules of methane , ammonia and water are given below

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This variation in bond angle is a result of

1. The increasing repulsion between hydrogen

atoms as the bonds length drecrease.

2. The number of non-bonding electron pairs in the

molecule .

3. A non-bonding electron pair having a greater

repulsive force than a bonding electron pair .

A. 1,2 and 3 are correct

B. 1, and 2 only are correct

C. 2 and 3 only are correct

D. 1 only is correct

Answer: c

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234. Shape and hydridisation of IF_5 respectively are

A. Trigonal bipyrmidal ,sp^3d

B. See saw, sp^3d

C. Square pyramidal, sp^3d^2

D. Pentagonal pyramidal , sp^3d^3

Answer: c

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235. The state of hybridization of C_2, C_3, C_5 and C_6 of the hydrocarbon,

$$\underset{7}{CH_3} - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{\underset{6}{C}}} - \underset{5}{CH} = \underset{4}{CH} - \underset{3}{\overset{\overset{CH_3}{|}}{CH}} - \underset{2}{C} \equiv \underset{1}{CH}$$

is in the following sequence

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

B. sp, sp^2, sp^2 and sp^3

C. sp, sp^2, sp^3 and sp^2

D. sp, sp^3, sp^2 and sp^3

Answer: d

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236. The bond dissociation energy of $B - F$ in BF_3 is $646\ \text{kJ mol}^{-1}$ whereas that of $C - F$ in CF_4 is

$515\ \text{kJ mol}^{-1}$. The correct reason for higher $B-F$ bond dissociation energy as compared to that of $C-F$ is

A. smaller size of B-atom as compared to that of C-atom

B. stronger $sigam$-bond between B and F is BF_3 as compared to that between C and F in CF_4

C. significant $p\pi-p\pi$ interaction between B and F in BF_3 whereas there is no possibility of such interaction between C and F in CF_4

D. lower degree of $p\pi-p\pi$ interaction between B and F in BF_3 than that between C and F in CF_4

Answer: c

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237. In the compound $HC \equiv C - CH = CH_2$, the hybridizations of $C - 2$ and $C - 3$ carbons are, respectively,

A. sp^3 and sp^3

B. sp^2 andsp^3

C. sp^2 and sp

D. sp^3 and sp

Answer: c

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238. The compound which does not follow octet rule among the following is/are :

A. CH_4

B. CO_2

C. PCl_3

D. ClF_3

Answer: d

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239. Molten sodium chloride conducts electricity due to the presence of

A. free electrons

B. free molecules

C. free sodium and chloride atoms

D. free sodium and chloride ions

Answer: d

240. Which one is the highest melting halide ?

A. NaCl

B. NaBr

C. NaF

D. Nal

Answer: c

241. The pair of molecules having having similar geometry is

A. BF_3 and NH_3

B. H_2O_2 and C_2H_2

C. CO_2 and SO_2

D. NH_3 and PH_3

Answer: d

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242. Total number of electrons present in a molecule of Acetylene is

A. 14

B. 16

C. 18

D. 26

Answer: a

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243. Dative bond is present in a molecule of

A. NH_3

B. SO_3

C. BF_3

D. PCl_5

Answer: b

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244. The compound 1,3-butadiene has

A. only sp hybrid carbon atoms

B. only sp^2 hybrid carbon atoms

C. both sp^2 hybrid carbon atoms

D. sp, sp^2 and sp^3 hybrid carbon atoms

Answer: b

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245. The substance which conducts electricity in the solid state is

A. Na

B. NaCl

C. $MgCl_2$

D. All of these

Answer: a

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

A. One sigma (σ) and one pi(π) bonds

B. One sigma (σ) and two pi (π) bonds

C. One sigma (σ) and one and a half pi (π) bonds

D. One sigma (σ) bond

Answer: b

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247. The electronic configuration of four elements L, P, Q and R are given in brackets

$L\left(1s^2, 2s^2, 2p^4\right), P\left(1s^2, 2p^6, 3s^1\right)$

$Q\left(1s^2, 2s^2 2p^6, 3s^2 3p^5\right), R\left(1s^2, 2s^2 2p^6, 3s^2\right)$

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

A. L_2P, RL, PQ, R_2Q

B. LP, RL, PQ, RQ

C. P_2L, RL, PQ, RQ_2

D. LP, R_2L, P_2Q, RQ

Answer: c

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248. Resonance cannot be used to explain the structures of

A. Water

B. Benzene

C. Carbon dionide

D. Sulphur dioxide

Answer: a

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249. There is no $S - S$ bond in

A. $S_2O_4^{2-}$

B. $S_2O_5^{2-}$

C. $S_2O_3^{2-}$

D. $S_2O_7^{2-}$

Answer: d

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250. BF_3 and NF_3 both are covalent compounds but NF_3 is polar whereas BF_3 is non-polar. This is because :

A. Boron is a metal nad nitrogen is a gas in uncomined state

B. BF bonds have no dipole moment where as NF bonds have dipole moment

C. Atomic size of boron is smaller than of nitrogen

D. BF_3 is polar but NF_3 is pyramidal in shape

Answer: d

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251. Which of the following is not applicable ?

A. CO_2 Irregular geometry

B. BF_3 Regular geometry

C. NH_3 Irregular geometry

D. SO_2 Irregular geometry

Answer: a

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252. In the triatomic molecule A_2B, the angle ABA for which the dipole moment will be maximum is

A. 60°

B. 90°

C. 120°

D. 180°

Answer: a

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253. The chloric of a metal has the formula MCl_3. The formula of its phosphate will be:

A. M_2PO_4

B. $M(PO_4)_3$

C. $M_3(PO_4)_2$

D. MPO_4

Answer: c

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254. "The molecule species having same number of atoms and same total number of valence electrons will have similar molecular orbitals and structures" . This is a statement of

A. Linnet principle

B. Law of neutrality

C. Law of octaves

D. Isoelectronic principle

Answer: d

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255. Two elements X and Y have following electronic configurations.

$X: 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$

$Y: 1s^2 2s^2 2p^6 3s^2 3p^5$

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

A. XY_2

B. X_5Y_2

C. S_2Y_5

D. XY_5

Answer: a

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256. Most of the water present in plants and animasl is attached to proteins by

A. Ionic bonds

B. Covalent bonds

C. Vander Wall's forces

D. Hydrogen bonds

Answer: d

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257. The molecule containing hydrogen bonds is

A. HI

B. $CuSO_4.5H_2O$

C. HBr

D. All of these

Answer: b

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258. Fill in the blanks with appropriate choice .

Bond order of N_2^+ is $\underline{P}$ while that of N_2 is $\underline{Q}$.

Bond order of O_2^+ is $\underline{R}$ while that of O_2 is $\underline{S}$.

N-N bond distance $\underline{T}$ when N_2 changes to N_2^+

and when O_2 changes to O_2^+, the O-O bond distance $\underline{U}$.

A.

P	Q	R	S	T	U
2	2.5	2.5	1	increases	$decreases$

B.

P	Q	R	S	T	U
2.5	3	2	1.5	decrases	increases

C.

P	Q	R	S	T	U
3	2	1.5	1	incrases	decreases

D.

P	Q	R	S	T	U
2.5	3	2.5	2	incrases	decreases

Answer: d

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259. How many orbitals are singly occupied in O_2 molecule ?

A. 2

B. 1

C. 3

D. None of these

Answer: a

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260. Assertion : The dipole moment in case of BeF_2 is zero.

Reason : The two equal bond dipoles point in opposite directions and cancel the effect of each other.

A. Both assertion and reason are true and reason is the correct expalanation of assertion

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

C. Assertion is true but reason is false

D. Both assetion and reason are false

Answer: c

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261. Match the column I with Column II and mark the appropriate choich .

Column I	Column II
(A) C_2H_2	(i) sp^3d^2 hybridisation
(B) SF_6	(ii) sp^3d^3 hybridisation
(C) SO_2	(iii) sp hybridisation
(D) IF_7	(iv) sp^2 hybridisation

A. $(A) \to (i), (B) \to (iii), (C) \to (ii), (D) \to (iv)$

B. $(A) \to (iii), (B) \to (i), (C) \to (iv), (D) \to (ii)$

C. $(A) \to (ii), (B) \to (i), (C) \to (i), (D) \to (iv)$

D. $(A) \rightarrow (iv), (B) \rightarrow (i), (C) \rightarrow (iii), (D) \rightarrow (ii)$

Answer: b

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262. Which type of hybridisation is shown by carbon atoms from left to right in the given compound :

$CH_2 = CH - C \equiv N$?

A. $sp^2, sp^2 sp$

B. sp^2, sp, sp

C. sp, sp^2, sp^3

D. sp^3, sp^2, sp

Answer: a

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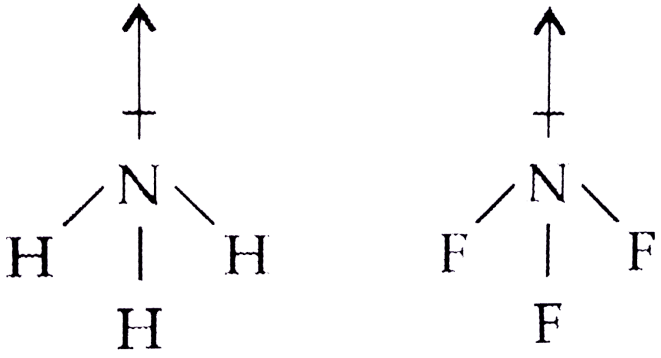
263. Although F is more electronegative than H , then resultant dipole moment of NH_3 is much moe than that of NF_3 . It can be explained as



A. the lone pair of nitrogen opposes the dipole moment of NF_3 while it is added to the dipole moment of NH_3

B. all the dipole of NF_3 are in same direction

C. all the dipoles of NH_3 are in opposite direction

D. NH_3 has regular geometry while NF_3 has irregular geometry which makes dipole moment of NH_3 more than NF_3

Answer: a

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264. Which of the following observations can be explained on the basis of hydrogen bonding ?

(i) H- F has higher boiling point than other halogen acids.

(ii) H_2 O has highest boiling point among hydrides of group

16 elements.

(iii) NH_3 has lower boiling point than PH_3.

A. (i),(ii) and (iii)

B. (i) nad (iii)

C. (ii) and (iii)

D. (i) and (ii)

Answer: d

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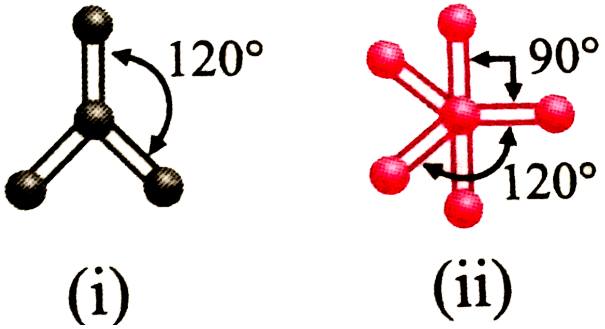
265. Which molecule is depicted by the given ball and stick models ?



A. $(i) BeCl_2$, $(ii) CH_4$

B. (i) BF_3, $(ii) PCl_5$

C. $(i) BF_4$, $(ii) CH_4$

D. $(i) BeCl_2$, $(ii) PCl_5$

Answer: b

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266. Which type of overlapping is shown by $p\left(P_x, P_y \text{and } P_z\right)$ - orbitals ?

A. Two end to end and one sidewise overpal

B. Two sidewise and one end to end overlpa

C. Three sidewise overlap

D. Three end to end overlap

Answer: b

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267. Oder of size of sp, sp^2 and sp^2 orbitals is

A. $sp^3 < sp^2 < sp$

B. $sp < sp^2 < sp^3$

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

D. $sp^2 < sp^3 < sp$

Answer: b

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268. Assertion : Boiling point of p-nitrophenol is greater than that of o-nitrophenol.

Reason : There is intramolecular hydrogen bonding in p-nitrophenol and intermolecular hydrogen bonding in o-nitrophenol.

A. Both assertion and reason are true and reason is the correct expalanation of assertion

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

C. Assertion is true but reason is false

D. Both assetion and reason are false

Answer: c

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269. 2s and 2p- atomic orbitals combine to give how many molecular orbitals ?

A. 2

B. 4

C. 8

D. 6

Answer: c

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270. Match the bond enthalpics given in column II with the molecular given in column I and mark the appropriate choice .

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A. $(A) \rightarrow (i), (B) \rightarrow (ii), (C) \rightarrow (iii)$

B. $(A) \rightarrow (iii), (B) \rightarrow (ii), (C) \rightarrow (i)$

C. $(A) \rightarrow (i), (B) \rightarrow (iii), (C) \rightarrow (ii)$

D. $(A) \rightarrow (iii), (B) \rightarrow (i), (C) \rightarrow (ii)$

Answer: d

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271. In water molecule, the O-H bonds are oriented at an angle of 104.5°. In BF_3, the three B-F bonds are oriented at an angle of 120°. In BeF_2, the two Be-F bonds are oriented at an angle of 180°. Which of the following will have highest dipole moment?

A. BeF_2

B. BF_3

C. H_2O

D. All have zero dipole moment

Answer: c

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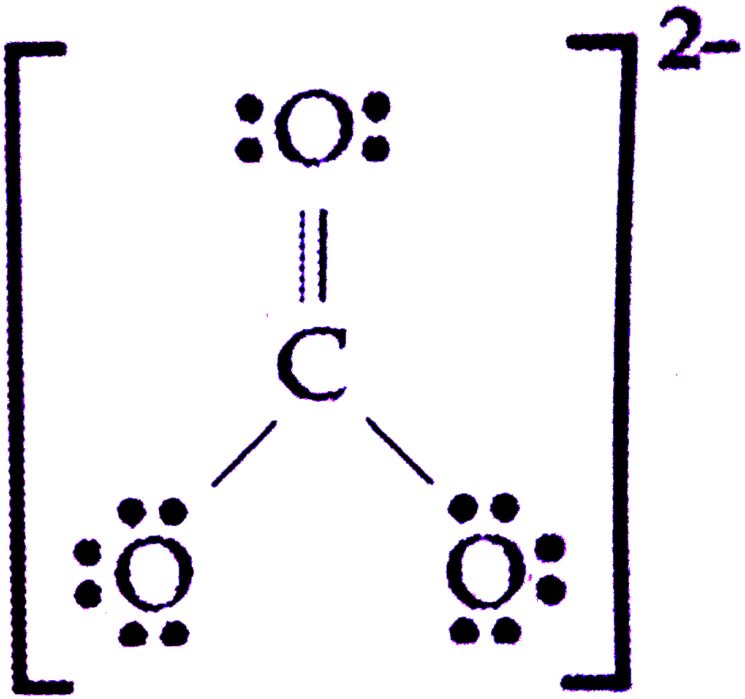
272. What is the formal charge on carbon atom in the following two structures ?



A. $0. \ -2$

B. 0,0

C. $+2, \ -2$

D. $+1, \ -1$

Answer: b

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273. Bond order of which among the following molecules is zero ?

A. F_2

B. O_2

C. Be_2

D. Li_2

Answer: c

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274. Which of the following molecules has the maximum dipole moment ?

A. CO_2

B. CH_4

C. NH_3

D. NF_3

Answer: c

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275. Which one of the following species has plane triangular shape ?

A. N_3

B. NO_3^-

C. NO_2^-

D. CO_2

Answer: c

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276. Which of the following organic compounds has the same hybridization as its combustion product (CO_2) ?

A. Ethane

B. Ethyne

C. Ethene

D. Ethanol

Answer: b

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Test Your Grasp

1. Which of the following does not follow the octet rule ? .

A. CO_2

B. PCl_3

C. IC1

D. ClF_3

Answer: d

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2. The stability of ionic crystal depends principally on

A. high electron affinity of anion forming species

B. the lattice energy of crystal

C. low I.E. of cation forming species

D. low heat of sublimation of cation forming solid

Answer: b

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3. Which of the following statements about LiC and NaCl is wrong?

A. LiCl has lower melting point than NaCl

B. LiCl dissolves more in organic solvents whereas NaCl does not

C. LiCl would ionise in water more than NaCl

D. Fused LiCl would be less conducting than fused NaCl

Answer: c

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4. Which of the following bonds is the strongest ? .

A. F - F

B. I- I

C. Cl - Cl

D. Br - Br

Answer: c

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5. Which of the following is the correct electron-dot structure of N_2O molecule?

A. $: N = N = \ddot{O} :$

B. $: N \equiv \overset{+}{N} - \ddot{O}^{-} :$

C. $\ddot{N} = \ddot{N} = \ddot{O} :$

D. $: N = N = \ddot{O} :$

Answer: b

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6. Which of the following molecule has highest dipole moment?

A. H_2S

B. CO_2

C. CCl_4

D. BF_3

Answer: a

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7. Which of the following molecule has highest dipole moment?

A. BF_3

B. NH_3

C. NF_3

D. B_2H_6

Answer: b

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8. The correct order of decreasing polarity is

A. $HF > SO_2 > H_2O > NH_3$

B. $HF > H_2O > SO_2 > NF_3$

C. $HF > NH_3 > SO_2 > H_2O$

D. $H_2O > NH_3 > SO_2 > HF$

Answer: b

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9. In an ionic compound A^+X^- the degree of covalent bonding is greatest when

A. A^+ and x^- ions are small

B. A^+ is small and X^- is large

C. A^+ and X^- ions are approximately of the same size

D. X^- is small and A^+ is large .

Answer: b

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10. According to Fazan rule, the covalent bond is favoured by :

A. small cation and large anion

B. small cation and small anion

C. large cation and large anion

D. large cation and small anion

Answer: a

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11. Out of $CHCl_3, CH_4$ and SF_4 the molecules do not having regular geometry are:

A. $CHCl_3$ only

B. $CHCl_3$ and SF_4

C. CH_4 only

D. CH_4 and SF_4

Answer: c

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12. Which out of the following structures is expected to have three bond pairs and one lone pair?

A. tetrahedral

B. octahedral

C. trigonal planar

D. Pyramidal

Answer: d

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13. A molecule XY_2 contains two σ bonds two π 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 planar

D. Unpredictable

Answer: c

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14. N atom in NH_4^+ involves the hybridizations

A. sp

B. sp^2

C. sp^3

D. sp^3d

Answer: c

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15. A hybrid orbital formed from s and p-orbital can contribute to

A. σ bond only

B. p bond only

C. either σ or π bond

D. cannot be predicted

Answer: a

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16. The state of hybridization of the central atom is not the same as in the others :

A. B in BF_3

B. O in H_3OI^+

C. N in NH_3

D. P in PCl_3

Answer: a

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17. The d-orbitals involved in dsp^2 hybridisation is

A. d_{xy}

B. d_{z^2}

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

D. d_{xz}

Answer: c

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18. Which of the following molecules in planar ?

A. NH_3

B. CH_4

C. C_2H_4

D. $SiCl_4$

Answer: c

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19. The number of $sp^2 - s$ sigma bonds in benzene are

A. 3

B. 6

C. 12

D. None

Answer: b

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20. The bond angle in H_2O is nearly 105° whereas bond angle in H_2S is nearly 92°. This is because.

A. Electronegativity of oxygen is greater than that of sulphur

B. Oxygen is a gas whereas sulphur is solid

C. Sulphur contains d-orbitals whereas oxygen does not

D. The number of lone pairs present on oxygen and sulphur is not equal

Answer: a

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21. Which of the following molecules has hargest bond angle ?

A. H_2O

B. NH_3

C. CH_4

D. CO_2

Answer: d

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22. Which of the following has the least bond angle ?

A. BeF_2

B. H_2O

C. NH_3

D. CH_4

Answer: b

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23. The percentage of s-character in the hybrid orbitals sp, sp^2 and sp^3 follows the pattern

A. $sp^3 > sp^2 > sp$

B. $sp > sp^2 > sp^3$

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

D. $sp = sp^2 = sp^3$

Answer: B

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24. Which of the following conditions is not correct for resonating structures?

A. The contributing structures must have the same number of unpaired electrons

B. The contributing structures should have similar energies

C. The contribonting structures should be so written the unlike charages reside on atoms that are far apart

D. The positive charge should be present on the electropositive element and the the negative charge on the electronegative element

Answer: c

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25. Two ice cubes are pressed over each other until they unite to form one block. The force mainly responsible for holding them together is

A. Dipole-dipole interaction

B. van der Waals forces

C. Hydeogen bond formation

D. Covalent attraction

Answer: c

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26. Maximum number of H-bonds that can be formed by a water molecule is .

A. 2

B. 4

C. 8

D. 6

Answer: b

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27. Which of the following combination is not allowed in the $LCAO$ method for the formation of molecular orbital (consider Z-axis as the molecular axis) ? .

A. $s + P_z$

B. $s + P_x$

C. $P_x + P_x$

D. $P_z + P_z$

Answer: b

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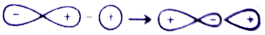
28. According to MOT, two atomic orbitals overlap resulting in the formation of molecular orbital formed. Number of atomic orbitals overlapping together is equal to the molecule orbital formed. The two atomic orbital thus formed by LCAO (linear combination of atomic orbital) in the phase or in the different phase are known as bonding and antibonding molecular orbitals respectively. The energy of bonding molecular orbital is lower than that of the pure atomic orbitals by an amount Δ. This known as the stabilization energy. The enerby of antibonding molecular orbital in increased by Δ' (destabilisation energy).

Q. which of the following combination of orbitals is corrects?

A. 

B. 

C. 

D. 

Answer: b

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29. The calculated bond order of superoxide ion $\left(O_2^-\right)$ is

A. 2.5

B. 2

C. 1.5

D. 1

Answer: c

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30. The bond length of H_2^+, H_2^- and H_2 are in the order

A. $H_2^+ > H_2 > H_2^-$

B. $H_2 > H_2^+ > H_2^-$

C. $H_2^- > H_2 > H_2^+$

D. $H_2^- > H_2^+ > H_2$

Answer: d

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31. Which of the following has unpaired electron in antibonding MO?

A. O_2

B. N_2

C. C_2

D. B_2

Answer: a

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32. Which species is paramagnetic in nature ?

A. d^5

B. d^{10}

C. p^6

D. f^0

Answer: A

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33. Mark the incorrect statement in the following :

A. The bond order in the species O_2, O_2^+ and O_2^- decreases as $O_2^+ > O_2 > O_2^-$

B. The bond antibonding M.O. contribute to repulsion between two atoms

C. Electrons in antibonding M.O. contribute to repulsion between two atoms

D. With increase in bond order , bond length decreases and bond strength increases

Answer: b

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34. Lewis dot symbol of S (atomic no. 16) is

A. $: \dot{\dot{S}} :$

B. $\cdot \dot{S} \cdot$

C. $\cdot \dot{S} \cdot$

D. $\cdot (S) \cdot$

Answer: a

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35. Highest bond order among the following molecules

C_2, N_2, O_2, F_2 is for

A. F_2

B. O_2

C. N_2

D. C_2

Answer: c

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36. Maximum bond angle between two bond is in _____ molecule.

A. $BeCl_2$

B. BF_3

C. NH_3

D. H_2O

Answer: A

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37. Total number of bonding molecular orbitals in O_2 molecule is

A. 3

B. 4

C. 5

D. 6

Answer: c

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38. Delta (δ) molecular orbitals are formed by combination of

A. two s-orbitals

B. two p-orbitals

C. one s-one p-orbitals

D. two d-orbitals

Answer: d

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39. Bond order of helium molecule is

A. 0

B. 1

C. $\frac{1}{2}$

D. 1

Answer: A

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40. Among the following molecules $PCl_5, SF_6, SCl_2, BeCl_2$, completed octet is present in

A. $BeCl_2$

B. SCl_2

C. SF_6

D. PCl_5

Answer: b

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41. Number of co-ordinate bond present in H_2SO_4 molecule is

A. 0

B. 1

C. 2

D. 3

Answer: A

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42. C-C bond length is higest for

A. $-C \equiv C -$

B. $-\overset{|}{C} = \overset{|}{C} -$

C. $-\underset{|}{\overset{|}{C}} - \underset{|}{\overset{|}{C}} -$

D. can't be predicted

Answer: c

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43. Number of electrons around I in IF_7 is

A. 7

B. 12

C. 12

D. 14

Answer: d

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44. The structure of PF_5 molecule is _____.

A. Square planar

B. Trigonal bipyramidal

C. Octahedral

D. Square pyramidal

Answer: b

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45. Bond angle in H_2S molecule is

A. 90°

B. 92.1°

C. 104.5°

D. 120°

Answer: b

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46. Type of orbital overlap in H_2O molecule is

A. $sp^3 - sp^3$

B. $sp^3 - 2p$

C. $sp^2 - s$

D. $sp^3 - s$

Answer: d

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47. According to valence bond theory , number of electrons available for bonding in boron is

A. 1

B. 2

C. 3

D. 5

Answer: b

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48. Lithium iodide is more covalent than lithium chloride due to

A. smaller lithium ion

B. smaller iodide ion

C. larger lithium ion

D. larger iodide ion

Answer: d

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49. Hybrid state of carbon in CO_2 is

A. sp

B. sp^2

C. sp^3

D. carbon no hybridization

Answer: a

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50. Calculate the formal charge on Cl atom in $HClO_4$.

A. 1

B. 2

C. 3

D. 4

Answer: c