CHEMISTRY

BOOKS - S DINESH & CO CHEMISTRY (HINGLISH)

CHEMICAL BONDING AND MOLECULAR STRUCTURE

M.C.Q

1. The compound which does not contain ionic bond is

A. NaOH

B. HCl

C. K_2S

D. LiH

Answer: B

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2. 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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3. Which of the following has highest ionic character?

A. $MgCl_2$

B. $CaCl_2$

C. $BaCl_2$

D. $BeCl_2$

Answer: C

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4. 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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5. Ionic compounds in general possess both

A. high melting points and non-directional bonds

B. high melting points and low boiling points

C. directional bonds and low boiling points

D. high solubilities in polar and non-polar bonds

Answer: A

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6. 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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7. Most favourable conditions for inoic bonding are .

A. Low charge on ions, large cation, small anion

B. Low charge on ions, large cation, large anion

C. High charge on ions, small cation, large anion

D. High charge on ions, large cation, small anion

Answer: D

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8. 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. No fixed number

Answer: C

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9. The number of π bonds in the structure given below are : $(NC)_2C = C(CN)_2$

A. 1

B. 9

C. 5

D. unpredictable.

Answer: B

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10. A sigma bonded molecule MX_3 is T-shaped The number of non-bonding pairs of electrons is .

A. 0

B. 2

C. 1

D. can be predicted only if atomic number of M is known.

Answer: B

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11. 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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12. Which atomic orbital is always involved in sigma bonding only ?

A. p

B. d

C. s

D. none

Answer: C

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

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

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

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

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

Answer: C

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

A. $SiCl_4 < AlCl_3 < CaCl_3 < KCl$

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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15. Which of the followingwill provide the most efficient overiap?

A. s-s

B. s-p

C. sp^2 - sp^2

D. sp-sp

Answer: D

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16. 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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17. 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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18. Propyne molecule contains

A. 6 sigma and 3 pi bonds

B. 4 sigma and 1 pi bond

C. 3 sigma and 2 pi bonds

D. 6 sigma and 2 pi bonds.

Answer: D

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19. The number of σ and π-bonds in but-1-en-3-yne are

A. 5 sigma and 5 pi

B. 7 sigma and 3 pi

C. 8 sigma and 2 pi

D. 5 sigma and 4 pi.

Answer: B

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20. Indicate the nature of bonding in diamond

A. Ionic

B. Covalent

C. Molecular

D. Metallic

Answer: B

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21. The formal charge on P atom in orthophosphoric acid molecule is

A. $+1$

B. $+3$

C. $+5$

D. 0

Answer: A

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22. In a covalent solid the lattice points are occupied by

A. atoms

B. ions

C. molecules

D. electrons.

Answer: A

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23. Which of the following chloride has considerable covalent character ?

A. $LiCl$

B. $NaCl$

C. KCl

D. $CsCl$.

Answer: A

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24. The hybrid state of C in CS_2 should be

A. sp^2

B. sp

C. sp^3

D. no specific

Answer: B

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25. 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 in CH_4

D. C in CO_2

Answer: B

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26. Which of the following molecule containsan sp^2 hybrid carbon atom?

A. C_2H_5CHO

B. $CH_3C \equiv CH$

C. CO_2

D. $CH_3CH_2CH_3$

Answer: A

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27. In OF_2 the hybridisation of oxygen atom in the molecule is

A. sp

B. sp^2

C. sp^3

D. none of these

Answer: C

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

A. a σ bond only

B. π-bond only

C. either σ or π bond

D. cannot be predicted

Answer: A

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29. 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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30. 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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31. The hybrid state of C in charcoal is

A. sp^3

B. sp^2

C. sp

D. no specific state.

Answer: D

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32. Hybridisation involves

A. separation of atomic orbitals

B. overlapping of atomic orbitals

C. mixing of atomic orbitals of atom

D. all of these.

Answer: C

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33. The equilateral shape has

A. sp-hybridisation

B. sp^2- hybridisation

C. sp^3-hybridisation

D. sp^3d-hybridisation

Answer: B

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34. sp^3d^2 hybrid orbitals are

A. linear

B. pentagonal bipyramidal

C. trigonal bipyramidal

D. octahedral

Answer: D

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35. In the following molecule, the hybrid state of 1 and 3 carbon atoms is $CH_2 = C = CH_2$

A. sp^3

B. sp^2

C. sp

D. sp^3d

Answer: B

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36. Type of hybridisation of central carbon in propadiene is

A. sp^3

B. sp^2

C. sp

D. none of these

Answer: C

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37. The compound $1, 2$ - butadiene has :

A. only sp hybridized carbon atoms

B. only sp^2 hybridized carbon atoms

C. both sp and sp^2 hybridized carbon atoms

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

Answer: D

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38. The carbon atoms in graphite are

A. sp^3 hybridised

B. sp hybridised

C. sp^2 hybridised

D. none of these

Answer: C

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39. The state of hybridisation of S in SO_2 is same to that of

A. C in C_2H_2

B. C in C_2H_4

C. C in CH_4

D. C in CO_2

Answer: B

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40. The nature of hybridisation in the NH_3 molecule is

A. sp

B. sp^2

C. sp^3

D. sp^2d

Answer: C

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41. Which of the following types of hybridisation leads to two dimensional geometry of bonds around the atoms ?

A. sp

B. sp^2

C. sp^3

D. none of the above.

Answer: B

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42. 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: B

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43. The d-orbital involved in sp^3d hybridisation is

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

B. d_{xy}

C. d_z^2

D. d_{zx}

Answer: C

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44. In which of the molecule S atom does not assume sp^3 hybridisation

A. SO_4^{2-}

B. SF_4

C. SF_2

D. S_8

Answer: B

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45. The hybrid state of B in BF_4^- is

A. sp^2

B. sp

C. sp^3

D. no specific

Answer: C

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

A. sp^2 to sp^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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47. 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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48. The shape of covalent molecule AX_3 is

A. Triangular

B. T-shape

C. Pyramidal

D. Any of the above three depending upon the number of lone pairs present in A.

Answer: D

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49. Which of the following is correct order of repulsive interactions ?

A. lp-lp gt lp-bp gt bp-bp

B. lp-bpgt lp-lp gt bp-bp

C. bp-bp gt lp-bp gt lp-lp

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

Answer: A

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50. The shape of CO_2 molecule is similar to

A. H_2O

B. BeF_2

C. SO_2

D. none of these.

Answer: B

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51. The pair with similar geometry is

A. BF_3, NH_3

B. H_2O, C_2H_2

C. CO_2, SO_2

D. NH_3 and PH_3

Answer: D

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52. 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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53. A molecule XY_2 contains two σ, two π and one lone pair of electron in 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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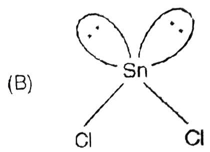
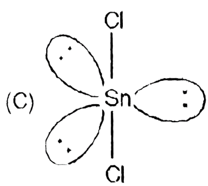
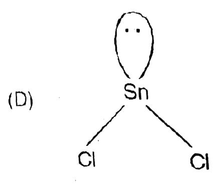
54. The atomic number of Sn is 50. The shape of gaseous $SnCl_2$ molecule is

A. Cl-Sn-C

B. 

C. 

D. 

Answer: D

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55. Which among the following molecules is not flat?

A. C_6H_6

B. C_2H_4

C. SO_3

D. C_2H_6

Answer: A

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56. If the central atom in certain molecule has two lone pairs and three bond pairs, the shape of the molecule could be

A. T-shaped

B. trigonal planar

C. trigonal bipyramidal

D. distorted tetrahedral.

Answer: B

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57. Of the three molecules XeF_4, SF_4, SiF_4 one which have tetrahedral structures is

A. All the three

B. Only SiF_4

C. Both SF_4 and XeF_4

D. Only SF_4 and XeF_4

Answer: B

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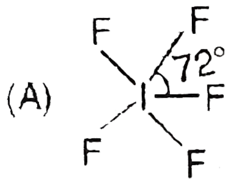
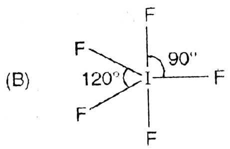
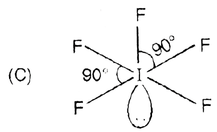
58. The structure of IF_5 can be best described

A. 

B. 

C. 

D. None of these

Answer: C

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59. Which of the following will be planar trigonal ?

A. PCl_3

B. NH_3

C. ClF_3

D. $AlCl_3$

Answer: D

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60. The shape of SO_4^{2-} ion is

A. square planar

B. square pyramid

C. tetrahedral

D. none of these

Answer: A

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61. The geometrical arrangement and shape of I_3^- are respectively

A. Trigonal bipyramidal geometry, linear shape

B. Hexagonal structure, linear shape

C. Triangular planar geometry, triangular shape

D. Tetrahedral geometry, pyramidal shape

Answer: A

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62. The correct order of decreasing polarity is

A. $HF > SO_2 > H_2O > NH_3$

B. $HF > H_2O > SO_2 > NH_3$

C. $HF > NH_3 > SO_2 > H_2O$

D. $H_2O > NH_3 > SO_2 > HF$

Answer: B

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63. 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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64. Which of the following structure is most expected for the molecule $XeOF_4$?

A. Tetrahedral

B. Square pyramid

C. Square planar

D. Octahedral.

Answer: B

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65. CO_2 is iso-structural with

A. SO_2

B. $SnCl_2$

C. C_2H_2

D. NO_2

Answer: C

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66. 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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67. The pair of species with similar shape is

A. PCl_3, NH_3

B. CF_4, SF_4

C. $PbCl_2, CO_2$

D. PF_5, IF_5

Answer: A

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68. Consider the dipole moments of NH_3 and NF_3. Which of the following is correct?

A. Dipole moment of NF_3 is equal to that of NH_3

B. Dipole moment of NH_3 is equal in magnitude but opposite in sign to that of NH_3

C. Dipole moment of NF_3 is more than that of NH_3

D. Dipole moment of NH_3 is more than that of NF_3

Answer: D

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

A. NF_3

B. SF_4

C. CF_4

D. F_2

Answer: C

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70. 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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71. Which of the following molecule is polar ?

A. SO_3

B. SO_2

C. SF_6

D. All are polar

Answer: B

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

A. 120°

B. 90°

C. 180°

D. 150°

Answer: B

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74. 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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75. Which of the following has zero value of dipole moment?

A. Benzene

B. Naphthalene

C. p-dichlorobenzene

D. All the three

Answer: D

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76. The molecule which has the largest dipole moment amongst the following is

A. CH_4

B. $CHCl_3$

C. CCl_4

D. CH_2Cl_2

Answer: D

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

A. CS_2

B. H_2S

C. SO_3

D. $SnCl_4$

Answer: B

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78. The unit of dipole moment is

A. Einstein

B. Debye

C. Dalton

D. Curie

Answer: B

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79. The smallest bond angle around the central atom will be there in

A. H_2O

B. BeF_2

C. CH_4

D. NH_3

Answer: A

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80. Which of the following set contains species having same angle around the central atom?

A. SF_4, CH_4, NH_3

B. NH_3, NCl_3, NH_3

C. $BF_3, NF_3, AlCl_3$

D. BF_3, BCl_3, BBr_3

Answer: D

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81. The bond angle around the central atom is highest in

A. BBr_3

B. CS_2

C. SO_2

D. SF_4

Answer: B

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82. The bond angle around the O atom in ethanol $\left(C_2H_5OH\right)$ is

A. $\approx 90^\circ$

B. $\approx 120^\circ$

C. $\approx 109^\circ$

D. $\approx 180^\circ$

Answer: C

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83. In which of the following species the angle around the central atom is exactly equal to $109^\circ . 28'$

A. SF_4

B. NH_3

C. NH_4^+

D. none of above.

Answer: C

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84. In ethene, the bond angles are exactly

A. $109^{\circ}28'$

B. 120°

C. 180°

D. different than the above values.

Answer: D

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85. Which one of the following compounds has bond angle close to 90° ?

A. NH_3

B. H_2S

C. CCl_4

D. CH_4

Answer: B

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86. Which of the following molecules contains the shortest C - H bonds?

A. ethene

B. ethane

C. ethyne

D. methane.

Answer: C

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87. In which of the following molecule, the bond lengths are not equal

A. SiF_4

B. PF_5

C. SF_6

D. CF_4

Answer: B

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88. The bond angle in H_2S is

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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89. Which has the lowest boiling point?

A. NH_3

B. PH_3

C. AsH_3

D. SbH_3

Answer: B

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90. Which of the following is not different for two atoms in N-Cl bond

A. Electronegativity

B. Valency

C. Atomic size

D. Ionisation potential

Answer: A

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91. 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 diethyl ether (74)

B. The extent of H-bonding decreases from water to methanol while it is absent in ether

C. The extent of intramolecular H-bonding decreases from ether to methanol to water

D. The density of water is 1.00 g ml^{-1} methanol $0.7914 gml^{-1}$- and that of diethyl ether is $0.7137 gml^{-1}$

Answer: B

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92. Which carbon is more electronegative ?

A. sp^3 hybridised carbon

B. sp hybridised carbon

C. sp^2 hybridised carbon

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

Answer: B

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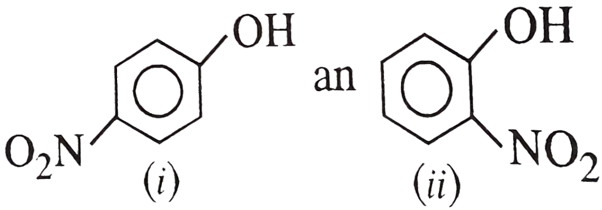
93. For the two compounds, the vapour pressure of (i) at a particular temperature is expected to be



A. higher than (i)

B. lower than that of (i)

C. same as that of (i)

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

Answer: A

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94. Which of the following solvent will have highest solubility of KCl ?

A. $C_6H_6(D = 0)$

B. $\left(CH_3\right)_2, CO(D = 2)$

C. $CH_3OH(D = 32)$

D. CCl_4 (D=0).

Answer: C

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95. Which one of them has the highest melting point ?

A. NaCl

B. NaF

C. NaBr

D. NaI

Answer: B

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96. Explain why HCl is a gas and HF is a liquid ?

A. H-F bond is strong

B. H-F bond is weak

C. Molecules of HF form aggregate because of hydrogen bonding

D. HF is a weak acid

Answer: C

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97. Out of o-nitrophenol and p-nitrophenol, which is more volatile ? Explain?

A. Hydrogen bonding

B. Covalent bonding

C. Resonance

D. Conjugation.

Answer: A

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98. 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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99. Which of the crystals should be the softest and have the lowest boiling point?

A. Covalent crystals

B. Ionic crystals

C. Metallic crystals

D. Molecular crystals.

Answer: D

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100. Which of the following is solid with highest m.p. ?

A. CO_2(s)

B. H_2O(s)

C. SiO_2

D. He(s).

Answer: C

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101. Which of the following resonating form is not correct for CO_2?

A. (A) $:\ddot{O}=C=\ddot{O}:$

B. (B) $:\overset{-}{\underset{\cdot\cdot}{\ddot{O}}}-C\equiv\overset{+}{O}:$

C. (C) $:\overset{+}{O} \equiv C - \overset{-}{\underset{\cdot\cdot}{\ddot{O}}}:$

D. (D) $:\overset{+}{\underset{\cdot\cdot}{O}} - C \equiv \overset{-}{\underset{\cdot\cdot}{O}}:$

Answer: D

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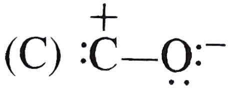
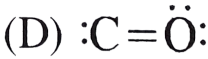
102. The carbon monoxide molecule may be represented by the following structures except

A. (A) $:\bar{C} \equiv O:^{+}$

B. (B) $\overset{+}{C} = \overset{-}{\underset{\cdot\cdot}{O}}:$

C. 

D. 

Answer: B

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103. CO_3^{2-} ion exists as resonance hybrid of three equivalent structures. In each of these structures the carbon atom contains

A. three single bonds

B. two single and a double bond

C. three single bonds and one lone pair of electrons

D. three single bonds and two lone pair of electrons

Answer: B

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104. Consider H_2CO_3 and CO_3^{2-} ion. Which of the following is correct?

A. There is no resonance in H_2CO_3

B. Resonance stabilization energy of CO_3^{2-} is more than H_2CO_3

C. Resonance stabilization energy of H_2CO_3 is more than CO_3^{2-}

D. There is no resonance in CO_3^{2-}

Answer: B

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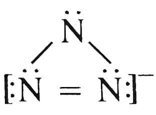
105. Which of the following is not a preferred resonating structure for azide ion N_3^- ?

A. (A) $[:\underset{\cdot\cdot}{N}-N\equiv N:]^-$

B. (B) $[:N\equiv N-\ddot{\underset{\cdot\cdot}{N}}:]^-$

C. (C) $[:\ddot{N}=N=\ddot{N}:]^-$

D. (D) 

Answer: D

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

A. The resonating structures are hypothetical.

B. The unpaired electrons in various resonating structures are same

C. Hybrid structure is most stable.

D. Hybrid structure has maximum energy.

Answer: D

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107. Which of the following is not correct about a coordinate bond ?

A. A co-ordinate bond once formed cannot be distinguished from a covalent bond

B. A co-ordinate bond is also called a semi polar bond

C. A co-ordinate bond is non-directional in nature.

D. Due to co-ordinate bond the formal charges on donor and acceptor atoms are + and - respectively,

Answer: C

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108. Which of the following does not have a co-ordinate bond ?

A. H_3O^+

B. PCl_5

C. O_3

D. HNO_3

Answer: B

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109. Which of the following has no co-ordinate bond ?

A. HNO_3

B. CO

C. CO_3^{2-}

D. CH_3NC

Answer: C

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110. Which of the following species have intramolecular H-bonds?

A. Phenol

B. o-Nitrophenol

C. p-Nitrophenol

D. Nitroethane

Answer: B

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111. Which of the following H-bonds is expected to have maximum strength ?

A. H-O.. .H

B. H-N.. .H

C. H-S......H

D. All have same strength

Answer: A

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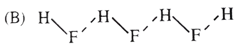
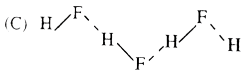
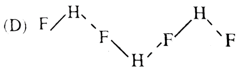
112. The H-Bonds in solid HF can be best represented as :

A. H-F---H-F---H-F

B. 

C. 

D. 

Answer: C

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113. 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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114. Highest viscosity is exhibited by

A. Glycerol

B. Ethylene glycol

C. Ethanol

D. Water.

Answer: A

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115. Acetic acids exists in dimer state in benzene due to

A. condensation reaction

B. hydrogen bonding

C. presence of carboxyl group

D. presence of hydrogen atom at α-carbon

Answer: B

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

A. Phenol

B. Liquid NH_3

C. Water

D. Liquid HCl

Answer: D

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117. Intramolecular H-bonding is present in

A. meta nitrophenol

B. salicylaldehyde

C. hydrogen chloride

D. benzophenone.

Answer: B

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118. In the metallic crystal

A. the valence electrons remain within the field of influence of their own kernels

B. the valence electrons constitute a sea of mobile electrons

C. the valence electrons are localised between the two kernels

D. both kernels as well as electrons move rapidly

Answer: B

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119. The element out of L. M, Q. R showing maximum metallic character is

A. $Q : [Ne]3s^2$

B. $M : [He]2s^2 2p^5$

C. $R : [Ne]3s^2 3p^2$

D. $L : [He]2s^2 2p^3$

Answer: A

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120. What structural units occupy the lattice sites in the metallic crystals ?

A. Atoms

B. Electrons

C. Negative ions

D. Metal kernels

Answer: D

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121. Which forces are strongest amongst the following ?

A. Ion-ion interaction

B. ion-dipole forces

C. Dipole-dipole forces

D. Dipole induced dipole forces

Answer: A

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122. The interparticles forces in liquid hydrogen are

A. H-bonds

B. van der Waals forces

C. Covalent bonds

D. None of these

Answer: B

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123. In solid argon the atoms are held by

A. ionic bonds

B. hydrogen bonds

C. van der Waals forces

D. co-ordinate bonds.

Answer: C

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124. 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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125. What is true about PF_5?

A. The molecule does not exist

B. P-F bonds are co-ordinate covalent

C. All O-F bonds are not equal

D. Molecule has pentagonal planar geometry.

Answer: C

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126. 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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127. Hydrogen fluoride is a liquid unlike other hydrogen halides because

A. HF molecules associate due to hydrogen bonding

B. F_2 is highly reactive

C. HF is the weakest acid of all hydrogen halides

D. Fluorine atom is the smallest of all halogen

Answer: A

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128. Polarisation involves the distortion of the shape of an anion by an adjacently placed cation In this context, which of the following statements is correct ? .

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

B. Minimum polarisation is brought about by a cation of low radius

C. A large cation is likely to bring about a large degree of polarisation

D. Polarisation power of cation is less than that of anion

Answer: A

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129. Point out the false statement

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

B. Carbon tetrachloride is a non-polar molecule

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

D. Anhydrous $AlCl_3$ is a covalent substance

Answer: C

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130. $AlCl_3$ anhydrous is covalent but $AlCl_3.6H_2O$ is ionic because

A. $AlCl_3$ dissolves in CS_2

B. $AlCl_3$ has planar structure

C. IE of Al is low

D. Hydration energy compensates the high IE of Al.

Answer: D

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

A. Valence bond theory

B. Crystal structure

C. Lattice energy

D. Fajan's Rule.

Answer: D

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132. The element having 18 electrons in its outer most shell is:

A. A_2X_3

B. AX_3

C. A_3X_2

D. A_2X

Answer: C

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133. The chemical inertness of N_2 is attributed to

A. the presence of large no. of bonding electrons in comparison to antibonding electron

B. its high heat of dissociation

C. the presence of triple bonds between nitrogen atoms which make the molecule quite stable

D. all the statements are correct

Answer: D

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134. Which element out of L, M, Q. R will most readily form a diatomic molecule ?

A. $L : [He]2s^2 2p^3$

B. $M : [He]2s^2 2p^5$

C. $Q : [Ne]3s^1$

D. $R : [Ne]3s^2 3p^2$

Answer: B

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135. Which of the following best defines a crystal ?

A. A coloured substance soluble in water

B. A simple lattice containing ions, atoms or molecules

C. A clear or coloured substance which can transmit light

D. A salt which has been grown from its saturated solution.

Answer: B

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136. What is the valency of carbon in CO_3^{2-} ?

A. 2

B. 3

C. 4

D. -3

Answer: C

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137. Solid NaCl is a bad conductor of electricity because

A. in solid NaCl there are no ions

B. solid NaCl is covalent

C. in solid NaCl there is no mobility of ions

D. in solid NaCl there are no electrons.

Answer: C

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138. If ammonia is added to pure water, the concentration of a chemical species already present will decrease. The species is

A. O^{2-}

B. OH^{-}

C. H_3O^{+}

D. H_2O

Answer: C

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139. Which of the following bonds have lowest bond energy?

A. C-C

B. N-N

C. H-H

D. O-O

Answer: D

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140. The bonds between P atoms and Cl atoms in PCl_5 are likely to be

A. Ionic with no covalent character

B. Covalent with no ionic character

C. Covalent with some ionic character

D. Ionic with some metallic character.

Answer: C

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141. The pairs of bases in DNA are held together by

A. hydrogen bonds

B. ionic bonds

C. phosphate groups

D. deoxyribose groups.

Answer: A

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142. The combination of atoms takes place so that

A. They can gain two electrons in the outermost orbit

B. They get eight electrons in the outermost orbit

C. They acquire stability by lowering of energy

D. They get eighteen electrons in the outermost orbit.

Answer: C

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

A. 20

B. 16

C. 12

D. 8

Answer: A

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144. The bonds present in N_2O_5, are

A. only ionic

B. covalent and coordinate

C. only covalent

D. covalent and ionic

Answer: B

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145. Silicon carbide is a

A. Molecular solid

B. Covalent solid

C. Ionic solid

D. None of the above

Answer: B

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146. When an element of very low ionisation potential reacts with an element with very high electron affinity, the bond formed will be predominantly :

A. ionic

B. covalent

C. co-ordinate

D. hydrogen.

Answer: A

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147. Which of the following molecular orbital has the lowest energy ?

A. $\sigma 2p_z$

B. $\sigma^* 2p_z$

C. $\pi^* 2p_x$

D. $\pi^* 2p_y$

Answer: A

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148. For a homonuclear diatomic molecule the energy of σ_{2s} orbital is

A. $> \sigma_{2s}^{*}$ orbital

B. $< \sigma_{2s}^{*}$ orbital

C. $> \sigma_{1s}^{*}$ orbital

D. Both (B) and (C) are correct.

Answer: D

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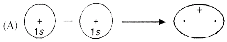
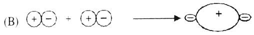
149. Which of the following overlap is correct?

A. 

B. 

C. 

D. None of the above.

Answer: C

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150. Which sequence correctly describes a relative bond strength, of oxygen molecule, superoxide ion and peroxide ion?

A. $O_2 < O_2^- < O_2^{2-}$

B. $O_2 > O_2^- > O_2^{2-}$

C. $O_2 < O_2^- > O_2^{2-}$

D. $O_2^- > O_2 > O_2^{2-}$

Answer: B

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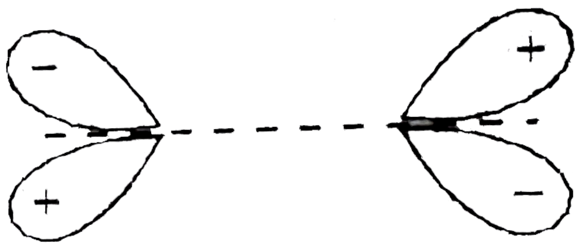
151. The molecular orbital shown in the diagram can be described as



A. σ

B. σ^*

C. π^*

D. π

Answer: C

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

A. σMO orbital

B. πMO orbital

C. $\pi * MO$ orbital

D. $\sigma *$ MO orbital

Answer: C

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

A. πMO orbital

B. sp hybrid orbital

C. σMO orbital

D. 2p orbital

Answer: C

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

A. Resonance theory

B. V.S.E.P.R. theory

C. Molecular orbital theory

D. Valence bond energy

Answer: C

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

A. C_2

B. N_2

C. O_2

D. Both C_2 and N_2

Answer: C

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156. During change of $NO^+ \rightarrow NO$, the electron is added to

A. σ-orbital

B. π-orbital

C. σ^* -orbital

D. π^* -orbital.

Answer: D

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157. Which is paramagnetic and has bond order Y_2?

A. O_2

B. N_2

C. F_2

D. H_2^+

Answer: D

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158. Bond order of N-O bonds in nitrate ion is

A. 1.0

B. 1.25

C. 1.33

D. 1.50

Answer: C

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

A. 2.5

B. 1.5

C. 2

D. 1

Answer: D

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160. For a stable molecule the value of bond order should be

A. negative

B. positive

C. zero

D. no relationship of stability and bond order.

Answer: B

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161. Find the bond order of B_2

A. 0

B. 1

C. 2

D. 3

Answer: B

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162. Which of the following is paramagnetic ?

A. O_2

B. N_2

C. O_2^{-2}

D. H_2

Answer: A

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163. Which of the species is diamagnetic ?

A. O_2^+

B. O_2

C. O_2^-

D. O_2^{2-}

Answer: D

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164. Which of the following is paramagnetic and also has a bond order equal to 0.5 ?

A. O_2

B. N_2

C. He_2

D. H_2^+

Answer: D

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165. Among the following isostructural compounds which one has highest lattice energy ?

A. $LiCl$

B. MgO

C. $NaCl$

D. LiF

Answer: B

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166. Which of the following molecule is associated with permanent dipole moment?

A. CF_4

B. XeF_4

C. SF_4

D. BF_4^-

Answer: C

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167. Among

$NO_4^-(I), AsO_3^{3-}(II), CO_3^{2-}(III) ClO_3^-(IV)$ and $SO_3^{2-}(V)$

. The multiplanar species are

A. II, IV, V

B. III, IV

C. I, II, V

D. II, III, IV

Answer: A

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168. Among the species given below which one is isostere of N_2 ?

A. CO

B. O_2

C. O_2^-

D. CO^+

Answer: A

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169. What is true about CN^- and N_2 ?

A. Both are isoelectronic

B. Both are chemically inert

C. Both are highly reactive

D. Both have same polarity of bonds.

Answer: A

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170. Which statements among the following is true ?

A. SO_3 molecule contain sp π-d π bond

B. SO_2 molecule does not contain π bond

C. BH_3 and PH_3 do not exist

D. HCl dissolve in water because of H-bonding

Answer: A

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171. The covalent nature of $AlCl_3$ can be justified on the basis of

A. Resonance

B. Fajan's Rule

C. Hund's Rule

D. MO theory.

Answer: B

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172. Which of the following provides explanation for the ionic nature of $AlCl_3 . 6H_2O$ although we know that $AlCl_3$ is covalent?

A. Resonance

B. Concept of hydration energy

C. Concept of molecular orbitals

D. ionisation energy

Answer: B

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173. The electronic configuration of four elements is as follows

X: $1s^22s^22p^4$, Z [Ne] $3s^1$ Y:[Ne] $3s^23p^5$, W: [Ne] $3s^2$

Which of the following set containscorrect formulae of X. Y, Z. W

A. X_2Z, WX, WY, ZY

B. Z_2X, WX, ZY, WY_2

C. W_2Y, WX. ZY, ZX

D. XY. YZ, ZX W_2X

Answer: B

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174. Among the following diatomic molecules, the shortest bond length is associated with

A. F_2

B. C_2

C. O_2

D. N_2

Answer: D

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175. Which of the following diatomic species gets stabilised by losing an electron

A. O_2

B. N_2

C. O_2

D. CN^-

Answer: A

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176. The nature of π-bonds in perchlorate ion

A. $O - Cl\left(d_{\pi} - p_{\pi}\right)$

B. $O - Cl\left(p_{\pi} - d_{\pi}\right)$

C. $O - Cl\left(d_{\pi} - d_{\pi}\right)$

D. None of these.

Answer: B

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177. Which of the following has a trigonal bipyramidal shape?

A. BrF_5

B. IF_5

C. $(SbF_5)^{2-}$

D. PF_3Cl_2

Answer: D

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178. A bond formed between two similar atoms cannot be

A. ionic

B. co-ordinate

C. covalent

D. π-bond

Answer: A

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179. Which pair does not contain species with similar shape?

A. CH_4, BF_4^-

B. I_3^+, I_3^-

C. HCN, C_2H_2

D. Both A and B

Answer: B

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180. Which of the following conditions apply to resonating structures ?

A. Identical arrangement of atoms

B. Nearly same energy content

C. Identical number of bonds

D. Same number of unpaired electrons

Answer: A,B,D

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181. Which among the following have regular geometry?

A. BF_3

B. NF_3

C. PF_3

D. BF_4^-

Answer: A,D

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182. Which of the following species is hypervalent?

A. ClO_4^-

B. BF_3

C. SO_4^{2-}

D. CO_3^{2-}

Answer: A,C

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183. Which among the following species have bond order zero?

A. F_2^{2-}

B. Ar_2

C. He_2^+

D. H_2^+

Answer: A,B

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184. Which among the following have bond order 2.5?

A. O_2

B. N_2^{2-}

C. N_2^{+}

D. O_2^{+}

Answer: C,D

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185. In which of the following the hybrid orbitals of the central atom have the same s-character

A. CH_4

B. $Ni(CO)_4$

C. XeO_3

D. $\left[Ni(CN)_4\right]^{2-}$

Answer: A,B,C

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186. CO_2 is isostructural with

A. $HgCl_2$

B. $SnCl_2$

C. C_2H_2

D. NO_2

Answer: A,C

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187. The linear struture is assumed by :

A. $SnCl_2$

B. NCO^-

C. NO_2^+

D. CS_2

Answer: B,C,D

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188. Which of the following have identical bond order ?

A. CN^{-}

B. O_2^{-}

C. NO^{+}

D. CN^{+}

Answer: A,C

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189. Pick out the isoelectronic structures from the following .

$ICH_3^+ \ (II)H_3O^+, (III)NH_3, (IV)CH_3^- \ :$

A. CH_3^+

B. H_3O^+

C. NH_3

D. CH_3^-

Answer: B,C,D

Watch Video Solution

190. On hybridization of one s and one p orbital we get

A. two mutually perpendicular orbitals

B. two orbitals at 180°

C. four orbitals directed tetrahedrally

D. three orbitals in a plane.

Answer: B

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191. 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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192. The compound which contains both ionic and covalent bonds is

A. CH_4

B. H_2

C. KCN

D. KCl

Answer: C

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193. Which of the following is soluble in water?

A. CS_2

B. C_2H_5OH

C. CCl_4

D. $CHCl_3$

Answer: B

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194. Element X is strongly electropositive and element Y is strongly electronegative. Both are univalent. The compound formed would be

A. $X^{+}Y^{-}$

B. $X^{-}Y^{+}$

C. $X - Y$

D. $X \rightarrow Y$

Answer: A

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195. Which of the following compound is covalent

A. H_2

B. CaS

C. KCl

D. Na_2S

Answer: A

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196. The total number of electrons that take part in forming the bond in N_2 is

A. 2

B. 4

C. 6

D. 10

Answer: C

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197. How many unpaired electrons are there in Ni^{2+}?

A. 0

B. 2

C. 4

D. 8

Answer: B

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198. If molecule MX_3 has zero dipole moment, the sigma bonding orbitals used by M (atomic number < 21) are

A. pure p

B. sp hybrid

C. sp^2 hybrid

D. sp^3

Answer: C

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

A. Ethane

B. Ethene

C. Ethyne

D. Benzene

Answer: A

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200. The pair of molecules forming strongest hydrogen bonds are

A. SiH_6 and SiF_6

B. $CH_3 - C| | o - CH_3$ and $CHCl_3$

C. $H - C| | o - OH$ and $CH_3 - C| | o - OH$

D. H_2O and H_2

Answer: C

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201. The ion that is isoelectronic with CO is

A. CN^{-}

B. O_2^{+}

C. N_2^{+}

D. O_2^{-}

Answer: A

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202. The species isoelectronic with C_2H_4 is

A. CN^{-}

B. O_2^{+}

C. O_2

D. N_2^{+}

Answer: C

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203. The types of bonds present in $CuSO_{4.5}H_2O$ are only

A. Electrovalent and covalent only

B. Electrovalent and co-ordinate covalent only

C. Electrovalent, covalent, co-ordinate covalent and hydrogen bonds

D. Covalent and co-ordinate covalent only

Answer: C

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204. The hydrogen bond is strongest in

A. O-Hâ€¦O

B. S-Hâ€¦.S

C. F-Hâ€¦.F

D. F-Hâ€¦.O

Answer: C

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205. Oxygen molecule is paramagnetic because

A. Bonding electrons are more than antibonding electrons

B. It contains unpaired electrons

C. Bonding electrons are less than antibonding electrons

D. Bonding electrons are equal to antibonding electron

Answer: B

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206. CO_2 is not isostructural with

A. $HgCl_2$

B. $SnCl_2$

C. C_2H_2

D. $ZnCl_2$

Answer: B

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207. The molecule having one unpaired electron is

A. NO

B. CO_2

C. CN^-

D. O_2

Answer: A

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208. Dipole moment is shown by :

A. 1, 4-dichlorobenzene

B. Cls 1,2-dichloroethene

C. trans 1, 2-dichloroethene

D. trans 2, 3-dichloro-2-butene

Answer: B

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209. Which of the following has a linear structure?

A. CCl_4

B. SO_2

C. C_2H_2

D. C_2H_4

Answer: C

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210. The hydrogen bond is the strongest in

A. F-Hâ€¦O

B. F-Hâ€¦F

C. O-Hâ€¦S

D. O-Hâ€¦N

Answer: B

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211. The metallic lustre exhibited by sodium is explained by

A. Diffusion of sodium ion

B. Excitation of free protons

C. Oscillation of loose electrons

D. Existence of body centred cubic lattice

Answer: A

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212. Hydrogen bonding is maximum in:

A. Ethanol

B. Diethyl ether

C. Ethyl chloride

D. Triethyl amine.

Answer: A

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213. Which one of the following halogens has the highest bond energy ?

A. F_2

B. Cl_2

C. Br_2

D. I_2

Answer: B

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214. Among the following, the linear molecule is

A. CO_2

B. NO_2

C. SO_2

D. ClO_2 or SiO_2

Answer: A

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215. The geometric form of crystals is the result of orderly arrangement of

A. molecules only

B. ions only

C. atoms only

D. molecules, atoms or ions

Answer: D

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216. 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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217. The species which has pyramidal shape is

A. PCl_3

B. SO_3

C. CO_3^{2-}

D. NO_3^{-}

Answer: A

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218. Which of the following species is para magnetic ?

A. O_2^-

B. CN^-

C. CO

D. NO^+

Answer: A

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219. The compound with C uses in the sp^3 hybrid orbitals for bond formation is .

A. HCOOH

B. $(H_2N)_2CO$

C. HCOH

D. CH_3CHO

Answer: D

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220. The enolic form of acetone contains

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

B. 8 sigma bonds, 2 pi bonds and 2 lone pairs

C. 10 sigma bonds, 1 pi bond and 1 lone pair

D. 9 sigma bonds, 2 pi bonds and 1 lone pair

Answer: A

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221. The compound with C uses in the sp^3 hybrid orbitals for bond formation is .

A. HCOOH

B. $(NH_2)_2CO$

C. $(CH_3)_3COH$

D. $CH_2 = C = O$

Answer: C

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222. Combination of two AO's lead to the formation of

A. Two MO's

B. Three MO's

C. One MO

D. Four MO's

Answer: A

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223. The hybridisation of carbons involved in C-C single bond in $CH \equiv C - CH = CH_2$ is

A. $sp^3 - sp^2$

B. $sp^3 - sp^3$

C. $sp - sp^2$

D. $sp - sp^3$

Answer: C

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224. 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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225. The maximum possible number of hydrogen bonds a water molecule can form is

A. 4

B. 3

C. 2

D. 1

Answer: A

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226. The Type of hybrid orbitals used by the chlorine atom in ClO_2^{Θ} is .

A. sp^3

B. sp^2

C. sp

D. None

Answer: A

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227. Homolytic fission of carbon-carbon bond of ethane produces an intermediate in which the carbon atom is in

A. sp^3 hybridised

B. sp^2 hybridised

C. sp hybridised

D. sp^2d hybridised

Answer: B

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228. Which of the following has zero dipole moment?

A. ClF

B. PCl_3

C. SiF_4

D. $CFCl_3$

Answer: C

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229. Which one is most ionic ?

A. P_2O_5

B. MnO

C. CrO_3

D. Mn_2O_7

Answer: B

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230. Among the following species , identify the isostructural pairs .

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

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

B. $[NF_3, HN_3]$ and $[NO_3^-, BF_3]$

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

D. $[NF_3, H_3^+O]$ and $[HN_3, BF_3]$

Answer: D

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231. 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_2

Answer: C

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232. Among the following the compounds , the one that is polar and has central atom with sp^2 hydridisation is

A. H_2CO_3

B. SiF_4

C. BF_3

D. $HClO_2$

Answer: C

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

A. NH_4Cl

B. HCN

C. H_2O_2

D. CH_4

Answer: C

Watch Video Solution

234. Which of the following involves sp^2 hybridisation?

A. CO_2

B. SO_2

C. N_2O

D. CO

Answer: B

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235. NH_3 and $BF_3$from adduct readily because they from

A. ionic bond between BF_3 and NH_3

B. co-ordinate bond between B and N

C. covalent bond between B and N

D. H-bonds between F atoms of BF_3 and H-atoms of NH_3

Answer: B

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236. The correct order of increasing $C-O$ bond lengths in CO, CO_3^{2-} and CO_2 is :

A. $CO_3^{2-} > CO_2 > CO$

B. $CO_2 > CO_3^{2-} > CO$

C. $CO > CO_3^{2-} > CO_2$

D. $CO > CO_2 > CO_3^{2-}$

Answer: D

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237. The hybridisation of atomic orbitals of nitrogen in NO_2^+, NO_3^- and NH_4^+ are :

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

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

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

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

Answer: B

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238. The correct order of hybridisation of the central atom in the following species NH_3, $\left[PtCl_4\right]^{2-}$, PCl_5 and BCl_3 is :

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

B. sp^3, dsp^2, dsp^3, sp^2

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

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

Answer: B

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

A. Bond order three and isoelectronic

B. Bond order three and weak field ligands

C. Bond order three and π-acceptors

D. Isoelectronic and weak field ligands.

Answer: A

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240. The nodal plane in the π-bond of ethene is located in:

A. the molecular plane

B. a plane parallel to the molecular plane

C. a plane perpendicular to the molecular plane which bisects the carbon-carbon sigma bond at right angles

D. a plane perpendicular to the molecular plane which containsthe carbon-carbon σ bond.

Answer: A

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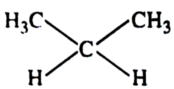
241. Which of the following hydrocarbons has the lowest dipole moment?

A. (A) 

B. $CH_3C \equiv CCH_3$

C. $CH_3CH_2C = CH$

D. $CH_2 = CH - C \equiv CH$

Answer: B

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242. 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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243. Which of the following represents the given mole of hybridization sp^2 - sp^2 - sp - sp from left to right?

A. $H_2C = CH - C = N$

B. $HC \equiv C - C \equiv CH$

C. $H_2C = C = C = CH_2$

D. 

Answer: A

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244. Among the following, the molecule with the highest dipole moment is :

A. CH_3Cl

B. CH_2Cl_2

C. $CHCl_3$

D. CCl_4

Answer: A

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245. Which of the following are isoelectronic and isostructural ?

$NO_3^-, CO_3^{2-}, ClO_3^-, SO_3$

A. NO_3^-, CO_3^{2-}

B. SO_3, NO_3^-

C. ClO_3^-, CO_3^{2-}

D. CO_3^{2-}, SO_3

Answer: A

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246. According to MOT whch of the following statement about magnetic character and bond order is corrent regarding $O_2^{\oplus}$.

A. Paramagnetic and Bond order lt O_2

B. Paramagnetic and Bond order gt O_2

C. Diamagnetic and Bond order lt O_2

D. Diamagnetic and Bond order gt O_2

Answer: B

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247. Total number of lone pair of electrons in $XeOF_4$ is :

A. 0

B. 1

C. 2

D. 3

Answer: B

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

A. $[ClO_3]^-$

B. XeF_4

C. AFF_4

D. $[I_3]^-$

Answer: D

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249. Among the following mixiture dipole-dipole as the mojor interaction is present is

A. KCl and water

B. benzene and carbon tetrachloride

C. benzene and ethanol

D. acetonitrile and acetone

Answer: D

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

A. XeF_4

B. BF_4^-

C. SF_4

D. SiF_4

Answer: C

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251. 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 lp-bp repulsion

B. decreasing electronegativity

C. increasing lp-bp repulsion

D. increasing p-orbital character in sp^3

Answer: B

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

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

B. sp lt sp^2lt sp^3

C. spgt sp^2 ltsp^3

D. spgt sp^2 gt sp^3

Answer: D

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253. The electronegaivity 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 as well as NF_3 the atomic dipole and bond dipole are in opposite directions

B. in NH_3 the atomic dipole and bond dipole are in opposite directions whereas in NF_3 these are in the same direction

C. in NH_3 as well as in NF_3 the atomic dipole and bond dipole are in the same direction

D. in NH_3 the atomic dipole and bond dipole are in the same direction whereas in NF_3 these are in opposite directions

Answer: D

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254. 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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255. Which of the following species has a linear shape?

A. NO_2^+

B. O_3

C. NO_2^-

D. SO_2

Answer: A

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256. Which of the following is not isostructural with $SiCI_4$?

A. PO_4^{3-}

B. NH_4^+

C. SCl_4

D. SO_4^{2-}

Answer: C

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

A. 4

B. 1

C. 2

D. 3

Answer: C

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258. In $\left[Ag(CN)_2\right]^-$, the number of π bonds is

A. 2

B. 3

C. 4

D. 6

Answer: C

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259. In which of the following pairs, the two species are iso-structural ?

$(a) SO_4^{2-}$ and NO_3^- (b) BF_3 and NF_3

$(c) BrO_3^-$ and XeO_3 (d) SF_4 and XeF_4

A. BrO_3^- and XeO_3

B. SF_4 and XeF_4

C. SO_3^{2-} and NO_3^-

D. BF_3 and NF_3

Answer: A

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260. In which of the following ionixation processes , the bond order has increased and the magnetic behaviour has changed ?

A. $N_2 \rightarrow N_2^+$

B. $C_2 \rightarrow C_2^+$

C. $NO \rightarrow NO^+$

D. $O_2 \rightarrow O_2^+$

Answer: C

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261. Among the following , the paramagnetic compound is :

A. Na_2O_2

B. O_3

C. N_2O

D. KO_2

Answer: D

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262. The species having bond order different from that in CO is

A. NO^{-}

B. NO^{+}

C. CN^{-}

D. N_2

Answer: A

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263. The percentage of p-character in the orbitals forming p - p bonds in P_4 is

A. 25

B. 33

C. 50

D. 75

Answer: D

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264. Angular shape of ozone molecule consists of

A. 1 sigma and 2 pie bonds

B. 2 sigma and 2 pie bonds

C. 1 sigma and 1 pie bonds

D. 2 sigma and 1 pie bonds

Answer: D

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

A. $O_2^- < NO < C_2^{2-} < He_2^+$

B. $NO < C_2^{2-} < O_2^- < He_2^+$

C. $C_2^{2-} < He_2^+ < NO < O_2^-$

D. $He_2^+ < O_2^- < NO < C_2^{2-}$

Answer: D

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

A. O_2^- and CN^-

B. NO^+, CN^+

C. CN^- and NO^+

D. CN^- and CN^+

Answer: C

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

A. $CN^-, N_2, O_2^{2-}, C_2^{2-}$

B. N_2, O_2^{2-}, NO^+, CO

C. C_2^{2-}, O_2^-, CO, NO

D. $NO^+, C_2^{2-}, CN^-, N_2$

Answer: D

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

A. $N_2^- < N_2^{2-} < N_2$

B. $N_2^- < N_2 < N_2^{2-}$

C. $N_2^{2-} < N_2^- < N_2$

D. $N_2 < N_2^{2-} < N_2^-$

Answer: C

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

A. London dispersion bond

B. Hydrogen bonding

C. Dipole-Dipole interaction

D. Covalent bonds

Answer: B

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270. Using MO theory predict which of the following sepcies has the shortest bond length ?

A. O_2^{2+}

B. O_2^{+}

C. O_2^{-}

D. O_2^{+}

Answer: A

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

A. $ClO_2 < Cl_2O < ClO_2^-$

B. $Cl_2O < ClO_2^- < ClO_2$

C. $ClO_2^- < Cl_2O < ClO_2$

D. $Cl_2O < ClO_2 < ClO_2^-$

Answer: C

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

A. Be_2

B. B_2

C. Li_2

D. Be_2^+

Answer: A

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273. In which of the following pairs of molecules/ ions, the central atoms have sp^2-hybridization ?

A. BF_3 and NO_2^-

B. NH_2^- and H_2O

C. BF_3 and NH_2^-

D. NO_2^- and NH_3

Answer: A

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274. Assuming that Hund's rule is violated the bond order and magnetic nature of the diatomic molecle B_2 is

A. 1 and diamagnetic

B. 0 and diamagnetic

C. 1 and paramagnetic

D. 0 and paramagnetic

Answer: A

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275. The species having pyramidal shape is

A. SO_3

B. BeF_3

C. SiO_3^{2-}

D. OSF_2

Answer: D

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

A. O_2^{2-}

B. O_2

C. O_2^{+}

D. O_2^{-}

Answer: C

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REVISION

1. The correct order of decreasing polarisability of ion is

A. $Cl^{-}, Br^{-}, I^{-}, F^{-}$

B. $F^{-}, I^{-}, Br^{-}, Cl^{-}$

C. $F^{-}, Cl^{-}, Br^{-}, I^{-}$

D. $I^{-}, Br^{-}, Cl^{-}, F^{-}$

Answer: D

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2. Inter molecular forces in solid hydrogen are

A. Covalent forces

B. van der Waal forces or London dispersion forces

C. Hydrogen bonds

D. All of these.

Answer: B

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3. A molecule is square planar with no lone pair. What type of hybridisation is associated with it?

A. sp^3d

B. sp^3d^2

C. dsp^3

D. dsp^2

Answer: D

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4. Octrahedral shape is associated with

A. PF_5

B. SF_4

C. TeF_6

D. ClF_3

Answer: C

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5. An ionic solid is poor conductor of electricity because

A. Ions do not conduct electricity

B. Charge on the ions is uniformly distributed

C. Ions occupy fixed positions in solids

D. Ions have uniform field of influence around it.

Answer: C

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6. The molecule having three fold axis of symmetry is :

A. NH_3

B. C_2H_4

C. CO_2

D. SO_2

Answer: A

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7. Which overlap is involved in HCl molecule ?

A. s - s overlap

B. p - p overlap

C. s - d overlap

D. s - p overlap

Answer: D

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8. In a homonuclear molecule which of the following set of orbitals are degenerate ?

A. σ_{2s} and σ_{1s}

B. $\pi_{2_{p_x}}$ and $\sigma_{2_{p_y}}$

C. $\pi_{2_{p_x}}$ and $\sigma_{2_{p_z}}$

D. $\sigma_{2_{p_z}}$ and $\sigma^*_{2_{p_x}}$

Answer: B

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9. The bond angle in PH_3 is close to

A. 90°

B. 105°

C. 109°

D. 120°

Answer: A

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10. Other factors being constant which bond order is expected to correspond to shortest bond length

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

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

C. 2

D. 0.5

Answer: A

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11. Which bond is most polar?

A. Cl-F

B. Br-F

C. I-F

D. F-F

Answer: C

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12. The hybridisation of carbon in diamond, graphite and acetylene are respectively

A. sp^2, sp, sp^3

B. sp, sp^2, sp^3

C. sp^3, sp^2, sp

D. sp^2, sp^3, sp

Answer: C

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13. XeF_4 has a shape of

A. Sphere

B. Trigonal bipyramidal

C. Tetrahedral

D. Square planar.

Answer: D

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14. The lustre of the metal is on account of

A. high density of metals

B. high polish of metals

C. reflection of light due to the presence of free electrons

D. chemical inertness of metals.

Answer: C

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15. Which one of them is the weakest ?

A. ionic bond

B. covalent bond

C. metallic bond

D. van der Waals forces

Answer: D

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16. Which of the following is non existent according to molecular orbital theory?

A. H_2^-

B. O_2^-

C. He_2

D. O_2^+

Answer: C

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17. Which of the following compound has μ= 0

?

A. CCl_4

B. $CHCl_3$

C. HF

D. NH_3

Answer: A

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18. Which of the following does not conduct electricity ?

A. Molten NaOH

B. Molten KOH

C. Solid NaCl

D. Aqueous NaCl

Answer: C

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19. Which of the following is polar ?

A. BF_3

B. C_2H_5 - F

C. CO_2

D. CH_4

Answer: B

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20. BCl_3 is a planar molecular because in this molecule boron is

A. sp^3 hybridised

B. sp^2 hybridised

C. sp hybridised

D. unhybridised

Answer: B

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21. Which of the following phenomena will occur when two atoms of the elements having same spin of electron approach for bonding ?

A. Orbital overlap will not occur

B. Bonding will not occur

C. Both (A) and (B) are correct

D. None of the above are correct

Answer: C

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22. Which of the following is electron deficient?

A. BCl_3

B. PCl_3

C. PCl_5

D. NH_3

Answer: A

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23. Which of the following has unchanged valency?

A. H

B. Na

C. Fe

D. Oxygen

Answer: B

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24. Which of the following molecules is linear ?

A. C_2H_2

B. CH_4

C. H_2O

D. NH_3

Answer: A

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25. Which of the following is not paramagnetic ?

A. NO

B. S^{-2}

C. O_2^{-1}

D. N_2^{-}

Answer: B

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26. NH_3 and $BF_3$from adduct readily because they from

A. ionic bond

B. covalent bond

C. co-ordinate bond

D. hydrogen bond.

Answer: C

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27. A molecule in which sp^2 hybrid orbitals are used by the central atom in forming covalent bonds is

A. He_2

B. SO_2

C. PCl_5

D. N_2

Answer: B

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28. The molecular species having highest bond order is

A. O_2

B. O_2^-

C. O_2^+

D. O_2^{2-}

Answer: C

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29. The AsF_5 molecule is trigonal bipyramidal. The orbitals used by As for hybridisation are

A. $d_{z}2, s, px, py, pz$

B. $d_{x^2-y^2}, s, px, py, pz^2$

C. s, p_x, p_y, p_z, d_{xz}

D. None.

Answer: A

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30. Which of the following molecule/ions has triangular pyramidal shape ?

A. BF_3

B. NO_3^-

C. H_3O^+

D. CO_3^{2-}

Answer: C

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31. The nature of interparticle forces in benzene is

A. Dipole-dipole interaction

B. Dispersion force

C. Ion-dipole interaction

D. H-bonding

Answer: B

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32. The angle between the covalent bonds is maximum in :

A. CH_4

B. BF_3

C. PF_3

D. NH_3

Answer: B

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33. One of the following is having square planar structure

A. NH_4^+

B. BF_4^-

C. XeF_4

D. CCl_4

Answer: C

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34. The carbon-carbon link in acetylene contains

A. One sigma and two pi bonds

B. Two sigma and three pi bonds

C. Two sigma and two pi bonds

D. Three sigma bonds.

Answer: A

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35. Paramagnetism is exhibited by molecules which

A. are not attracted by magnetic field

B. contain only paired electrons

C. contain unpaired electrons

D. carry positive charge.

Answer: C

Watch Video Solution

36. The bond angle around central atom which uses sp^2 hybridisation is :

A. 120°

B. 180°

C. 105°

D. 109.5°

Answer: A

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37. In the resonating structures of benzene, the number of σ and π bonds are:

A. 3π and 12σ

B. 3σ and 12π

C. 6π and 6σ

D. 12π and 12σ

Answer: A

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

A. dipole-dipole interactions

B. hydrogen bonding interaction

C. dipole induced dipole interaction

D. none of the above.

Answer: B

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39. Which one has covalent as well as ionic valency?

A. NaCl

B. NaOH

C. H_2O

D. HCl(g).

Answer: B

Watch Video Solution

40. How many σ and π bonds are present in tetracyanoethylene ?

A. Nine σ and nine π

B. Five π and nine σ

C. Nine σ and seven π

D. Eight σ and eight π

Answer: A

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41. Carbon dioxide is isostructural with which of the following ?

A. $HgCl_2$

B. H_2O

C. $SnCl_2$

D. NO_2^-

Answer: A

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42. The molecule of which of the following substance has $(\mu > 0)$

A. Water

B. Methane

C. Carbon dioxide

D. Nitrogen

Answer: A

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43. Given electronic configuration of four elements as (I) $1s^2$ (II) $1s^2 2s^2 2p^2$, (III) $1s^2 2s^2 2p^5$

and (IV) $1s^2 2s^2 2p^6$. The one which is capable of forming ionic as well as covalent bonds is

A. I

B. II

C. III

D. IV.

Answer: C

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44. The ion that is isoelectronic with CO is

A. CN^{-}

B. O_2^{-}

C. N_2^{+}

D. O_2^{+}

Answer: A

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45. The ground state electron configuration of N_2 molecule is written as

KK $\left(\sigma_{2s}\right)^2\left(\sigma_{2s}^{*}\right)^2\left(\pi_{2p}\right)^4\left(2_{pz}\right)^2$ The bond order is

A. 3

B. 2

C. 0

D. 1

Answer: A

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46. The correct order of O - O bond length in O_2, H_2O and O_3.

A. $O_2 > O_3 > H_2O_2$

B. $O_3 > H_2O_2 > O_2$

C. $H_2O_2 > O_3 > O_2$

D. $O_2 > H_2O_2 > O_3$

Answer: C

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47. Which of the following species is para magnetic ?

A. CO

B. NO

C. O_2^{2-}

D. CN^-

Answer: B

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48. BCl_3 molecule is planar while NCl_3 is pyramidal because

A. BCl_3 does not have lone pair on B but NCl_3 has on N

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

C. N atom is smaller than B

D. N-Cl bond is more covalent than B-Cl bond

Answer: A

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49. N_2 and O_2 are converted to mono cations N_2^{+} and O_2^{+} respectively, which statement is wrong ?

A. In N_2^{+}, the N-N bond weakens

B. In O_2^{+}, the O-O bond order increases

C. In O_2^{+}, paramagnetism decreases

D. N_2^{+} becomes diamagnetic.

Answer: D

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50. Which of the following pair contains iso-structural species ?

A. CH_3^- and CH_3^+

B. NH_4^+ and NH_3

C. SO_4^{2-} and BF_4^-

D. NH_2^- and BeF_2.

Answer: C

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51. What is the correct sequence of bond order ?

A. $O_2^{+} > O_2^{-} > O_2$

B. $O_2 > O_2^{-1} > O_2^{+1}$

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

D. $O_2^{-1} > O_2^{+1} > O_2$

Answer: C

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52. The structure of ICl_2^- is

A. Trigonal

B. Trigonal bipyramidal

C. Octahedral

D. Square planar.

Answer: B

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53. In piperidine  the hybrid state assumed by N is

A. sp

B. sp^2

C. sp^3

D. dsp^2

Answer: C

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54. The calculated bond order in H_2^- ion is

A. 0

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

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

D. 1

Answer: B

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55. The electronic configuration of metal M is $1s^2 2s^2 2p^6 3s^1$. The formula of its oxide will be :

A. MO

B. M_2O

C. M_2O_3

D. MO_2

Answer: B

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56. Directed bond in water form an angle of

A. 90°

B. 120°

C. 105°

D. 60°

Answer: C

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57. H-bonding is not present in

A. Glycerine

B. Water

C. Hydrogen sulphide

D. Hydrogen fluoride.

Answer: C

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58. The ion that is isoelectronic with CO is

A. O_2^-

B. O_2^+

C. CN^-

D. N_2^+

Answer: C

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59. The number of electrons shared by each N atom in N_2 is

A. 2

B. 1

C. 3

D. 4

Answer: C

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60. The shape of ClO_3^- according to valence shell electron pair repulsion theory will be

A. Planar triangle

B. Pyramidal

C. Tetrahedral

D. Square planar.

Answer: B

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

A.) 4

B. 3

C. 2

D. 5

Answer: A

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62. The species which is not paramagnetic among the following is

A. Be^{-}

B. Ne^{2+}

C. Cl^{-}

D. As^{+}

Answer: C

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63. Which of the following hydrides of the oxygen family shows the lowest boiling point?

A. H_2O

B. H_2S

C. H_2Se

D. H_2Te

Answer: B

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64. The molecule having bond order 3 is

A. H_2

B. N_2

C. O_2

D. He_2^+

Answer: B

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65. The hydrogen bond is strongest in

A. O-H...S

B. S-H...O

C. F-H...F

D. F-H...O.

Answer: C

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66. According to Fajans rule, the covalent bond is favoured by :

A. Large cation and small anion

B. Large cation and large anion

C. Small cation and small anion

D. Small cation and large anion

Answer: D

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67. According to VSEPR theory, the shape of the water molecule is

A. Octahedral

B. Distorted tetrahedral

C. Planar triangle

D. Linear.

Answer: B

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68. In a double bond connecting two atoms there is a sharing of

A. 2 electrons

B. 4 electrons

C. 1 electron

D. All electrons.

Answer: B

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69. Which chloride should exhibit the most covalent type of bond ?

A. KCl

B. $CaCl_2$

C. $BeCl_2$

D. $BaCl_2$

Answer: C

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70. Which of the following will be octahedral ?

A. SF_6

B. BF_4^-

C. PCl_5

D. BO_3^{3-}

Answer: A

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71. The bond order in O_2^{+} is

A. 2

B. 2.5

C. 1.5

D. 3

Answer: B

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72. Which of the following is paramagnetic ?

A. O_2

B. CN^-

C. CO

D. NO^+

Answer: A

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73. The most suitable method of separation of a mixture of ortho and para nitrophenol in the ratio $1:1$ is :

A. distillation

B. crystallisation

C. vapourisation

D. colour spectrum

Answer: A

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74. O_2 molecule is

A. paramagnetic

B. diamagnetic

C. ferromagnetic

D. none of these.

Answer: A

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75. Which of the following bonds is most polar ?

A. C-O

B. C-F

C. O-F

D. N-F.

Answer: B

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76. The relationship between the dissociation energy of N_2 and N_2^+ is

A. dissociation energy of N_2= dissociation energy of N_2^+

B. dissociation energy of N_2 can either be lower or higher than the dissociation energy of N_2^+

C. dissociation energy of N_2gt dissociation energy of N_2^+

D. association energy of N_2^+ gt dissociation

energy of N_2

Answer: C

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77. Among the following ions the p π- d π overlap could be present in

A. NO_3^-

B. PO_4^{3-}

C. CO_3^{2-}

D. NO_2^{-1}

Answer: B

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78. Among the following the electron deficient compound is

A. CCl_4

B. PCl_5

C. $BeCl_2$

D. BCl_3

Answer: D

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79. Which of the following is planar?

A. XeO_4

B. XeO_3F

C. XeO_2F_2

D. XeF_4

Answer: D

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80. Polarisation of electrons in acrolein may be written as :

A. $\overset{\delta-}{C}H_2 = \overset{\delta+}{C}H - CH = O$

B. $\overset{+\delta}{C}H_2 = CH - CH = \overset{-\delta}{O}$

C. $\overset{-\delta}{C}H_2 = CH - \overset{\delta+}{C}H = O$

D. $\overset{\delta-}{CH_2} = CH - CH = \overset{\delta+}{O}$

Answer: B

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81. Which of the following is not paramagnetic ?

A. N_2^+

B. CO

C. O_2^-

D. NO.

Answer: B

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

A. HCl

B. HF

C. H_2O

D. NH_3.

Answer: B

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83. Carbon atoms in benzene molecule are inclined at an angle of

A. 120°

B. 180°

C. 109°-28'

D. $60\ ^{\circ}$

Answer: A

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84. The bond length between C- C bonds in sp^2 hybridised molecule is

A. 1.2 Ã…

B. 1.32 Ã…

C. 1.54 Ã…

D. 1.4 Ã...

Answer: B

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85. The molecule having non-zero dipole moment is

A. H_2O_2

B. CH_4

C. C_2H_6

D. BF_3

Answer: A

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86. The shape of the molecule SF_2Cl_2 is

A. trigonal bipyramidal

B. cubic

C. octahedral

D. tetrahedral

Answer: A

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87. The hybridization of sulphur in SO_2 is

A. sp^2

B. sp^3

C. sp

D. sd^3

Answer: A

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88. 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

B. Van der Waal forces

C. Hydrogen bond formation

D. Covalent attraction

Answer: C

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

A. 16

B. 12

C. 7

D. 14

Answer: D

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90. The structure of $CH_2 = C = CH_2$ is

A. linear

B. planar

C. non-planar

D. has several resonance structures

Answer: B

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91. The hybridisation of xenon in XeF_2 is

A. sp^3

B. sp^2

C. sp^3d

D. sp^2d

Answer: C

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92. The shape of gaseous $SnCl_2$ is

A. Tetrahedral

B. Linear

C. Angular

D. T-shaped

Answer: C

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93. Which of the following substances has the least ionic character ?

A. $FeCl_2$

B. $ZnCl_2$

C. $CdCl_2$

D. $MgCl_2$

Answer: B

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94. Which one of the following molecules will have unequal bond lengths ?

A. NF_3

B. BF_3

C. PF_5

D. SF_6

Answer: C

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95. The bond order of individual carbon-carbon bond in benzene is

A. one

B. two

C. between one and two

D. one and two alternately.

Answer: C

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96. In which of the following molecules, is the covalent bond most polar ?

A. HI

B. HBr

C. HCl

D. H_2

Answer: C

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97. Among the following compounds, which has a dipole moment

A. CCl_4

B. C_6H_6

C. BF_3

D. HF

Answer: D

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98. Which of the following is least ionic ?

A. C_2H_5Cl

B. KCl

C. $BaCl_2$

D. $C_6H_5\overset{+}{N}H_3Cl^-$

Answer: A

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

A. 4

B. 3

C. 2

D. 5

Answer: A

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100. Most efficient overlapping is

A. sp^2 - sp^2

B. s-s

C. sp^3 - sp^3

D. sp-sp

Answer: C

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101. IF_5 has the following hybridisation

A. sp^3d^2

B. sp^3d^3

C. sp^3d

D. None of these

Answer: A

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102. Antibonding MO is formed by

A. Addition of atomic orbitals

B. Subtraction of atomic orbitals

C. Multiplication of atomic orbitals

D. None of these.

Answer: B

Watch Video Solution

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

A. 0.5

B. 1.5

C. 3.5

D. 2.5

Answer: A

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104. In O_3, there are

A. 2σ , 1π bond

B. 1σ, 2π bonds

C. 2σ, 2π bonds

D. 2σ, 1π one lone pair

Answer: D

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105. Which is most viscous ?

A. CH_3OH

B. $C_2H_5 - OH$

C. $\begin{array}{c} CH_2OH \\ | \\ CH_2OH \end{array}$

D. None

Answer: C

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106. The boiling point of heavy water is

A. 108° C

B. 101.4° C

C. 99° C

D. 110° C

Answer: C

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107. Fluorine molecule is formed by

A. The axial p-p overlap

B. The sidewise p-p overlap

C. The axial s-p overlap

D. The overlap of two sp^2 hybrid orbitals.

Answer: A

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108. The correct order of bond angles in the molecules, H_2O, NH_3, CH_4, and CO_2 is

A. $H_2O > NH_3 > CH_4 > CO_2$

B. $H_2O < NH_3 < CO_2 < CH_4$

C. $H_2O < NH_3 > CO_2 > CH_4$

D. $CO_2 > CH_4 > NH_3 > H_2O$

Answer: D

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109. Which is the correct arrangement of the molecules basexd on dipole moments ?

A. BF_3gt NF_3 gt NH_3

B. NF_3gt BF_3 gt NH_3

C. NH_3gt BF_3gt NF_3

D. NH_3gt NF_3 gt BF_3

Answer: D

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110. The boiling point of para nitrophenol is greater than that of ortho nitrophenol, because

A. there is intermolecular hydrogen bonding in para nitrophenol and intramolecular hydrogen bonding in ortho nitrophenol

B. there is intramolecular hydrogen bonding in para nitrophenol and intermolecular hydrogen bonding in ortho nitrophenol

C. both have the same kind of hydrogen bonding

D. para nitrophenol is polar, while ortho nitrophenol is non-polar

Answer: A

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111. Which of the following compounds shows ionic, covalent and co-ordinate bonds as well ?

A. $CaSO_4 . 5H_2O$

B. $CuSO_4 . 5H_2O$

C. HCl

D. NaCl

Answer: B

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112. Which of the following has sp^3 hybridisation of central atom ?

A. XeO_3

B. BCl_3

C. XeF_4

D. BBr_3

Answer: A

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113. The shape of ClO_3^- is

A. Triangular pyramidal

B. Tetrahedral

C. Triangular planar

D. Triangular bipyramidal.

Answer: A

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114. Sideways overlap of p - p orbitals forms

A. Sigma bond

B. Pi bond

C. Coordinate bond

D. H-bond.

Answer: B

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115. The main axis of diatomic molecule is z. The orbitals p_x and p_y overlap to form

A. π molecular orbital

B. σ molecular orbital

C. δ molecular orbital

D. no bond will be formed

Answer: D

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116. Which of the following pairs are iso-structural ?

A. XeF_2, IF_2^-

B. NH_3, BF_3

C. CO_3^{2-}, SO_3^{2-}

D. PCl_5, ICl_5

Answer: A

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117. Number of π-bonds in naphthalene is

A. 6

B. 3

C. 4

D. 5

Answer: D

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118. Which of the following is soluble in water?

A. CS_2

B. C_2H_5OH

C. CCl_4

D. $CHCl_3$

Answer: B

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119. Dipole moment is shown by

A. 1,4-Dichlorobenzene

B. Cls 1,2-Dichlorobenzene

C. trans 1,2-Dichlorobenzene

D. trans 2, 3-Dichloro-2-butene.

Answer: B

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120. 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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121. Which of the following does not contain coordinate bond?

A. BH_4^-

B. NH_2^-

C. CO_3^{2-}

D. H_3^+O

Answer: C

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122. A square planar complex is formed by hybridisation of which atomic orbitals?

A. s, p_x, p_y, p_z

B. $s, p_x, p_y, d_{x^2-y^2}$

C. s, p_x, p_y, d_z^2

D. s, p_x, p_z, d_{xy}

Answer: B

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123. 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 forces of attraction overcome the forces of repulsion

D. In covalency, the transference of electrons takes place.

Answer: C

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124. Number of sigma bonds in P_4O_{10} is

A. 6

B. 7

C. 17

D. 16

Answer: D

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125. In which of the following sepcies , is the underlined carbon has sp^3 -hybridisation ?

A. $CH_3\underline{C}OOH$

B. $CH_3\underline{C}H_2OH$

C. $CH_3\underline{C}OCH_3$

D. $CH_2 = CH - CH_3$

Answer: B

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126. In XeF_2, XeF_4, and XeF_6, the number of lone pairs on 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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127. The bond order in O_2^+ is

A. 1

B. 1.5

C. 2.5

D. 3

Answer: C

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128. Which of the following has zero dipole moment?

A. ClF

B. PCl_3

C. SiF_4

D. $CFCl_3$

Answer: C

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129. The correct sequence of decrease in the bond angles of the following hydrides is

A. NH_3 gt PH_3gt AsH_3gt SbH_3

B. NH_3gt AsH_3 gt PH_3gt SbH_3

C. SbH_3gt AsH_3 gt PH_3gt NH_3

D. PH_3gt NH_3 gt AsH_3gt SbH_3

Answer: A

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130. 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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131. In $\overset{+}{NO_3}$ ion, number of bond pairs and lone pairs of electrons are respectively

A. 2,2

B. 3,1

C. 1,3

D. 4,8

Answer: D

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

A. NO_3^-

B. SO_3^{2-}

C. BO_3^{3-}

D. CO_3^{2-}

Answer: B

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133. Sulphuric acid provides a simple example of

A. coordinate bonds

B. non covalent compound

C. covalent ion

D. non-covalent ion

Answer: A

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134. A lone pair of electrons in an atom implies

A. A pair of valence electrons

B. A 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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135. Chemical bond implies

A. repulsion

B. attraction

C. attraction and repulsion balanced at particular distance

D. attraction and repulsion.

Answer: C

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

A. Sodium is less reactive

B. Hydrogen is a non-metal

C. Hydrogen chloride is a gas

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

Answer: B

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137. Covalent compounds have low melting points because

A. covalent molecules have definite shape

B. covalent bond is weaker than ionic bond

C. covalent bond is less exothermic

D. covalent molecules are held by weak van der Waals forces of attraction.

Answer: D

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138. The number of σ - and π bonds present in pent-4en-1-yne is :

A. 3, 10

B. 9,4

C. 4,9

D. 10, 3

Answer: D

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139. 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 effect in this regard.

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

C. Bond energies of sigma and pi-bonds are of the order of 264 kJ/mol and 347 kJ/mol respectively.

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

Answer: C

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140. In an anion $HCOO^-$ the two carbon-oxygen bonds are found to be equal length. What is the reason for it?

A. Electronic orbitals of carbon atom are hybridised

B. The C=O bond is weaker than the C-O bond

C. The anion $HCOO^-$ has two resonating Structures

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

Answer: C

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141. The pair of species having identical shapes for molecules of both species is

A. CF_4, SF_4

B. XeF_2, CO_2

C. BF_3, PCl_3

D. PF_5, IF_5

Answer: B

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142. The ion which is not tetrahedral in shape is

A. BF_4^-

B. NH_4^+

C. $Cu(NH_3)_4^{2+}$

D. $NiCl_4^-$

Answer: C

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143. Which of the following compounds prossesses the C - H bonds with the lowest bond dissociation energy?

A. Toluene

B. Benzene

C. n-Pentane

D. 2, 2-Dimethylpropane

Answer: A

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144. Maximum hydrogen bonds in water are,

A. 4

B. 3

C. 2

D. 8

Answer: A

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145. sp^3 has s-character

A. $1/2$

B. $1/4$

C. $1/8$

D. 1

Answer: B

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146. Which one is configuration of most metallic metal ?

A. 2,8,8,1

B. 2, 8, 2

C. 2, 8, 18, 1

D. 2, 8, 1

Answer: A

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147. The nature of hybridisation in the NH_3 molecule is

A. sp^2

B. sp^3

C. dsp^2

D. sp

Answer: B

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148. Which of the following bonds require the largest amount of bond energy to dissociate the atoms concerned ?

A. H - H bond in H_2

B. C - H bond in CH_4

C. $N \equiv N$ bond in N_2

D. $O = O$ bond in O_2

Answer: C

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149. From elementary molecular orbital theory we can deduce the electronic configuration of the singly positive nitrogen molecular ion N_2^+

as

A. $\sigma_{1s^2}\overset{*}{\sigma}_{1s^2}\sigma_{2s^2}\overset{*}{\sigma}_{2s^2}\overset{*}{\sigma}_{2s}\,2\pi_{2p^4}\sigma_{2p^1}$

B. $\sigma_{1s^2}\overset{*}{\sigma}_{1s_2},\ \sigma_{2s^2}\sigma_{2s} * 2\sigma_{2p^1}\pi_{2p^3}$

C. $\sigma_{1s^2}\overset{*}{\sigma}_{1s^2},\ \sigma_{2s^2}\overset{*}{\sigma}_{2s^2}\sigma_{2p^2}\pi_{2p^4}$

D. $\sigma_{1s^2}\overset{*}{\sigma}_{1s^2},\ \sigma_{2s^2}\overset{*}{\sigma}_{2s^2}\sigma_{2p^2}\pi_{2p^2}$

Answer: A

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150. Which one of the following has the smallest bond angle?

A. NH_3

B. BeF_2

C. H_2O

D. CH_4

Answer: C

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151. Identify the correct statement from below concerning the structure of $CH_2 = C = CH_2$

A. The molecule is planar

B. One of the three carbon atoms is in an sp^3- hybridized state

C. The molecule is non-planar with the two CH_2 groups being in planes perpendicular to each other

D. All the carbon atoms are sp-hybridised

Answer: C

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152. Which carbon is more electronegative ?

A. sp^3-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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153. Molecular shape of SF_4, CF_4 and XeF_4 are :

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

B. The same with 1, 1 and 1 lone pair of electrons respectively

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

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

Answer: D

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154. The correct order of bond angles (smallest first) in H_2S, NH_3, BF_3 and SiH_4 is

A. H_2S lt SiH_4 lt NH_3 lt BF_3

B. H_2S lt NH_3 lt BF_3 lt SiH_4

C. H_2lt NH_3lt SiH_4ltBF_3

D. NH_3 lt H_2S lt SiH_4 lt BF_3

Answer: C

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155. The states of hybridisation of boron and oxygen atoms in boric acid $\left(H_3BO_3\right)$ are respecitivelty :

A. sp^2 and sp^2

B. sp^3 and sp^3

C. sp^3 and sp^2

D. sp^2 and sp^3

Answer: D

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156. Which of the following has the regular tetrahedral structure?

A. XeF_4

B. $[Ni(CN)_4]^{2-}$

C. BF_4^-

D. SF_4

Answer: C

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157. The bond order in NO is 2.5 while that in NO^+ is 3. Which of the following statements is true for these two species ?

A. Bond length in NO^{+} is greater than in NO

B. Bond length is unpredictable

C. Bond length in NO^{+} is equal to that in NO

D. Bond length in NO is greater than in NO^{+}

Answer: D

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

A. dsp^3-hybridisation

B. $sp^3 - d^2$hybridisation

C. dsp^2-hybridisation

D. sp^3d-hybridisation

Answer: B

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159. Among the species CO_2, CO_3^{2-}, CH_3COO^-, CO, HCHO which has longest carbon-oxygen bond

A. CO_2

B. CH_3COO^-

C. CO

D. CO_3^{2-}

Answer: D

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160. The boiling point of methanol is greater than methyl thiol because

A. There is intramolecular hydrogen bonding in methanol and intermolecular hydrogen bonding in methyl thiol

B. There is intermolecular hydrogen bonding in methanol and no hydrogen bonding in methyl thiol.

C. There is no hydrogen bonding in methanol and intermolecular hydrogen bonding in methyl thiol

D. There is no hydrogen bonding in methanol and intramolecular hydrogen bonding in methyl thiol.

Answer: B

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161. Two nodal planes are present in

A. π^*_{2px}

B. σ_{2p_z}

C. π_{2p_x}

D. π_{2p_y}

Answer: A

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162. In acetylene molecule, the carbon atoms are linked by:

A. one sigma bond and two pi-bonds

B. two sigma bonds and one pi-bond

C. three sigma bonds

D. three pi-bonds.

Answer: A

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163. Shape of O_2F_2 is similar to that of

A. C_2F_2

B. H_2O_2

C. H_2F_2

D. C_2H_2

Answer: B

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164. The ONO bond angle is maximum in

A. NO_3^-

B. NO_2

C. NO_2^-

D. NO_2^+

Answer: D

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165. The dipole moment is the highest for

A. Trans-2-butene

B. 1, 3-Dimethylbenzene

C. Acetophenone

D. Ethanol.

Answer: C

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166. The decreasing order of bond angle is

A. $NO_2 > NO_2^+ > NO_2^-$

B. $NO_2^- > NO_2 > NO_2^+$

C. $NO_2^+ > NO_2 > NO_2^-$

D. $NO_2^+ > NO_2^- > NO_2$

Answer: C

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167. H_2O is dipolar, whereas BeF_2 is not. It is because

A. H_2O is angular and BeF_2 is linear

B. the electronegativity of F is greater than that of O.

C. H_2O involves hydrogen bonding whereas BeF_2 is a discrete molecule

D. H_2O is linear and BeF_2 angular.

Answer: A

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

A. d_{xy}, d_{yz}

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

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

D. d_z^2, d_{xz}

Answer: B

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169. In BrF_3 molecule, the lone pair occupies equatorial position minimize

A. lone pair-lone pair repulsion only

B. lone pair-bond pair repulsion only

C. bond pair-bond pair repulsion only

D. lone pair-lone pair repulsion and lone pair-bond pair repulsion.

Answer: D

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170. Among the following the pair in which the two species are not isostructural is

A. PF_6^- and SF_6

B. SiF_4 and SF_4

C. IO_3^- and XeO_3

D. BH_4^- and NH_4^+

Answer: B

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171. Decreasing order of C-C bond length is (I) C_2H_4 (II) C_2H_2 (III) C_6H_6 (IV) C_2H_6

A. IVgt IIgt I gt II

B. I gt II gt IV gt III

C. II gt I gt IV gt III

D. IV gt I gt III gt II.

Answer: A

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172. How many sigma and pi bonds are present in toluene ?

A. $3\pi + 8\sigma$

B. $3\pi + 6\sigma$

C. $3\pi + 15\sigma$

D. $6\pi + 6\sigma$

Answer: C

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173. If the molecule of HCl were totally polar, the expected value of dipole moment is 6-12 D (debye) but the experimental value of dipole moment was 1.03 D. Calculate the percentage ionic character.

A. 17

B. 83

C. 50

D. Zero

Answer: A

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174. Which one of the following molecules has the smallest bond angle ?

A. NH_3

B. PH_3

C. H_2O

D. H_2Se

Answer: D

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175. Which one of the following sepcies is diamagnetic in nature ?

A. He_2^+

B. H_2

C. H_2^+

D. H_2^-

Answer: B

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176. Lattice energy of an ionic compound depedns upon :

A. Charge on the ion only

B. Size of the ion only

C. Packing of ions only

D. Charge on the ion and size of the ion.

Answer: D

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177. Molecular shape of SF_4, CF_4 and XeF_4 are

:

A. The same with 2, 0 and 1 lone pairs of electrons on the central atom respectively.

B. The same with 1, 1 and 1 lone pair of electrons on the central atoms respectively

C. different with 0, 1 and 2 lone pairs of electrons on the central atom respectively

D. different with 1. 0 and 2 lone pairs of electrons on the central atom respectively

Answer: D

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178. The number and type of bonds between carbon atoms in calcium carbide are

A. two sigma, one pi

B. two sigma, two pi

C. one sigma, one pi

D. one sigma, two pi.

Answer: D

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179. Of the following sets ,which one does not contain isoeletronic species ?

A. $PO_4^{3-}, SO_4^{2-}, ClO_4^{-}$

B. CN^{-}, N_2, C_2^{2-}

C. $SO_3^{2-}, CO_3^{2-}, NO_3^{-}$

D. $BO_3^{3-}, CO_3^{2-}, NO_3^{-}$

Answer: C

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180. The correct order in which the O-O bond length increases in the following is

A. H_2O_2 lt O_2 lt O_3

B. O_3 lt H_2O_2 lt O_2

C. O_2 lt O_3lt H_2O_2

D. O_2 ltH_2O_2 lt O_3

Answer: C

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181. The correct sequence of increasing covalent character is represented by

A. LiCl, NaCL, $BeCl_2$

B. $BeCl_2$, NaCl, LiCl

C. NaCl, LiCl, $BeCl_2$

D. $BeCl_2$, LICl, NaCl

Answer: C

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182. Which of the following is electron deficient molecule ?

A. B_2H_6

B. C_2H_6

C. PH_3

D. SiH_4

Answer: A

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183. Which of the following would have permanent dipple moment ?

A. BF_3

B. SiF_4

C. SF_4

D. XeF_4

Answer: C

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184. In which of the following molecules the central atom does not follow the octet rule ?

A. CO_2

B. BF_3

C. H_2O

D. H_2S

Answer: B

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185. Which one of the following statements is true ?

A. The dipole moment of NF_3 is zero

B. The dipole moment of NF_3 is less than NH_3

C. The dipole moment of NF_3 is more than NH_3

D. The dipole moment of NF_3 is equal to NH_3

Answer: B

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186. The correct order of the lattice energies of the following ionic compounds is

A. $NaCl > MgBr_2 > CaO > Al_2O_3$

B. $NaCl > CaO > MgBr_2 > Al_2O_3$

C. $Al_2O_3 > MgBr_2 > CaO > NaCl$

D. $Al_2O_3 > CaO > MgBr_2 > NaCl$

Answer: D

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187. The H - O - H bond angle in water is

A. $120\ ^{\circ}$

B. $109.5\ ^{\circ}$

C. $107\ ^{\circ}$

D. $104.5\ ^{\circ}$

Answer: D

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188. Which of the following molecule is linear?

A. $BeCl_2$

B. H_2O

C. SO_2

D. CH_4

Answer: A

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189. Which of the following is correct ?

A. The number of electrons present in the valence shell of S in SF_6 is 12

B. The rate of ionic reactions are very slow.

C. According to VSEPR theory $SnCl_2$ is a linear molecule

D. The correct order of stability to form ionic compounds among $Na^+, Mg^{2+},$ and $Al^{3+} is Al^{3+} > Mg^{2+} > Na^+$

Answer: A

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190. The hydrogen bond is strongest in

A. S-H.. O

B. O-H... S

C. F- H...F

D. O- H. N

Answer: C

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191. Match list and list II and pick out correct matching from the given choices.

List I (Compound)	List II (Structure)
$(a) ClF_3$	1. Square planar
$(b) PCl_5$	2. tetrahedral
$(c) IF_5$	3. trigonal bipyramidal
$(d) CCl_4$	4.square bipyramidal
$(e) XeF_4$	5. T-shaped

A. a-5,b-4,c-3,d-2,e-1

B. a-5,b-3,c-4,d-2,e-1

C. a-4,b-3,c-4,d-1,e-2

D. a-4, b-3, c-5, d-2, e-1

Answer: A

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192. The sequence that correctly describes the relative bond strengths pertaining to oxygen molecule and its cation or anion is

A. $O_2^{2-} > O_2^{-} > O_2 > O_2^{+}$

B. $O_2 > O_2^{+} > O_2^{2-} > O_2^{2+}$

C. $O_2^{+} > O_2 > O_2^{2-} > O_2^{-}$

D. $O_2^{+} > O_2 > O_2^{-} > O_2^{2-}$

Answer: D

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193. Consider the following molecules or ions

CH_2Cl_2 (ii) NH_4^+ (iii) SO_4^{2-} (iv) ClO_4^- (v) NH_3

sp^3-hybridization is involved in the formation of

A. (i), (ii), (v) only

B. (i). (ii) only

C. (i),(ii),(iv) only

D. (i),(ii),(iii),(iv) and (v)

Answer: D

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194. The decreasing order of the boiling points of the following hydrides

(i) NH_3 (ii) PH_3

(iii) AsH_3 (iv) SbH_3

(v) H_2O is

A. (v) gt (iv) gt (i) gt (iii) gt (ii)

B. (v) gt (i) gt (ii) gt (iii) gt (iv)

C. (ii) gt (iv) gt (iii) gt (i) gt (v)

D. (iv)gt (iii) gt (i) gt (ii) gt (v)

Answer: A

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195. Match list and list II and pick out correct matching from the given choices.

List I (Compound)	List II (Structure)
$(a)ClF_3$	1. Square planar
$(b)PCl_5$	2. tetrahedral
$(c)IF_5$	3. trigonal bipyramidal
$(d)CCl_4$	4.square bipyramidal
$(e)XeF_4$	5. T-shaped

A. a-2, b- 1, c-3, d-5, e-4

B. a-1, b-5, c-2, d-3, e - 4

C. a -5, b- 1, c-2, d-3, e-4

D. a-3, b-1, c-4, d-5, e-2

Answer: C

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

A. $2kJmol^{-1}$

B. $20kJmol^{-1}$

C. $200kJmol^{-1}$

D. $2000kJmol^{-1}$

Answer: B

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197. The number of lone pairs of electrons present on the central atom of CIF_3 is

A. 0

B. 1

C. 2

D. 3

Answer: C

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198. Bond order of nitric oxide is

A. 1

B. 2.5

C. 2

D. 1.5

Answer: B

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199. How many types of $F - S - F$ bonds are present in SF_4?

A. 2

B. 3

C. 4

D. 5

Answer: A

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200. The number of σ and π- bonds in allyl isocyanide are

A. 9 σ , 3 π

B. 9 σ, 9π

C. 3 σ, 4 π

D. 5 σ, 7 π

Answer: A

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201. In $TeCl_4$, the central tellurium involves the hybridization

A. sp^3

B. sp^3d

C. sp^3d^2

D. dsp^2

Answer: B

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202. Match the compounds in the List with that in List II

List I	List II
$(a) XeO_3$	1.Planar triangular
$(b) XeOF_4$	2. T-shape
$(c) BO_3^{3-}$	3. Trigonal pyramid
$(d) ClF_3$	4. Square pyramid
$(e) I_3^-(aq)$	5. Linear
	6.Bent

A. a-1, b-4, c-3, d-2,e-5

B. a -2,b-4, c-1,d-3, e-6

C. a-3, b-4,c-1,d-2,e- 6

D. a-3,b-4, c-1, d-2 , e-5

Answer: D

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203. The correct order of bond order values among the following

(i) NO^{-}

(ii) NO^{+}

(iii) NO

(iv) NO^{2+}

(v) NO^{2-}

A. $a < d < c < b < e$

B. $d = b < a < e < c$

C. $e < a < d = c < b$

D. $b < c < d < a < e$

Answer: C

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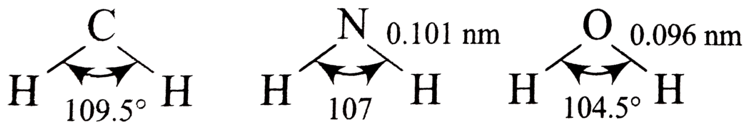
204. The bond lengths and bond angles in the molecules of methane, ammonia, and water are given below:



This variation in bond angle is a result of

(i) the increasing repulsion between H atoms as the bond length decreases

(ii) the number of nonbonding electron pairs in the molecule

(iii) a nonbonding 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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205. Which one of the following pairs consists of only paramagnetic species

A. O_2, NO

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

C. CO, NO

D. NO, NO^+

Answer: A

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206. The hybridization of oxygen atom in H_2O_2 is

A. sp^3d

B. sp

C. sp^2

D. sp^3

Answer: D

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207. Which of the following is paramagnetic with bond order 0.5?

A. F_2

B. H_2^+

C. N_2

D. O_2^-

Answer: B

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208. Which of the following is correctly based on molecular orbital theory for peroxide ion?

A. Its bond order is two and it is diamagnetic

B. Its bond order is one and is paramagnetic

C. Its bond order is two and it is paramagnetic

D. Its bond order is one and it is diamagnetic

Answer: D

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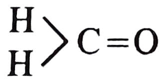
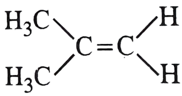
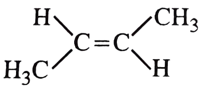
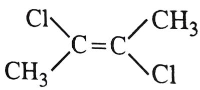
209. Which has the highest dipole moment?

A. (A) 

B. (B) 

C. (C) 

D. (D) 

Answer: A

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210. The magnetic moment of KO_2 at room temperature is --------- BM.

A. 1.41

B. 1.73

C. 2.23

D. 2.64

Answer: B

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211. Shape of ClF_3 is

A. Equilateral triangle

B. Pyramidal

C. V-shaped

D. T-shaped

Answer: D

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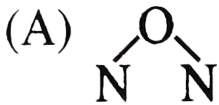
212. Which of the following is the structure of N_2O which is isoelectronic with CO_2 and N_3^-?

A. 

B. N-O-N

C. 

D. N-N-O

Answer: D

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213. Which of the following has transient existence?

A. H

B. H_2^+

C. H^+

D. He

Answer: B

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214. The number of nodal planes present in a σ^* antibonding orbital is

A. 0

B. 3

C. 1

D. 2

Answer: C

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

A. 1.5

B. 1

C. 2.5

D. 2

Answer: A

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216. The bond angle and dipole moment of water respectively are :

A. 105.5°, 1.84D

B. 107.5°, 1.56 D

C. 104.5°, 1.84 D

D. 102.5°, 1.56 D

Answer: C

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217. Match list (Molecules) with list II (Boiling points) and select the correct answer

List I	List II
$(a) NH_3$	(1) 290 K
$(b) PH_3$	(2) 211 K
$(c) AsH_3$	(3) 186 K
$(d) SbH_3$	(4) 264 K
$(e) BiH_3$	(5) 240 K

A. a-3, b-2,c-5, d -4,e-1

B. a -5, b -3, c-2, d-4, e - 1

C. a - 1,b-4,c -5, d-2, e-3

D. a- 1, b-2, c-3, d-4, e-5

Answer: B

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218. Shape and hybridization of IF_5, respectively, are

A. Trigonal bipyramidal, sp^3d

B. Seesaw, sp^3d

C. Square pyramidal, sp^3d^2

D. Pentagonal pyramidal, sp^3d^3

Answer: C

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219. RbO_2 is

A. Peroxide and paramagnetic

B. Peroxide and magnetic

C. Super oxide and paramagnetic

D. Super oxide and diamagnetic.

Answer: C

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220. Arrange the following ions in the order of decreasing $X - O$ bond length where X is the central atom:

A. $ClO_4^-, SO_4^{2-}, PO_4^{3-}, SiO_4^{4-}$

B. $SiO_4^{4-}, PO_4^{3-}, SO_4^{2-}, ClO_4^-$

C. $SiO_4^{4-}, PO_4^{3-}, ClO_4^-, SO_4^{2-}$

D. $SiO_4^{2-}, SO_4^{2-}, PO_4^{3-}, ClO_4^-$

Answer: B

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221. The molecule which has highest bond order is

A. C_2

B. N_2

C. B_2

D. O_2

Answer: B

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222. The molecular geometry of BF_3 is

A. tetrahedral

B. pyramidal

C. square planar

D. trigonal planar

Answer: D

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223. The types of hybridisation on the five carbon atoms from left to right in the molecule $CH_3 - CH = C = CH - CH_3$ are

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

B. $sp^3, sp, sp^2, sp^2, sp^3$

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

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

Answer: C

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224. In which pair of species, both species do have similar geometry

A. CO_2, SO_2

B. NH_3, BH_3

C. CO_3^{2-}, SO_3^{2-}

D. SO_4^{2-}, ClO_4^{-}

Answer: D

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225. In forming $C_2 \rightarrow C_2^+$ and (ii) $O_2 \rightarrow O_2^+$,

the electrons respectively are removed from

A. $\left(\pi^*_{2pz} \text{ or } \pi^*_{2px}\right)$ and $\left(\pi^*_{2py} \text{ or } \pi^*_{2px}\right)$

B. $\left(\pi^*_{2py} \text{ or } \pi^*_{2px}\right)$ and $\left(\pi^*_{2py} \text{ or } \pi_{2px}\right)$

C. $\left(\pi_{2py} \text{ or } \pi_{2px}\right)$ and $\left(\pi^*_{2py} \text{ or } \pi^*_{2px}\right)$

D. $\left(\pi^*_{2py} \text{ or } \pi^*_{2px}\right)$ and $\left(\pi_{2py} \text{ or } \pi_{2px}\right)$

Answer: C

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

A. Bond order three and isoelectronic

B. Bond order three and weak field ligands

C. Bond order two and π acceptor

D. Iso-electronic and weak fields.

Answer: A

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227. It is believed that atoms combine with each other such that the outermost shell acquires a stable configuration of 8 electrons. If stability were attained with 6 electrons rather than 8. What would be the formula of the stable fluoride ion.

A. F^{-}

B. F^{+}

C. F^{2+}

D. F^{3+}

Answer: B

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228. The correct statement with regard to H_2^{+} and H_2^{-} is

A. Both H_2^{+} and H_2^{-} are equally stable

B. Both H_2^{+} and H_2^{-} do not exist

C. H_2^{-} is more stable than H_2^{+}

D. H_2^{+} is more stable than H_2^{-}

Answer: D

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229. Arrange the following in the increasing order of their bond order:

A. O_2, O_2^{+}, O_2^{-} and O_2^{2-}

B. $O_2^{2-}, O_2^{-}, O_2, O_2^{+}$

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

D. $O_2, O_2^{+}, O_2^{-}, O_2^{2-}$

Answer: B

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230. Pi (π) bond is formed by the overlap of

A. p - p orbitals

B. s - s orbitals

C. s-p orbitals

D. s-d orbitals.

Answer: A

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231. The bond angle formed by different hybrid orbitals are in the order

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

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

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

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

Answer: D

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232. The s and p characters in bond formed by central atom are equal in :

A. CH_4

B. $CH \equiv CH$

C. CH_3^+

D. CH_3^-

Answer: B

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233. The maximum bond strengths is in:

A. O_2

B. O_2^+

C. O_2^-

D. O_2^{2-}

Answer: B

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234. The number of bonding and anti-bonding electrons respectively in CO molecule is :

A. 8, 2

B. 2,8

C. 4,2

D. 10,4

Answer: D

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235. The bond order in He_2^+ ions is :

A. 0.5

B. 1.0

C. 1.5

D. 2.0

Answer: A

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236. The total number of electrons that take part in forming bond in O_2 is

A. 2

B. 4

C. 6

D. 8

Answer: B

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237. How many σ(sigma) bonds are there in $CH_2 = CH - CH = CH_2$?

A. 3

B. 6

C. 9

D. 12

Answer: C

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238. How many σ and π bonds are present in the given compound $Ph - CH = C \mid CH_3 - C_2H_5$

A. 19 σ and 4 π bonds

B. 22σ and 4π bonds

C. 25 σ and 4π bonds

D. 26 σ and 4π bonds

Answer: C

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239. The species having pyramidal shape is

A. SO_3

B. BrF_3

C. SiO_3^{2-}

D. OsF_2

Answer: D

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240. Peroxide ionâ€¦â€¦

(i) has five completely filled antibonding molecular orbitals

(ii) is diamagnetic

(iii) has bond order one.

(iv) is isoelectronic with neon

Which of the following are correct

A. (iii) and (iv)

B. (i), (ii) and (iv)

C. (i) and (ii)

D. (iv) and (iv)

Answer: C

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241. In which of the following molecules, the central atom does not have sp^3 hybridization ?

A. CH_4

B. SF_4

C. SiF_4

D. CH_4

Answer: B

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242. Some of the properties of the two species NO_2^- and H_3O^+ are described below which one of them is correct ?

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

B. Isostructural with same hybridization for the central atom

C. Isostructural with different hybridization for the central atom

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

Answer: A

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243. Find the bond order of CO

A. 2

B. 2.5

C. 3

D. 3.5

Answer: C

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244. Which of the following has a regular geometry

A. $CHCl_3$

B. PCl_3

C. XeF_6

D. SF_4

Answer: A

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245. A neutral molecule XF has a zero dipole moment. The X is most likely

A. chlorine

B. boron

C. nitrogen

D. carbon

Answer: B

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246. N_2 and O_2 are converted into mono positive cations N_2^+ and O_2^+ respectively. Which is in correct

A. In N_2^+, the N-N bond is weakened

B. In O_2^+, the O-O bond is weakened

C. In O_2^+ para magnetism increases

D. N_2^+ becomes diamagnetic

Answer: D

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247. Which of the following statement is false

A. H_2 molecule has one sigma bond

B. HCl molecule has one sigma bond

C. Water molecule has two sigma bonds and two lone pairs

D. Acetylene molecule has three sigma bond and three sigma bonds.

Answer: D

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248. The bond angle formed by different hybrid orbitals are in the order

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

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

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

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

Answer: D

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249. Assuming that Hund's rule is violated the bond order and magnetic nature of the diatomic molecle B_2 is

A. 1 and diamagnetic

B. 0 and diamagnetic

C. 1 and paramagnetic

D. 0 and paramagnetic

Answer: A

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250. In which of the following molecules is hydrogen bridge bond present ?

A. Water

B. Inorganic benzene

C. Diborane

D. Methanol

Answer: C

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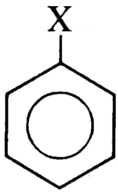
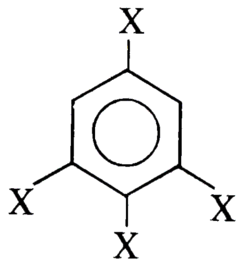
251. Complete the following reaction

The dipole moment of  is 1·5 D. The dipole moment of



is

A. 1.5 D

B. 2.25 D

C. 1 D

D. 3 D

Answer: A

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252. In which one of the following species , the central atom has the tuype of hybdridiztion which is not the same as that present in other three?

A. PCl_5

B. SF_4

C. I_3^-

D. $SbCl_5^{2-}$

Answer: D

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253. Which of the following conversion involves change in both hybridization and shape ?

A. $CH_4 \rightarrow C_2H_6$

B. $NH_3 \rightarrow NH_4^+$

C. BF_3 to BF_4^-

D. $H_2O \rightarrow H_3O^+$

Answer: C

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

A. $ClO_2^- < Cl_2O < ClO_2$

B. $Cl_2O < ClO_2 < ClO_2^-$

C. $ClO_2 < Cl_2O < ClO_2^-$

D. $Cl_2O < Cl^-O_2 < ClO_2$

Answer: A

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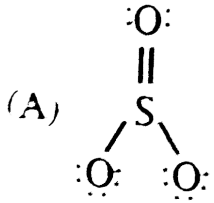
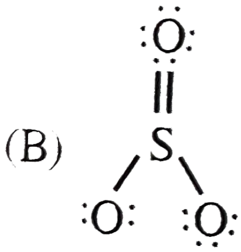
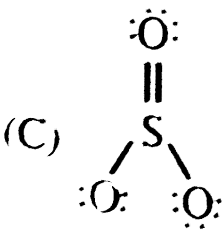
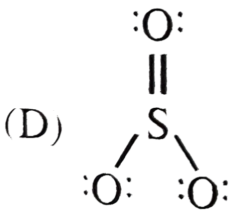
255. Which of the following is a the most preferred and hence of the lower energy for SO_3?

A. 

B. 

C. 

D. 

Answer: D

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256. In which of the following, the central atoms has two lone pairs of electrons

A. SF_4

B. B_2H_6

C. SO_2

D. XeF_4

Answer: D

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257. 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

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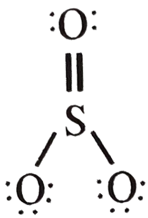
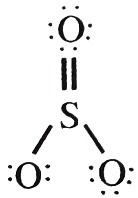
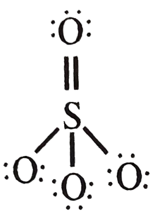
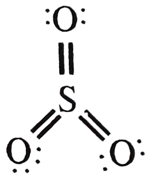
258. Which of the following is a the most preferred and hence of the lower energy for SO_3?

A. (A) 

B. (B) 

C. (C) 

D. (D) 

Answer: D

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259. The pairs of species of oxygen and their magnetic behaviour are noted below. Which of the following presents the correct description ?

A. O_2^-, O_2^{2-} Both diamagnetic

B. O_2^+, O_2^{2-} Both paramagnetic

C. O_2^+, O_2 Both paramagnetic

D. O, O_2^{2-} Both paramagnetic

Answer: C

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260. The covalent bond length is the shortest in which of the following bonds

A. C-O

B. C-C

C. $C \equiv N$

D. O-H

Answer: D

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261. Among the molecules, SO_2, SF_4, ClF_3. BrF_5 and XeF_4 which of the following shape does not describe any of these molecules

A. Bent

B. Trigonal molecules

C. See saw

D. T shape

Answer: B

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262. The hydrogen bond is shortest in

A. S-H---S

B. N-H---O

C. S-H---O

D. F-H---F

Answer: D

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263. Which one of the following is not correct with respect to bond length of the species?

A. $C_2 > C_2^-$

B. $B_2^+ > B_2$

C. $Li_2^+ > Li$

D. $O_2 > O^-$

Answer: D

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

A. H_2O

B. BF_3

C. NH_2^-

D. PCl_3

Answer: D

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265. The percentage of p character of hybrid orbitals in graphite and diamond are respectively

A. 33 and 25

B. 50 and 75

C. 67 and 75

D. 33 and 75

Answer: C

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266. Which one of the following is the correct statement

A. O_2 molecule has bond order 2 and is diamagnetic

B. N_2 molecule has bond order 3 and is paramagnetic

C. H_2 molecule has bond order zero and is diamagnetic

D. C_2 molecule has bond order 2 and is diamagnetic

Answer: D

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

A. $BCl3$ and $BrCl_3$

B. NH_3 and NO_3^-

C. NF_3 and BF_3

D. BF_4^- and NH_4^{3+}

Answer: D

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268. Bond order of 1.5 is shown by:

A. O_2^+

B. O_2^-

C. O_2^{2-}

D. O_2

Answer: B

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269. During change of O_2 to O_2^{2-} ion, the electrons add on which of the following orbitals ?

A. π^* orbital

B. π orbital

C. σ^* orbital

D. σ orbital

Answer: A

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

A. PCl_4^+ and $SiCl_4$

B. PF_5 and BrF_5

C. AlF_6^{3-} and SF_6

D. CO_3^{2-} and NO_3^-

Answer: B

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271. Ortho -nitrophenol is less soluble in water than p-and m - nitrophenols because

A. ortho nitrophenol shows intramolecular H- bonding

B. Ortho Nitrophenol shows intramolecular H- bonding

C. melting point of o-nitrophenol is lower than those of m-and p-isomers

D. o-nitro phenol is more volatile in steam than those of m- and p-isomers.

Answer: A

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272. The electronegativity of an element is low. The bond formed between two identical atoms of the above element is most likely to be

A. covalent

B. metallic

C. ionic

D. coordinate covalent.

Answer: B

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273. Which of the following pairs form a stable coordinate bond ?

A. NaOH. HCl

B. NH_3H_2O

C. NH_3BF_3

D. BF_3BCl_3

Answer: C

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274. The paramagnetic behaviour of B_2 is due to the presence of

A. 2 unpaired electron in π_b MO

B. 2 unpaired electrons in π^* MO

C. 2 unpaired electrons in σ^* MO

D. 2 unpaired electrons in σ_b MO.

Answer: A

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275. Which of the following is a polar molecule

A. BF_3

B. SF_4

C. SiF_4

D. XeF_4

Answer: B

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276. XeF_2 is iso-structural with :

A. TeF_2

B. ICl_2^-

C. $SbCl_3$

D. $BaCl_2$

Answer: B

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

A. H_2^-, H_2^{2+}

B. H_2^+, He_2^{2-}

C. H_2^-, He_2^{2-}

D. H_2^{2+}, He_2

Answer: D

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278. 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. H_2^-, He_2^{2-}

D. H_2^{2+}, He_2

Answer: C

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279. Which of the following is paramagnetic ?

A. CO

B. O_2^-

C. CN^-

D. NO^+

Answer: B

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Comprehension M.C.Q

1. It is a common observation that many compounds containing hydrogen attached to highly electronegative elements such as oxygen, nitrogen, or fluorine, often exhibit unexpected properties, such as relatively high melting points, boiling points, viscosity, solubility in water etc Such an unexpected behaviour can be explained on the basis of hydrogen bonding. When a hydrogen atom is attached to a highly electronegative element of small size such as F. N, O. etc. the electronegative atoms strongly attracts the

shared pair of electrons towards it self. As a result, the hydrogen atom becomes slightly positive and the electronegative element becomes slightly negative when two molecules of such a substance say HF come close to each other, the negatively charged fluorine atom of one molecule attracts the positively charged hydrogen atom of the other molecule. A hydrogen atom, thus links to highly electronegative atoms, one by a strong covalent bond and the other by weak electrostatic attraction as shown ahead

$\overset{\delta+}{H} - \overset{\delta-}{F} \ldots \overset{\delta+}{H} - \overset{\delta-}{F}$, the dotted line represents a

hydrogen bond.

NH_3 has much higher boiling point than PH_3 because

A. NH_3 has larger molecular mass

B. NH_3 undergoes umbrella mass

C. NH_3 forms hydrogen bond

D. NH_3 contains ionic bonds whereas PH_3 contain covalent bonds

Answer: C

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$\overset{\delta+}{H} - \overset{\delta-}{F} .... \overset{\delta+}{H} - \overset{\delta-}{F}$, the dotted line represents a hydrogen bond.

Hydrgen bonding is not present in

A. glycerine

B. water

C. hydrogen sulphide

D. ammonia

Answer: C

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3. It is a common observation that many compounds containing hydrogen attached to highly electronegative elements such as oxygen, nitrogen, or fluorine, often exhibit unexpected properties, such as relatively high melting points, boiling points, viscosity, solubility in water etc Such an unexpected behaviour can be explained on the basis of hydrogen bonding. When a hydrogen atom is attached to a highly electronegative element of small size such as F. N, O. etc. the electronegative atoms strongly attracts the

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$$\overset{\delta+}{H} - \overset{\delta-}{F} \ldots \overset{\delta+}{H} - \overset{\delta-}{F}$$

, the dotted line represents a

hydrogen bond.

The molecular containing hydrogen bond is

A. HI

B. $CuSO_4 . 5H_2O$

C. HF

D. All of these

Answer: C

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4. It is a common observation that many compounds containing hydrogen attached to highly electronegative elements such as oxygen, nitrogen, or fluorine, often exhibit unexpected properties, such as relatively high melting points, boiling points, viscosity, solubility in water etc Such an unexpected behaviour can be explained on the basis of hydrogen bonding. When a hydrogen atom is attached to a highly electronegative element of small size such as F. N, O. etc. the electronegative atoms strongly attracts the

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$\overset{\delta+}{H} - \overset{\delta-}{F} \ldots \overset{\delta+}{H} - \overset{\delta-}{F}$, the dotted line represents a

hydrogen bond.

Hydrogen bond is strongest in

A. F-HO

B. F-HF

C. O-HS

D. O-HN

Answer: B

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5. It is a common observation that many compounds containing hydrogen attached to highly electronegative elements such as oxygen, nitrogen, or fluorine, often exhibit unexpected properties, such as relatively high melting points, boiling points, viscosity, solubility in water etc Such an unexpected behaviour can be explained on the basis of hydrogen bonding. When a hydrogen atom is attached to a highly electronegative element of small size such as F. N, O. etc. the electronegative atoms strongly attracts the

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$$\overset{\delta+}{H} - \overset{\delta-}{F} \ldots \overset{\delta+}{H} - \overset{\delta-}{F}$$

, the dotted line represents a

hydrogen bond.

Hydrogen bonding is maximum in

A. ethyl chloride

B. triethylamine

C. ethanol

D. diethyl ether.

Answer: C

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6. It is a common observation that many compounds containing hydrogen attached to highly electronegative elements such as oxygen, nitrogen, or fluorine, often exhibit unexpected properties, such as relatively high melting points, boiling points, viscosity, solubility in water etc Such an unexpected behaviour can be explained on the basis of hydrogen bonding. When a hydrogen atom is attached to a highly electronegative element of small size such as F. N, O. etc. the electronegative atoms strongly attracts the

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$\overset{\delta+}{H} - \overset{\delta-}{F} .... \overset{\delta+}{H} - \overset{\delta-}{F}$, the dotted line represents a

hydrogen bond.

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

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

B. intramolecular hydrogen bonding exists in p-nitrophenol

C. there is intermolecular bonding p-nitrophenol

D. p-nitrophenol has a higher molecular mass than o-nitrophenol

Answer: C

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7. It is a common observation that many compounds containing hydrogen attached to highly electronegative elements such as oxygen, nitrogen, or fluorine, often exhibit unexpected properties, such as relatively high

melting points, boiling points, viscosity, solubility in water etc Such an unexpected behaviour can be explained on the basis of hydrogen bonding. When a hydrogen atom is attached to a highly electronegative element of small size such as F. N, O. etc. the electronegative atoms strongly attracts the shared pair of electrons towards it self. As a result, the hydrogen atom becomes slightly positive and the electronegative element becomes slightly negative when two molecules of such a substance say HF come close to each other, the negatively charged fluorine atom of

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$\overset{\delta+}{H} - \overset{\delta-}{F} .... \overset{\delta+}{H} - \overset{\delta-}{F}$, the dotted line represents a hydrogen bond.

Hydrogen chloride gas dissolves in water due to

A. H-bonding

B. hydration

C. Van der Waals' forces

D. None of the above.

Answer: D

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8. It is a common observation that many compounds containing hydrogen attached to highly electronegative elements such as oxygen, nitrogen, or fluorine, often exhibit unexpected properties, such as relatively high

melting points, boiling points, viscosity, solubility in water etc Such an unexpected behaviour can be explained on the basis of hydrogen bonding. When a hydrogen atom is attached to a highly electronegative element of small size such as F. N, O. etc. the electronegative atoms strongly attracts the shared pair of electrons towards it self. As a result, the hydrogen atom becomes slightly positive and the electronegative element becomes slightly negative when two molecules of such a substance say HF come close to each other, the negatively charged fluorine atom of

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$\overset{\delta+}{H} - \overset{\delta-}{F} .... \overset{\delta+}{H} - \overset{\delta-}{F}$, the dotted line represents a hydrogen bond.

High density of water as compared to ice is due to

A. dipole-dipole interaction

B. hydrogen bonding

C. dipole induced dipole interaction

D. None of the above.

Answer: B

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9. It is a common observation that many compounds containing hydrogen attached to highly electronegative elements such as oxygen, nitrogen, or fluorine, often exhibit unexpected properties, such as relatively high

melting points, boiling points, viscosity, solubility in water etc Such an unexpected behaviour can be explained on the basis of hydrogen bonding. When a hydrogen atom is attached to a highly electronegative element of small size such as F. N, O. etc. the electronegative atoms strongly attracts the shared pair of electrons towards it self. As a result, the hydrogen atom becomes slightly positive and the electronegative element becomes slightly negative when two molecules of such a substance say HF come close to each other, the negatively charged fluorine atom of

one molecule attracts the positively charged hydrogen atom of the other molecule. A hydrogen atom, thus links to highly electronegative atoms, one by a strong covalent bond and the other by weak electrostatic attraction as shown ahead

$$\overset{\delta+}{H} - \overset{\delta-}{F} \ldots. \overset{\delta+}{H} - \overset{\delta-}{F}$$

, the dotted line represents a hydrogen bond.

Which is most viscous ?

A. CH_3OH

B. C_2H_5OH

C. $C \mid {}_{CH_2OH}H_2OH$

D. None

Answer: C

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10. Atomic orbitals of bonded atoms combine to form molecular orbitals. The number of molecular orbitals formed is equal to the number of atomic orbitals taking part in the bond formation. When two atomic orbitals combine, two molecular orbitals are formed one of which has lower energy than the combining orbitals and is called bonding Molecular Orbital (MO). Whereas the other having higher energy than the two combining atomic orbitals is called Anti Bonding Molecular orbitals (ABMO) The two combining atomic orbitals must have comparable energies and should be properly oriented to allow considerable overlapping. If the overlapping is end to end along internuclear axis, the molecular orbital is called sigma and if the overlapping is lateral 1.e., sidewise the molecular orbital is called pie. Just like atomic orbitals, the molecular orbitals also have varying energy levels. Filling of electrons in molecular orbitals takes place following the same rules as followed for filing of atomic orbitals. The order of filling may not be same for all the molecules or their ions. Bond order is a useful parameter for comparing the various characteristics of molecules.

Ground state electron configuration of valence shell electrons in nitrogen molecule $\left(N_2\right)$ is $\left(\sigma_{2s}\right)^2\left(\sigma_{2s}^{*}\right)^2\left(\pi_{2px}\right)^2\left(\pi_{2py}\right)^2\left(\pi_{2pz}\right)^2$. Hence the bond order of nitrogen molecule is

A. 2

B. 3

C. 1

D. 2

Answer: B

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11. Atomic orbitals of bonded atoms combine to form molecular orbitals. The number of molecular orbitals formed is equal to the number of atomic orbitals taking part in the bond formation. When two atomic orbitals combine, two molecular orbitals are formed one of which has lower energy than the combining orbitals and is called bonding Molecular Orbital (MO). Whereas the other having higher energy than the two combining atomic orbitals is called Anti Bonding Molecular orbitals (ABMO) The two combining atomic orbitals must have comparable energies and should be properly oriented to allow considerable overlapping. If the overlapping is end to end along internuclear axis, the molecular orbital is called sigma and if the overlapping is lateral 1.e., sidewise the molecular orbital is called pie. Just like atomic orbitals, the molecular orbitals also have varying energy levels. Filling of electrons in molecular orbitals takes place following the same rules as followed for filing of atomic orbitals. The order of filling may not be same for all the molecules or their ions. Bond order is a useful parameter for comparing the various characteristics of molecules.

Which of the following combinations is not allowed (assume z-axis as the internuclear axis

) ?

A. 2s and 2s

B. $2p_x$ and $2p_x$

C. $2p_z$ and $2p_z$

D. $2p_x$ and $2p_y$

Answer: D

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12. Atomic orbitals of bonded atoms combine to form molecular orbitals. The number of molecular orbitals formed is equal to the number of atomic orbitals taking part in the bond formation. When two atomic orbitals combine, two molecular orbitals are formed one of which has lower energy than the combining orbitals and is called bonding Molecular Orbital (MO). Whereas the other having higher energy than the two combining atomic orbitals is called Anti Bonding Molecular orbitals (ABMO) The two combining atomic orbitals must have comparable energies and should be properly oriented to allow considerable overlapping. If the overlapping is end to end along internuclear axis, the molecular orbital is called sigma and if the overlapping is lateral 1.e., sidewise the molecular orbital is called pie. Just like atomic orbitals, the molecular orbitals also have varying energy levels. Filling of electrons in molecular orbitals takes place following the same rules as followed for filing of atomic orbitals. The order of filling may not be same for all the molecules or their ions. Bond order is a useful parameter for comparing the various characteristics of molecules.

In the homonuclear diatomic molecule which of the following sets of M.O. orbitals are grade or un-grade

A. σ_{2s}, π_{2p_x}

B. $\sigma^*_{2s}, \pi^*_{2p_x}$

C. $\sigma^*_{2s}, \pi_{2p_x}$

D. $\sigma_{2p_x}, \pi^*_{2p_x}$

Answer: D

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13. Atomic orbitals of bonded atoms combine to form molecular orbitals. The number of molecular orbitals formed is equal to the number of atomic orbitals taking part in the bond formation. When two atomic orbitals combine, two molecular orbitals are formed one of which has lower energy than the combining orbitals and is called bonding Molecular Orbital (MO). Whereas the other having higher energy than the two combining atomic orbitals is called Anti Bonding Molecular orbitals (ABMO) The two combining atomic orbitals must have comparable energies and should be properly oriented to allow considerable overlapping. If the overlapping is end to end along internuclear axis, the molecular orbital is called sigma and if the overlapping is lateral 1.e., sidewise the molecular orbital is called pie. Just like atomic orbitals, the molecular orbitals also have varying energy levels. Filling of electrons in molecular orbitals takes place following the same rules as followed for filing of atomic orbitals. The order of filling may not be same for all the molecules or their ions. Bond order is a useful parameter for comparing the various characteristics of molecules.

Which of the following pair is expected to have the same bond order ?

A. O_2, N_2

B. O_2^+, N_2^-

C. O_2^-, N_2^+

D. O_2^-, N_2^-

Answer: B

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14. Atomic orbitals of bonded atoms combine to form molecular orbitals. The number of molecular orbitals formed is equal to the number of atomic orbitals taking part in the bond formation. When two atomic orbitals combine, two molecular orbitals are formed one of which has lower energy than the combining orbitals and is called bonding Molecular Orbital (MO). Whereas the other having higher energy than the two combining atomic orbitals is called Anti Bonding Molecular orbitals (ABMO) The two combining atomic orbitals must have comparable energies and should be properly oriented to allow considerable overlapping. If the overlapping is end to end along internuclear axis, the molecular orbital is called sigma and if the overlapping is lateral 1.e., sidewise the molecular orbital is called pie. Just like atomic orbitals, the molecular orbitals also have varying energy levels. Filling of electrons in molecular orbitals takes place following the same rules as followed for filing of atomic orbitals. The order of filling may not be same for all the molecules or their ions. Bond order is a useful parameter for comparing the various characteristics of molecules.

In which of the following ionization processes, the bond order has increased and the magnetic behaviour has changed ?

A. $N_2 \rightarrow N_2^+$

B. $C_2 \rightarrow C_2^+$

C. $NO \rightarrow NO^+$

D. $O_2 \rightarrow O_2^-$

Answer: C

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15. Atomic orbitals of bonded atoms combine to form molecular orbitals. The number of molecular orbitals formed is equal to the number of atomic orbitals taking part in the bond formation. When two atomic orbitals combine, two molecular orbitals are formed one of which has lower energy than the combining orbitals and is called bonding

Molecular Orbital (MO). Whereas the other having higher energy than the two combining atomic orbitals is called Anti Bonding Molecular orbitals (ABMO) The two combining atomic orbitals must have comparable energies and should be properly oriented to allow considerable overlapping. If the overlapping is end to end along internuclear axis, the molecular orbital is called sigma and if the overlapping is lateral 1.e., sidewise the molecular orbital is called pie. Just like atomic orbitals, the molecular orbitals also have varying energy levels. Filling of electrons in molecular orbitals takes place following the same rules as followed for filing of atomic orbitals. The order of filling may not be same for all the molecules or their ions. Bond order is a useful parameter for comparing the various characteristics of molecules.

The bond order (BO) in B_2 molecule is

A. 0

B. 1

C. 3

D. 2

Answer: B

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16. Atomic orbitals of bonded atoms combine to form molecular orbitals. The number of molecular orbitals formed is equal to the number of atomic orbitals taking part in the bond formation. When two atomic orbitals combine, two molecular orbitals are formed one of which has lower energy than the combining orbitals and is called bonding

Molecular Orbital (MO). Whereas the other having higher energy than the two combining atomic orbitals is called Anti Bonding Molecular orbitals (ABMO) The two combining atomic orbitals must have comparable energies and should be properly oriented to allow considerable overlapping. If the overlapping is end to end along internuclear axis, the molecular orbital is called sigma and if the overlapping is lateral 1.e., sidewise the molecular orbital is called pie. Just like atomic orbitals, the molecular orbitals also have varying energy levels. Filling of electrons in molecular orbitals takes place following the same rules as followed for filing of atomic orbitals. The order of filling may not be same for all the molecules or their ions. Bond order is a useful parameter for comparing the various characteristics of molecules.

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

A. σ orbital

B. π orbital

C. σ^* orbital

D. π^* orbital

Answer: A

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17. A polar covalent bond with positive and negative charge centres at its ends is called a dipole. The polarity of a dipole is measured by its dipole moment. Mathematically it is expressed as dipole moment, $\mu = q \times d$ where q and d are the net charge and the distance between the two charges respectively. Dipole moment is a vector quantity. The net dipole moment of a polyatomic molecule is the resultant of the various bond moments present in the molecule. The values of dipole moment are expressed in Debye (D) or in SI units in terms of coulomb- metre (Cm). One of the most important applications of dipole moment is in the determination of geometry and shape of molecules besides prediction of a number of properties of the molecules.

Which of the following has net dipole moment?

A. CCl_4

B. BF_3

C. NH_3

D. CO_2

Answer: C

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18. A polar covalent bond with positive and negative charge centres at its ends is called a dipole. The polarity of a dipole is measured by its dipole moment. Mathematically it is expressed as dipole moment, $\mu = q \times d$ where q and d are the net charge and the distance between the two charges respectively. Dipole moment is a vector quantity. The net dipole moment of a polyatomic molecule is the resultant of the various bond moments present in the molecule. The values of dipole moment are expressed in Debye (D) or in SI units in terms of coulomb- metre (Cm). One of the most important applications of dipole moment is in the determination of geometry and shape of molecules besides prediction of a number of properties of the molecules.

H_2O has a dipole moment while BeF, 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 oxygen

C. Fluorine has more electronegativity than oxygen

D. Beryllium has more electronegativity than oxygen.

Answer: B

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19. A polar covalent bond with positive and negative charge centres at its ends is called a dipole. The polarity of a dipole is measured by its dipole moment. Mathematically it is expressed as dipole moment, $\mu = q \times d$ where q and d are the net charge and the distance between the two charges respectively. Dipole moment is a vector quantity. The net dipole moment of a polyatomic molecule is the resultant of the various bond moments present in the molecule. The values of dipole moment are expressed in Debye (D) or in SI units in terms of coulomb- metre (Cm). One of the most important applications of dipole moment is in the determination of geometry and shape of molecules besides prediction of a number of properties of the molecules.

NH_3 has a net dipole moment, while BF_3 has zero dipole moment because

A. NH_3 is not a planar molecule while BF_3 is planar

B. NH_3 is a planar, while BF_3 is non-planar

C. Fluorine is more electropositive than nitrogen

D. Boron is more electronegative than oxygen.

Answer: A

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20. A polar covalent bond with positive and negative charge centres at its ends is called a dipole. The polarity of a dipole is measured by its dipole moment. Mathematically it is expressed as dipole moment, $\mu = q \times d$ where q and d are the net charge and the distance between the two charges respectively. Dipole moment is a vector quantity. The net dipole moment of a polyatomic molecule is the resultant of the various bond moments present in the molecule. The values of dipole moment are expressed in Debye (D) or in SI units in terms of coulomb- metre (Cm). One of the most important applications of dipole moment is in the determination of geometry and shape of molecules besides prediction of a number of properties of the molecules.

The molecules BF_3 and NH_3 both are covalent compounds but BF_3 is non-polar while NF_3 is polar . The reason is that

A. boron is a non-metal and nitrogen is a gas in uncombined state

B. B-F bonds have no dipole moment whereas N-F bonds have dipole moment

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

D. BF_3 is planar but NF3 is pyramidal.

Answer: D

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21. A polar covalent bond with positive and negative charge centres at its ends is called a dipole. The polarity of a dipole is measured by its dipole moment. Mathematically it is expressed as dipole moment, $\mu = q \times d$ where q and d are the net charge and the distance between the two charges respectively. Dipole moment is a vector quantity. The net dipole moment of a polyatomic molecule is the resultant of the various bond moments present in the molecule. The values of dipole moment are expressed in Debye (D) or in SI units in terms of coulomb- metre (Cm). One of the most important applications of dipole moment is in the determination of geometry and shape of molecules besides prediction of a number of properties of the molecules.

The dipole moment of HBr is 0.78×10^{-18} esu cm. The bond length of HBr is 1.41 Ã.... The percentage ionic character of HBr is

A. 7.54

B. 11.52

C. 15.7

D. 27.3

Answer: B

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22. A polar covalent bond with positive and negative charge centres at its ends is called a dipole. The polarity of a dipole is measured by its dipole moment. Mathematically it is expressed as dipole moment, $\mu = q \times d$ where q and d are the net charge and the distance between the two charges respectively. Dipole moment is a vector quantity. The net dipole moment of a polyatomic molecule is the resultant of the various bond moments present in the molecule. The values of dipole moment are expressed in Debye (D) or in SI units in terms of coulomb- metre (Cm). One of the most important applications of dipole moment is in the determination of geometry and shape of molecules besides prediction of a number of properties of the molecules.

Maximum dipole moment is shown by

A. 1, 4-dichlorobenzene

B. Cls 1, 2-dichlorobenzene

C. trans 1, 3-dichlorobenzene

D. trans 2. 3-dichloro-2-butene.

Answer: B

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23. A polar covalent bond with positive and negative charge centres at its ends is called a dipole. The polarity of a dipole is measured by its dipole moment. Mathematically it is expressed as dipole moment, $\mu = q \times d$ where q and d are the net charge and the distance between the two charges respectively. Dipole moment is a vector quantity. The net dipole moment of a polyatomic molecule is the resultant of the various bond moments present in the molecule. The values of dipole moment are expressed in Debye (D) or in SI units in terms of coulomb- metre (Cm). One of the most important applications of dipole moment is in the determination of geometry and shape of molecules besides prediction of a number of properties of the molecules.

A diatomic molecule has a dipole of 1.2 D, if the bond distance is 1 Ã..., what percentage of electronic charge exists on each atom.

A. 25% of e

B. 29% of e

C. 19% of e

D. 20% of e.

Answer: A

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24. A polar covalent bond with positive and negative charge centres at its ends is called a dipole. The polarity of a dipole is measured by its dipole moment. Mathematically it is expressed as dipole moment, $\mu = q \times d$ where q and d are the net charge and the distance between the two charges respectively. Dipole moment is a vector quantity. The net dipole moment of a polyatomic molecule is the resultant of the various bond moments present in the molecule. The values of dipole moment are expressed in Debye (D) or in SI units in terms of coulomb- metre (Cm). One of the most important applications of dipole moment is in the determination of geometry and shape of molecules besides prediction of a number of properties of the molecules.

Debye is equivalent to

A. 3.33×10^{-30} e.s.u. cm

B. 1.662×10^{-27} e.s.u.cm

C. 1×10^{-18} e.s.u. cm

D. 3.33×10^{-12} e.s.u.cm.

Answer: C

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Matrix Match

1.

Column-I	Column-II
(A)Molecular solid	p good conductor
(B)Graphite	q delocalised electrons
(C)Carbon dioxide	r van der Waals' interactions
(D)Metallic lusture	s zero dipole moment

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2.

Column-I	Column-II
$(A)\sigma_{2s}$	p 0
$(B)\sigma^{*}_{2p_x}$	q 1
$(C)\pi^{*}_{2p_x}$	r 2
$(D)\pi^{*}_{2p_y}$	s gerade

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3.

Column-I	Column-II
$(A)NH_3$	p linear
$(B)BeF_2$	q polar
$(C)H_2O$	rμ=0D
$(D)CO_2$	s Angular

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4.

Column-I	Column-II
$(A) CH_4$	p sigma bond
$(B) C_2H_4$	q pi bond
$(C) C_6H_6$	r sp^3 hybridized
$(D) CO_2$	s sp^2 hybridized

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Integer

1. The number of unpaired electrons in O_2 is â€¦â€¦

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2. In Al_2Cl_6 each Al atoms is linked to how many Cl atoms ?

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3. The number of water molecule(s) derectly bonded to the metal centre in $CuSO_{4.5}H_2O$ is

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4. Based on VSEPR theory, the number of 90 degree F-B-F angles in BrF_5 is â€¦â€¦

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Reason Assertion

1. Assertion(A) - In case the central atom in a molecule is surrounded only by shared pairs of electrons, the molecule has a regular geometry.

Reason(R) -The shared pair of electrons repel each other with equal force so all bonds are equidistant from each other.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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2. Assertion(A) - The bond order in a molecule can have any value, positive or negative, integral or fractional or zero.

Reason(R) - The bond order of a molecule depends upon the number of electrons in the bonding and antibonding molecular orbitals.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: D

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3. Assertion(A) - Water is speClally effective in screening the electrostatic interactions between the dissolved ions.

Reason(R)-The force of ionic interactions depends upon the dielectric constant (∈) of the solvent.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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4. Assertion(A) - When two uncharged similar atoms are brought very close together, their surrounding electron clouds influence each other, and a force of attraction is always built up between them.

Reason(R)-The random variation in the positions of electrons around one nucleus may create a transient electric dipole, which induces a transient opposite electric dipole in the nearby atoms.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: D

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5. Assertion(A) - The nearly tetrahedral arrangement of the orbitals about the oxygen atom allows each water molecule to form hydrogen bonds with as many as four neighbouring water molecules.

Reason(R)-In ice each water molecule forms four hydrogen bonds as each molecule is fixed in the space.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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6. Assertion(A) - There are ten valence electrons on the sulphur atom in SF_4 molecule.

Reason(R)-The structure of SF_4 molecule is based on a distorted trigonal bipyramid.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: B

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7. Assertion(A) - Fluorine molecule has bond order one.

Reason(R)-The number of electrons in antibonding molecular orbital is two less than that of bonding molecular orbitals.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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8. Assertion(A) - The geometry of formaldehyde molecule is trigonal planar.

Reason(R) -In H_2CO molecule, the carbon atom is surrounded by 3 sigma bonding electron pairs.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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9. Assertion(A) - Silicon tetrafluoride. SiF_4 is non polar even though fluorine is much more electronegative than silicon.

Reason(R)-The four bond dipoles cancel one another in SiF_4.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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10. Assertion(A) - H_2 molecule is more stable than He molecule.

Reason(R)-The occupation of antibonding orbitals stabilises the molecules.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: C

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11. 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. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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

Reason :Hydrogen energy of ions realeases sufficient energy to overcome lattice energy and break hydrogen bonds in water, white covalent bonded compound interact so weakly that even van der walls force between molecule of convalent compounds cannot be broken .

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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

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

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: C

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14. Assertion(A) - BF_3 molecule is planar but NF_3 is pyramidal

Reason(R)-N atom is smaller than B

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: B

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15. Assertion(A) - $FeCl_3$ undergoes sublimation at a lower temperature.

Reason(R)-Fe^{3+} has low polarising power and hence $FeCl_3$ has high covalent character.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: C

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16. Assertion(A) - The bond order of NO molecule is 2.5.

Reason(R)-NO molecule is paramagnetic in nature.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: B

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17. Assertion(A) - CO_3^{2-} ion is relatively more stable than H_2CO_3.

Reason(R)-The negative charge of carbonate ion is delocalised on all the three oxygen atoms.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: D

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18. Assertion(A) - Magnetic moment of super oxide ion is much larger than that of peroxide ion.

Reason(R)-Peroxide ion has no unpaired electrons but superoxide ion has unpaired electrons.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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19. Assertion(A) - OF molecule is theoretically more stable than F_2

Reason(R) : Bond order in OF molecule is higher than in F_2 molecule

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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20. Assertion(A) - In N_2 molecule, the N atoms are bonded by one sigma and two π-bonds.

Reason(R) :N atoms assume sp^2 hybrid state to constitute N_2 molecule.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: C

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21. Assertion(A) - In calcium carbide, the two carbon atoms are held by sigma bond as well as ionic bond

Reason(R) : calcium carbide can be considered to be an acetylene salt.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: D

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22. Assertion(A) - KCl is a heteroatomic as well as diatomic molecule

Reason(R) : Aqueous solution of KCl conducts electricity and at the same time it undergoes decomposition.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: D

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23. Assetion Both N_2 and $NO^{\oplus}$ are diamagnetic

Reasoning $NO^{\oplus}$ is isoelectronic with N_2.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: B

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24. Assertion(A) - The bond angle around PBr_3 is larger than that in PH_3 but bond angle of NB r_3 is less than that of NH_3

Reason(R) : Atomic size of Br is smaller than that P atom because of larger nuclear charge

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: C

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25. Assertion(A) - NO_3^- ion has same geometry as NH_3.

Reason(R) : The hybrid states of N in NO_3^- ion and $NH_3 sp^2$ and sp^3 respectively

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: D

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26. Assertion(A) - PCl_5 exists but $BiCl_5$ does not.

Reason(R) : Bi does not contain d orbitals to expand its octet.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: C

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27. Assertion(A) - SF_4 and BF_4^- have similar geometries.

Reason(R) : Hybrid states assumed by S in SF_4 and B in BF_4^- are different.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: D

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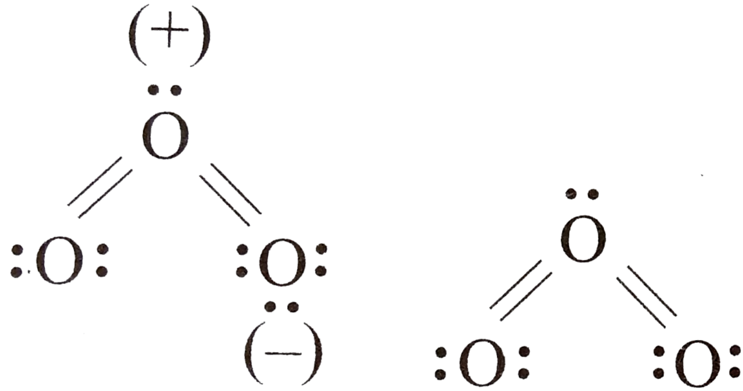
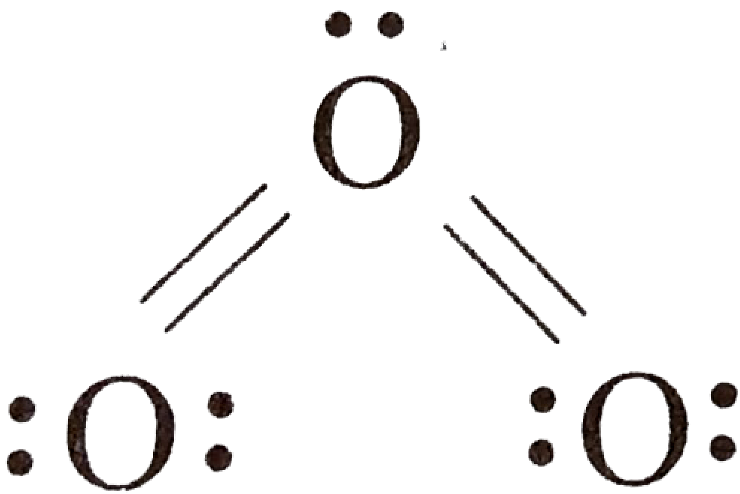
28. Asseration: The elctronic structure of O_3 is:



Reason: structure is not allowed because octet around O cannot be expanded



A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: B

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29. Assertion : σ-bond is strong white π -bond is a weak bond.

Reason :Atomic rotate freely about π-bond.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: C

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30. Assertion : All F - S - F angle in SF_4 are greater than 90° but less than 180°.

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

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: C

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31. Assertion(A) - H_2 molecule is stabler than HCH molecule.

Reason(R) :The antibonding electron in the molecules stabilises it.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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32. Assertion Bond order in a molecule can assume any value positive integral or fractional value including zero

Reasoning It depends on number of electrons in the bonding and antibonding orbitals .

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: C

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33. 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. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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34. Assertion:- NO_3^- is planar while NH_3 is pyramidal

Reason:- N in NO_3^- is sp^2 and in NH_3 it is sp^3 hybridised with one ione pair.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: C

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35. Asseration: $SeCl_4$, does not havea tetrahedral structure.

Reason: Se in $SeCl_4$ has two lone pairs.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: C

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36. Assertion B_2 molecule is diamagnetic

Reasoning The highest occupied molecular orbital is of sigma type .

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. Both A and R are false

Answer: D

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37. (A) Molecular nitrogen is less reactive than molecular oxygen.

(R) The bond length of N_2 is shorter than that of oxygen.

A. Both A and R true and R is the correct explanation of A

B. Both A and R true and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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Ultimate Preparatory Package

1. Consider the b.pr. of Br_2 and ICl. The b.pt. of Br_2

A. is equal to the b.pt. of IC l

B. is less than the b.pt. of IC l

C. is more than the b.pt.of IC l

D. none of these

Answer: B

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2. The decreasing order of polarity of the bonds in NH_3, PH_3, AsH_3 and SbH_3 is in the order

A. $NH_3 > PH_3 > AsH_3 > SbH_3$

B. $SbH_3 > AsH_3 > PH_3 > NH_3$

C. $NH_3 > AsH_3 > PH_3 > SbH_3$

D. $NH_3 > SbH_3 > AsH_3 > PH_3$

Answer: D

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3. The substance with highest boiling point out of the following H_2, He, Ne, Xe, CH_4 is

A. Xe

B. CH_4

C. Ne

D. H_2

Answer: A

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4. At 300 K and 1.00 atm. pressure, the density of gaseous HF is 3.17 gL^{-1}. Which of the following facts, is supported by the given data ?

A. Gaseous HF under these conditions is lighter than AIr

B. There is no hydrogen bonding in gaseous HF under these conditions

C. There is extensive hydrogen bonding in gaseous HF under these conditions

D. None of these

Answer: C

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5. The suggested molecular orbital electronic configuration of Co is : $KK(\sigma_2 s)^2(\sigma_{2s})^2, (\pi_{2px})^2(\pi_{2py})^2(\sigma_{2pz})^2$.

Experimentally determined bond length in CO and CO^+ are 112.8 pm and 111.5 pm . This suggest that

A. the given molecular orbital electronic configuration is correct

B. the energy of $\sigma_{2pz'}$ is less than the energies of π_{2p_x} , and π_{2p_y} which are equal in energy

C. the energies of π_{2p_x} and π_{2p_y} are not equal

D. none of these

Answer: D

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6. In N_2H_4 (hydrazine) both the nitrogen atoms are

A. trigonal and the molecule is planar

B. trigonal but the molecule is non planar

C. pyramidal and the molecule is non planar

D. none of these

Answer: C

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7. The expected shape of Br_3^- ion is

A. linear

B. trigonal planar

C. pyramidal

D. angular

Answer: A

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8. The shapes of molecules of CCl_4, XeF_4 and SF_4 are

A. all tetrahedral

B. tetrahedral. square planar, seesaw respectively

C. tetrahedral, seesaw, square planar respectively

D. tetrahedral, square planar and tetrahedral respectively

Answer: B

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9. The shapes of molecules of BF_3, NH_3 and ClF_3 are

A. all trigonal planar

B. trigonal planar, trigonal pyramidal and pyramidal

C. trigonal planar. trigonal pyramidal and trigonal planar

D. trigonal planar, trigonal pyramidal and T shaped

Answer: D

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10. Non-bonding orbitals have

A. same energy as the atomic orbitals from which they are formed

B. more energy than the atomic orbitals of the highest energy from which they are formed

C. less energy than the atomic orbitals of the lowest energy from which they are formed

D. none of these.

Answer: A

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11. Suppose energy level diagram used for O_2F_2 etc. is used for all homonuclear diatomic molecules of second period elements. The number of elements) whose predicted magnetic properties will differ from its (their) actual magnetic properties is (are)

A. only one

B. two

C. three

D. four

Answer: B

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12. Arrange the following in the increasing order of melting points

(a)NH_3, (b)CH_3NH_2 , (c)$\left(CH_3\right)_2NH$, (d) $\left(CH_3\right)_3N$

A. $a < b < c < d$

B. $d < c < b < a$

C. $a < d < c < b$

D. None of these.

Answer: B

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13. The number of lobes in δ and δ^* formed by the overlap of two d_{xy} A.O.s, are (Z-axis is internuclear axis)

A. 4 and 8 respectively

B. 3 and 6 respectively

C. 4 and 10 respectively

D. 6 and 8 respectively.

Answer: A

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14. Ground state He_2 does not exist. An electronic excited state of He_2

A. is more unstable than ground state He_2

B. is equally unstable as ground state He_2

C. is more stable towards dissociation than ground state He_2

D. is less reactive than ground state He_2 orbital

Answer: C

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

A. σ_{2s} is planar while σ_{1s}^{*} is is non-planar etrical

B. σ_{2s} is symmetrical while σ_{1s}^{*} is unsymmetrical

C. σ_{2s} is nearer to the nuclei than σ_{1s}^{*}

D. none of these.

Answer: D

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16. A molecule of chloral hydrate contains two - OH groups attached to a single carbon atom as shown below

$$\begin{array}{ccc} & C & & OH & \\ & | & & | & \\ Cl - & C \mid {\scriptstyle Cl} & - & C \mid {\scriptstyle OH} & - H \end{array}$$

Its extra stability is due to the presence of

A. hydrogen bonding between H atoms of -OH groups and Cl atoms

B. its planar structure

C. its symmetrical structure

D. none of these

Answer: A

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17. The bond length in O_2^{+}, O_2, O_2^{-} and O_2^{2-} follows the order :

A. $O_2^{+} < O_2 < O_2^{-} < O_2^{+}$

B. $O_2^{2-} < O_2^{-} < O_2 < O_2^{2+}$

C. $O_2^{+} < O_2^{-} < O_2 < O_2^{2-}$

D. $O_2^{+} < O_2^{2-} < O_2 < O_2^{-}$

Answer: B

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18. The order of energies of following combination

(a)2HHe (b)$H_2 + He_2$ (c)$He_2 + 2H$ and (d) $H_2 + 2He$ is

A. $d < a < b < c$

B. $d < b < a < c$

C. $c < a < b < d$

D. $c < b < a < d$

Answer: A

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19. Which of the following is paramagnetic O_2^{2-} and BN ?

A. Both

B. None

C. O_2^{2-}

D. BN

Answer: B

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20. Pick out the incorrect statement

A. N_2 has greater dissociation energy than N_2^+

B. O_2 has lower dissociation energy than O_2^+

C. Bond length in N_2^+ is less than in N_2

D. Bond length in NO^+ is less than in NO.

Answer: C

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Brain Teaser-1

1. 13.5 gmof aluminium when changes to Al^{+3} ion in solution, will lose: $\left[Ai = 27, N_A = 6 \times 10^{23}\right]$

A. 18.0×10^{23} electrons

B. 6.023×10^{23} electrons

C. 3.01×10^{23} electrons

D. 9.1×10^{23} electrons

Answer: D

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2. Which orbital is represented by the complete wave function Ψ_{410} ?

A. 4s

B. 3p

C. 3d

D. 4p

Answer: D

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3. The percentage of sodium in a breakfast careal labelled as $110mg$ of sodium per $100g$ of cereal is:

A. 11%

B. 1.10%

C. 0.110%

D. 110%

Answer: C

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4. If I_0 is the threshold wavelength for photoelectric emission, 1 the wavelength of light falling on the surface of a metal and m is the mass of the electron, then the velocity of ejected electron is given by

A. $\left[\frac{2h}{m}\left(\lambda_0 - \lambda\right)\right]^{1/2}$

B. $\left[\frac{2hc}{m}\left(\lambda_0 - \lambda\right)\right]^{1/2}$

C. $\left[\frac{2hc}{m}\left(\frac{\lambda_0 - \lambda}{\lambda_0\lambda}\right)\right]^{1/2}$

D. $\left[\frac{2h}{m}\left(\frac{1}{\lambda_0} - \frac{1}{\lambda}\right)\right]^{1/2}$

Answer: C

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5. Which of the following transitions of electrons in the hydrogen atom will emit maximum energy

A. $n_5 \rightarrow n_4$

B. $n_4 \rightarrow n_3$

C. $n_3 \rightarrow n_2$

D. energy is same in all A,B and C

Answer: C

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6. Which of the following weighs the least?

A. 14 g atoms of nitrogen

B. 0.6 moles of S_8

C. 4 g equivalents of sulphate ions

D. 1.2×10^{24} chloride ions.

Answer: D

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7. One among the following set of quantum numbers defines the highest energy electron in scandium (I)ion

A. n=3, l=1, m=0, s= -1/2

B. n=3, l=0, m=0, s= -1/2

C. n=4, l=0, m=0, s= +1/2

D. n=3, l=2, m=2, s= +1/2

Answer: C

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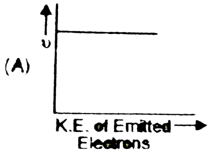
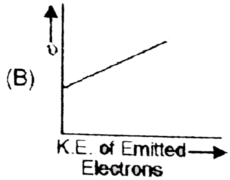
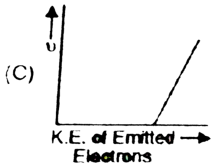
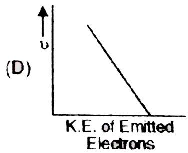
8. Which among the following graphs explains the photoelectric effect?

A. 

B. 

C. 

D. 

Answer: B

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9. The threshold frequency of metals $4x10^{14}s^{-1}$ The minimum energy which photons must possess to produce photoelectric effect with the metal is $\left(h = 6.6 \times 10^{-34}Js\right)$

A. $3.06 \times 10^{-12}J$

B. $1.4 \times 10^{-48}J$

C. $3.4 \times 10^{-19}J$

D. $2.64 \times 10^{-19}J$

Answer: D

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10. A weight lifter, after weight lifting exercises. drinks 500 mL of 9% glucose (mol. Mass 180) solution. The number of glucose molecules consumed by him are

A. 1.5×10^{23}

B. 3.0×10^{23}

C. 4.5×10^{23}

D. 6.023×10^{23}

Answer: A

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11. The threshold wavelength for the ejection of electrons from the metal X is 330 nm. The work function for the photoelectric emission for metal X is $\left(h = 66 \times 10^{-34} Js\right)$

A. $1.2 \times 10^{-18} J$

B. $6.0 \times 10^{-19} J$

C. $1.2 \times 10^{-20} J$

D. $6.0 \times 10^{-22} J$

Answer: B

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12. A 3d electron having $s = +1/2$ can have a magnetic quantum number

A. $+2$

B. $+3$

C. -3

D. $+4$

Answer: A

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13. The total energy of the electron in atom is

A. Zero under normal conditions of temperature and pressure because electron is very small and of negligible mass

B. greater than zero and is insignificant

C. may be less or more than zero depending upon the nature of orbital involved

D. less than zero.

Answer: D

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14. All elements in the third period have

A. three complete shells

B. three complete subshells

C. three valence electrons

D. three electrons less than octet.

Answer: B

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15. Each coinage metal has

A. two electrons in the valence shell

B. eight electrons in the penultimate shell

C. eight electrons in the outermost shell

D. eighteen electrons in their penultimate shell.

Answer: D

Watch Video Solution

16. Bond angle between two hybrid orbitals is 105° Percentage of s-orbital character of hybrid orbital is between

A. 50-51%

B. 9-12%

C. 22-23%

D. 11-12%

Answer: C

Watch Video Solution

17. The incorrect statement out of the following is

A. Iso electronic ions may be obtained from elements belonging to different periods of the periodic table

B. Electron affinity of noble gases is zero

C. van der Waal's radii of iodine is more than its covalent radius

D. X^{-} ion is formed with more ease in fluorine than in chlorine

Answer: D

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18. Atomic volume is the

A. volume occupied by one atom

B. volume occupied by 1 g atom of an element in gaseous state

C. volume occupied by 1 g mole of atoms in solid state

D. volume occupied by one g mole of atoms in any state

Answer: C

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19. The dye acriflavine when dissolved in water has its maximum light absorption at 4530 Ã... and has maximum fluorescence emission at 5080 Ã.... The number of fluorescence quantum is, on the average, 53% of the number of quanta absorbed. What percentage of absorbed light energy is emitted as fluorescence?

A. 41 %

B. 47 %

C. 74 %

D. 63 %

Answer: B

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

A. Metallic

B. Ionic

C. Covalent

D. Coordinate

Answer: B

Watch Video Solution

21. Born-Haber cycle is used to determine

A. Electronegativity

B. Lattice energy

C. Both

D. None

Answer: B

Watch Video Solution

22. Which of the following gaseous molecules is polar ?

A. CS_2

B. BF_3

C. $SnCl_2$

D. $PbCl_4$

Answer: C

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23. 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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24. Which of the following statements is not regarding bonding molecular orbitals

A. Bonding molecular orbitals possess less energy than combining atomic orbitals

B. Bonding molecular orbitals have low electron density between the two nuclei

C. Every electron in bonding molecular electron density between the two nuclei orbitals contributes to attraction between atoms

D. They are formed when the lobes of the combining atomic orbitals have same sign.

Answer: B

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

A. a σ-orbital

B. $a\pi$- orbital

C. a σ^* -orbital

D. a π^* - orbital

Answer: A

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26. The magnitude of lattice energy of a solid increases if

A. the ions are large

B. the ions are small

C. the ions are of equal size

D. charges on the ions are small

Answer: B

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27. 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

Watch Video Solution

28. In which of the following pairs does the first compound not have a higher boiling point than the second ?

A. Kr, Ne

B. HBr, HCl

C. NH_3, PH_3

D. Cl_2, KCl

Answer: D

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29. 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

Watch Video Solution

30. In which of the following set of molecules is the order of boiling point incorrect?

A. $Xe > Ar > He$

B. $HCl > HF > HBr$

C. $H_2O > H_2Se > H_2S$

D. $C_3H_8 > C_2H_6 > CH_4$

Answer: B

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31. Which of the following statement is correct?

A. Polarisation of an anion is maximum by high charged cation

B. Small sized cation minimises the polarisation

C. A small anion brings about a large degree of polarisation

D. A small anion undergoes a high degree of polarisation

Answer: A

View Text Solution

32. Which among the following molecules is diamagnetic ?

A. Superoxide ion

B. Oxygen molecule

C. Carbon molecule

D. Unipositive ion of nitrogen molecule.

Answer: C

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

A. σ_{2s} orbital is bigger than σ_{1s} orbital

B. σ_{2s} orbital is a bonding orbital whereas 6 is an antibonding orbital

C. σ_{2s} orbital has a greater value of n than σ_{1s}^* orbital

D. σ_{2s}-orbital is formed only after σ_{1s}^* orbital is formed

Answer: C

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34. A wedding ring presented to a bride contains 788 mg of gold and the rest is diamond. If the ring weighs Ig the bride receives (At. mass Au = 197, C = 12)

A. more number of gold atoms

B. more number of carbon atoms

C. equal numbers of gold and carbon atoms

D. gold and carbon atoms in ratio of 4:1 approximately.

Answer: B

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35. The bond that stabilizes the secondary structure of proteins is

A. Covalent bond

B. Ionic bond

C. Coordinate bond

D. Hydrogen bond.

Answer: D

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

A. H_3O^+

B. BF_4^-

C. HF_2^-

D. NH_4^+

Answer: C

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37. Hybridisation of central atom in ICl_2^+ is

A. dsp^2

B. sp

C. sp^2

D. sp^3

Answer: D

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38. The transition of an electron from a 4s orbital to ls orbital in hydrogen atom causes

A. photoelectric effect

B. a Lyman line

C. increase in kinetic energy of electron

D. conversion of H^{+} to H atom

Answer: B

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39. The chemical species having same number of electrons in the outermost and penultimate shell is

A. O^{2-}

B. Na^{+}

C. Cl^{-}

D. Al^{3+}

Answer: C

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40. From among the following triatomic species the least angle around the central atom is in

A. O_3

B. I_3^-

C. NO_2^-

D. H_2S

Answer: D

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Brain Teaser-2

1. 26.8 g of $Na_2SO_4 . xH_2O$ gave 12.6 g of water on heating. The value of in the compound is (M. mass of Na_2SO_4 = 142)

A. 10

B. 7

C. 5

D. 6

Answer: B

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2. For the reaction

$M^{x+} + MnO_4^{\ominus} \rightarrow MO_3^{\ominus} + Mn^{2+} + (1/2)O_2$

if $1\text{mol of} MnO_4^{\ominus}$ oxidises $1.67\text{mol of} M^{x+} \text{to} MO_3^{\ominus}$, then the value of x in the reaction is

A. 5

B. 3

C. 2

D. 1

Answer: C

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3. The continuum in an atomic spectrum is due to

A. instability in excited state

B. interaction of ion with an atom

C. uncertainty principle

D. ionisation of atom.

Answer: D

View Text Solution

4. The ionisation energy of gaseous Na atoms is $495.8 KJmol^{-1}$. The lowest possible frequency of light that can ionise a Na atom is

A. $1.24 \times 10^{15} s^{-1}$

B. $4.76 \times 10^{14} s^{-1}$

C. $1.24 \times 10^{12} s^{-1}$

D. $3.15 \times 10^{14} s^{-1}$

Answer: A

View Text Solution

5. The first orbital of H or H like atom is represented by

$$\psi = \frac{1}{\sqrt{\pi}}\left(\frac{Z}{a_0}\right)^{3/2} e^{-ze/a_0}$$

where $a_0 =$ Bohr's orbit . The actual probability of finding the electon at a distance r form the nucleus is :

A. $\Psi = \Psi^2 dr$

B. $\int \Psi^2 4\pi r^2 dr$

C. $\Psi^2 4\pi r^2 dr$

D. $\Psi. dV.$

Answer: C

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6. If e is the charge of an electron in esu m is the mass in grams and v the voltage 'h' is the planck constant in erg sec then the wavelength of the electron in cm is

A. $h/\sqrt{Ve}$

B. $h\sqrt{Vme}$

C. $h\sqrt{Ve}$

D. $h\sqrt{2mVe}$

Answer: D

Watch Video Solution

7. The limiting line Balmer series will have a frequency of

A. $3.29 \times 10^{15} s^{-1}$

B. $-3.65 \times 10^{14} s^{-1}$

C. $8.22 \times 10^{14} s^{-1}$

D. $-8.22 \times 10^{14} s^{-1}$

Answer: C

Watch Video Solution

8. According to Planck's equation, $\Delta E = hv$. The energy ΔE corresponding to intense yellow line of sodium at 589 mm is

A. 2.11 eV

B. 43.37 eV

C. 47.12 kJ

D. 2.11 kcal

Answer: A

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9. The threshold wavelength for the ejection of electrons from the metal X is 330 nm. The work function for the photoelectric emission for metal X is $\left(h = 66 \times 10^{-34} Js\right)$

A. $1.2 \times 10^{-20} J$

B. $6 \times 10^{-19} J$

C. $1.2 \times 10^{-20} J$

D. $6 \times 10^{-12} J$

Answer: B

Watch Video Solution

10. An atom emits energy equal to 4×10^{-12} erg. In which part of the electromagnetic spectrum does the corresponding line lie?

A. UV region

B. Infrared region

C. Visible region

D. Microwave region.

Answer: C

Watch Video Solution

11. Which of the following resonating form is not correct for CO_2?

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

B. (B) $:\overset{..-}{\underset{..}{O}} - C \equiv \overset{+}{O}:$

C. $:\overset{+}{O}_{..} - C \equiv \overset{-}{O}_{..}: +$

D. $:\overset{+}{O} \equiv C - \overset{..}{O}_{..}: -$

Answer: C

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

A. N_2^+

B. CN^-

C. CO

D. NO^+

Answer: A

Watch Video Solution

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

A. P in PCl_3

B. S in SF_4

C. Cl in ClF_3

D. B in BCl_3

Answer: A

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14. If the energy of first Bohr's orbit is -2.17×10^{-11} ergs, then the energy of fifth Bohr orbit is

A. -2.17×10^{-11} ergs

B. -8.68×10^{-13} ergs

C. -5.42×10^{-10} ergs

D. -2.08×10^{-11} ergs

Answer: B

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15. What transition in $He^{\oplus}$ ion shall have the same wave number as the first line in Balmer series of H atom ?

A. $3 \rightarrow 2$

B. $6 \rightarrow 4$

C. $5 \rightarrow 3$

D. $7 \rightarrow 5$

Answer: B

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16. An equimolar mixture of Nitrogen gas and water vapours is taken in a 2 litre flask at $27\,^{\circ}$C and 1.23×10^{-2} atm. pressure. What is the mass of the gas at $-27\,^{\circ}$C?

A. $2.8 \times 10^{-4} g$

B. $5.2 \times 10^{-3} g$

C. $1.4 \times 10^{-2} g$

D. $0.07 g$

Answer: C

View Text Solution

17. A solid element has a specific heat of $1 J g^{-1} K^{-1}$. The atomic mass of the element is

A. 9

B. 18

C. 27

D. 36

Answer: C

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18. A compound possesses 8% sulphur by mass. The least molecular mass is

A. 32

B. 64

C. 128

D. 400

Answer: D

Watch Video Solution

19. Which among the given molecules has a linear structure?

A. NO_2^+

B. $SnCl_2$

C. SCl_2

D. HOCl

Answer: A

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20. In which of the following molecules the central atom does not use sp^3 hybrid orbitals in its bonding?

A. NH_2^-

B. BeF_3^-

C. SO_2Cl_2

D. SO_4^{2-}

Answer: B

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21. The correct increasing bond angle among BF_3, PF_3 and ClF_3 follows the order

A. $BF_3 < PF_3 < ClF_3$

B. $PF_3 < BF_3 < ClF_3$

C. $ClF_3 < PF_3 < BF_3$

D. $BF_2 \approx PF_3 \approx ClF_3$

Answer: C

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22. The correct order of increasing electropositive character among Cu ,Fe and Mg is :

A. $Cu \approx Fe < Mg$

B. $Fe < Cu < Mg$

C. $Fe < Mg < Cu$

D. Cu lt Fe lt Mg

Answer: D

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23. The size of ionic species is correctly given in the order

A. $Cl^{7+} > Si^{4+} > Mg^{2+} > Na^{+}$

B. $Na^{+} > Mg^{2+} > Si^{4+} > Cl^{7+}$

C. $Na^{+} > Mg^{2+} > Cl^{7+} > Si^{4+}$

D. $Cl^{7+} > Na^{+} > Mg^{2+} > Si^{4+}$

Answer: B

Watch Video Solution

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

A. 54%

B. 46%

C. 23%

D. 72%

Answer: A

Watch Video Solution

25. There are two nodes in the radial probability distribution curve for the orbital with

A. n=2,n=0

B. n=3,l=1

C. n=4,l=3

D. n=3,l=0

Answer: D

View Text Solution

26. The bond angle in H_2O (for H-S-H) is

A. same as that of Cl-Be-Cl in $BeCl_2$

B. greater than H-N-H bond angle in NH_3

C. greater than H-Se-H and less than H-O-H

D. same as Cl-Sn-Cl in $SnCl_2$

Answer: C

View Text Solution

27. If the ionic radii of each K^{+} and F^{-} are 1.34Å, then tha atomic radii of K and F will be respectively:

A. 1.34 and 1.34 Ã...

B. 2.31 and 0.64 Ã...

C. 0.64 and 2.31 Ã...

D. 2.31 and 1.34 Ã...

Answer: B

Watch Video Solution

28. One among the following is the incrorrect order of increasing ionisation energy :

A. Cl^{-} lt Arlt K^{+}

B. Klt Ca lt Sc

C. Au lt Ag lt Cu

D. Cslt Rblt K

Answer: C

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29. Which of the following is false ?

A. 3s orbital is spherically symmetrical with two nodes

B. $d_{x^2-y^2}$ orbitals has lobes of electron density in XY plane along X and Y axis

C. The radial probability curve of 1s. 3p and 5d have one, two and three regions of maximum probability

D. $3d_z^2$ has zero electron density in XY plane.

Answer: D

View Text Solution

30. 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

Watch Video Solution

31. A 5.82 g silver coin is dissolved in nitric acid. When sodium chloride is added to the solution, all the silver gets precipitated as AgCl. The mass of the precipitated silver chloride is 7.2 g. The percentage of silver in the coin is :

A. 98 %

B. 93.1 %

C. 86 %

D. 82 %

Answer: B

Watch Video Solution

32. Which of the following linear combinations of atomic orbitals is incorrectly depicted?

A. 

B. 

C. 

D. 

Answer: B

Watch Video Solution

33. In one among the following molecules the state of hybridisation of the central atom is not the same as the others

A. B in BF_3

B. O in H_3O^+

C. N in NH_3

D. P in PCl_3

Answer: B

Watch Video Solution

34. The state of hybridisation of sulphur in SO_2 is same as that of sulphur in

A. SCl_2

B. SO_3

C. SO_4^{3-}

D. SF_4

Answer: B

Watch Video Solution

35. The magnetic character of oxygen molecule is he same as that of one of the following molecules

A. Nitrogen

B. Carbon

C. Peroxide ion

D. Boron.

Answer: B

Watch Video Solution

36. The density of the nucleus is

A. 10^4 g/c c

B. 10^{14} g/c c

C. 10^{-4} g/c c

D. 10^{-14} g/c c

Answer: B

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37. Azimuthal Quantum number was given by

A. Lande

B. Bohr

C. Zeemann

D. Sommer field

Answer: B

Watch Video Solution

38. Diatomic molecule has a dipole moment of $1.2D$ If its bond 1.0Å what fraction of an electronic charge exists on each atom ? .

A. 12% of e

B. 18% of e

C. 25% of e

D. 29% of e

Answer: B

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39. 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: B

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40. The energy required to stop ejection of electrons from a Cu plate is 0.24 eV.Calculate the work function Cu when a radiation of wavelength $\lambda = 250$ nm strikes the plate.

A. 24.3 eV

B. 24 eV

C. 4.65 eV

D. 4.95 eV

Answer: B

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Unit Test - 1

1. In multiplication and division the significant figures of answer must be same as that in the quantity with â€¦â€¦. number of significant figures

A. maximum

B. 3

C. 2

D. minimum

Answer: D

View Text Solution

2. How many significant figures are there in (respectively)

(1) 73.000 g (2) 0.0503 g and (3) 2.001 s

A. 3,3,4

B. 3,4,5

C. 2,5,4

D. 5,3,4

Answer: D

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3. The sample with largest number of atoms is

A. 1 g of O_2(g)

B. 1 g of Ni (g)

C. 1 g of B (s)

D. 1 g of N_2 (g)

Answer: C

Watch Video Solution

4. Number of atoms in 560gm of Fe(atomic mass $56 gm \text{ mol}^{-1}$) is:

A. twice that of 70 g of nitrogen

B. half that of 20 g of hydrogen

C. Both (A) and (C) are correct

D. None of the above is correct

Answer: C

Watch Video Solution

5. About a gaseous reaction

$$xX + yY \rightarrow lL + mM$$

which statement is wrong?

A. x litres of X combines with y litre of Y to give L and M

B. x moles of X combines with y moles of Y to give L and M

C. x number of molecules of X combine y molecules of Y to form L and M

D. x g of X combines with y g of Y to give M and L

Answer: D

View Text Solution

6. Pick out the isoelectronic structures from the following

$CIH_3^+ \; H_3IIO^+ \; NIIIH_3 CIVH_3^-$.

A. I and II

B. I and III

C. I and IV

D. II, III and IV.

Answer: D

Watch Video Solution

7. The radius of which of the following orbit is same as that of the first Bohr's orbit of Hydrogen atom?

(a). $He^{+}(n = 2)$

(b) $Li^{2+}(n = 2)$

(c). $Li^{2+}(n = 3)$

(d). $Be^{3+}(n = 2)$

A. Li^{2+}(n=2)

B. Li^{3+} (n=3)

C. Be^{3+}(n=2)

D. $He^{+}(n = 2)$

Answer: C

Watch Video Solution

8. Which of the following sets of quantum numbers represents an impossible arrangement ?

A. $\begin{matrix} n & l & m & s \\ 3 & 2 & -2 & +1/2 \end{matrix}$

B. $\begin{matrix} n & l & m & s \\ 3 & 2 & -3 & +1/2 \end{matrix}$

C. $\begin{matrix} n & l & m & s \\ 4 & 0 & 0 & -1/2 \end{matrix}$

D. $\begin{matrix} n & l & m & s \\ 5 & 3 & 0 & -1/2 \end{matrix}$

Answer: B

Watch Video Solution

9. The electrons present in K-shell of the atom will differ in

A. prinClpal quantum number

B. azimuthal quantum number

C. magnetic quantum number

D. spin quantum number

Answer: D

Watch Video Solution

10. The increasing order (lowest first) for the values of e/m (charge//mass) for electron (e), proton (p), neutron (n), and alpha particle (α) is

A. n,α,p,e

B. e,p,n,α

C. n,p,e,α

D. n,p,α,e

Answer: A

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11. The incorrect statement Among the following is A)The first ionisation potential of Al is less than the first ionisation potential of Mg. B)The first ionisation potential of Na is less than the first ionisation potential of Mg. C)The second ionisation potential of Mg greater than the second ionisation potential of Na D)The third ionisation potential of Mg greater than the third ionisation potential of Al

A. The first ionization potential of Al is less than the first ionization potential of Mg

B. The second ionization potential of Mg is greater than the second ionization potential of Na^+

C. The first ionization potential of Na is less than the first ionization potential of Mg

D. The third ionization potential of Mg is greater than that of Al

Answer: B

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12. The screening effect of inner electrons of an atom can cause

A. an increase in the ionization potential

B. a decrease in the ionization potential

C. no effect on the ionization potential

D. None of the above.

Answer: A

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13. Which of the following transitions involves maximum amount of energy?

A. $M^{-}(g) \rightarrow M(g)$

B. $M(g) \rightarrow M^{+}(g)$

C. $M^{+}(g) \rightarrow M^{2+}(g)$

D. $M^{2+}(g) \rightarrow Mg^{3+}(g)$

Answer: D

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14. The set representing the correct order of the first ionisation potential is

A. K gt Na gt Li

B. Be gt Mg gt Ca

C. Ge gt Si gt C

D. B gt C gt N.

Answer: B

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15. Which one of the following elements has the highest ionisation energy?

A. $[Ne]3s^2 3p^1$

B. $[Ne]3s^2 3p^2$

C. $[Ne]3s^2 3p^3$

D. $[Ar]3d^{10} 4s^2 4p^2$

Answer: C

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16. Number of electrons in the valence orbit of nitrogen in an ammonia molecule are

A. 5

B. 6

C. 7

D. 8

Answer: D

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17. The dipole moment of HBr is $1.6 \times 10^{-30} cm$ and interatomic spacing is 1Å. The $\%$ ionic character of HBr is

A. 7

B. 10

C. 15

D. 27

Answer: B

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18. When two atoms of chlorine combine to form one molecule of chlorine gas, the energy of the molecule is

A. equal to that of separate atoms

B. lower than that of separate atom

C. greater than that of the separate atoms

D. None of the above.

Answer: B

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19. In which of the following the central atom does not use sp^3 hybrid orbitals in its bonding

A. NH_2^-

B. H_3O^+

C. BeF_3^-

D. NF_3

Answer: C

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20. What is the effect of more electronegative atoms on the strength of an ionic bond ?

A. increases

B. decreases

C. remains same

D. None of these.

Answer: A

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