CHEMISTRY

BOOKS - PATHFINDER CHEMISTRY (BENGALI ENGLISH)

CHEMICAL BONDING AND MOLECULAR STRUCTURE

Question Bank

1. In which of the following compounds the bonds are Non directional ?

A. NCl_3

B. RbCl

C. $BeCl_2$

D. BCl_3

Answer: B

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2. What is the reason that ionic compounds do not show stereo isomerism

A. presence of ions

B. non-directional nature of ionic bond

C. brittle nature

D. electrostatic force of attraction between ions

Answer: B

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3. The correct order of the mobility of the alkali metal ions in aqueous solution is

A. $Rb^+ > K^+ > Na^+ > Li^+$

B. $Li^+ > Na^+ > K^+ > Rb^+$

C. $Na^+ > K^+ > Rb^+ > Li^+$

D. $Li^+ > Rb^+ > Na^+ > K^+$

Answer: A

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4. Ionic compounds are insoluble in non-polar solvent because

A. The dielectric constant of the solvent is high

B. Their dipole moment is high

C. They do not get ionised very easily

D. They do not form ion-solvent complex

Answer: D

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5. Which of the following compounds of elements in group IV is expected to be the most ionic ?

A. $PbCl_2$

B. $PbCl_4$

C. CCl_4

D. $SiCl_4$

Answer: A

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6. Arrange the bonds in order of increasing ionic character of the molecules LiF, K_2O, N_2, SO_2 and ClF_3

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7. Which of the following, aqueous solutions is non conducting ?

A. $FeSO_4$

B. KNO_3

C. C_2H_5OH

D. $K_2SO_4.\ Al_2(SO_4)_{3.24}H_2O$

Answer: C

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8. Which of the following contains both electrovalent and covalent bonds ?

A. C_6H_6

B. H_2O_2

C. $Ni(CO)_4$

D. Na_2SO_4

Answer: D

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9. Which of the following compound have incomplete octet ?

A. NaCl

B. $CaCl_2$

C. MgO

D. BCl_3

Answer: D

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10. Which of the following has a strong covalent bond ?

A. Cl-F

B. F-F

C. C-Cl

D. C-F

Answer: D

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11. Which of the following compounds do not follow octet rule ?

A. $BeCl_2$

B. $ZnCl_2$

C. ClO_2

D. All of these

Answer: D

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12. NH_3 and BF_3 combine readily because of the formation of

A. a covalent bond

B. a hydrogen bond

C. a coordinate bond

D. an ionic bond

Answer: C

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13. Which of the following ion follow octet rule ?

A. Sc^{2+}

B. Ti^{2+}

C. Mn^{7+}

D. Cr^{2+}

Answer: C

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14. The covalent compound HCl has the polar character because

A. The electronegativity of hydrogen is greater than that of chlorine

B. The electronegativity of chlorine is greater than that of hydrogen

C. The electronegativity of hydrogen is equal to that of chlorine

D. Hydrogen and chlorine are gaseous

Answer: B

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15. Draw the Lewis structures for the following molecule:

H_2S

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16. Draw the Lewis structures for the following ion :

CO_3^{2-}

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17. Draw the Lewis structures for the following molecule :

HCOOH

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18. What is the total number of sigma and pi bonds in the following molecule ?

C_2H_2

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19. What is the total number of sigma and pi bonds in the following molecule ?

C_2H_4

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20. Considering x-axis as the internuclear axis which out of the following will not form a sigma bond and why ?

A. 1s and 1s

B. 1s and $2p_x$

C. $2p_y$ and $2p_y$

D. 1s and 2s

Answer: C

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21. The compound which contains ionic as well as covalent bond is

A. $C_2H_4Cl_2$

B. CH_3I

C. KCN

D. H_2O_2

Answer: C

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22. Which hybrid orbitals are used by carbon atoms in the following molecules ?

$CH_3 - CH_3$

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23. Which hybrid orbitals are used by carbon atoms in the following molecules ?

$CH_3 - CH = CH_2$

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24. Which hybrid orbitals are used by carbon atoms in the following molecules ?

$CH_3 - CH_2 - OH$

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25. Which hybrid orbitals are used by carbon atoms in the following molecules ?

$CH_3 - CHO$

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26. Which hybrid orbitals are used by carbon atoms in the following molecules ?

CH_3COOH

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27. The correct order of the bond angles is

A. $NH_3 > H_2O > PH_3 > H_2S$

B. $NH_3 > PH_3 > H_2O > H_2S$

C. $NH_3 > H_2S > PH_3 > H_2O$

D. $PH_3 > H_2S > NH_3 > H_2O$

Answer: A

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28. Which of the following has pyramidal shape ?

A. PCl_3

B. SO_3

C. CO_3^{2-}

D. NO_3^-

Answer: A

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29. The shape of methyl carbocation $\left(CH_3^+\right)$ is likely to be :

A. linear

B. pyramidal

C. planar

D. spherical

Answer: C

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30. Bond length of which of the following types of bonds is maximum ?

A. $sp^2 - sp^2$

B. sp-sp

C. $sp^3 - sp^3$

D. $sp^3 - sp^2$

Answer: C

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31. In the XeF_4 molecule, the Xe atom is in the

A. sp^2-hybridized state

B. sp^3-hybridized state

C. sp^3d-hybridized state

D. sp^3d^2-hybridized state

Answer: D

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32. The shape of IF_5 and IF_7 are respectively

A. square pyramidal and pentagonal bipyramidal

B. octahedral and pyramidal

C. trigonal bipyramidal and square antiprismatic

D. distorted square planar and distorted octahedral

Answer: A

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33. The shape of a molecule which has 3 bond pairs and one lone pair is

A. Octahedral

B. pyramidal

C. Triangular planar

D. Tetrahedral

Answer: B

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34. Although geometries of NH_3 and H_2O molecules are distorted tetrahedral, bond angle in water is less than that of ammonia. Discuss.

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35. The melting point of KCl is higher than that of AgCl though the crystal radii of Ag^+ and K^+ ions are almost though the crystal radii of Ag^+ and K^+ ions are almost the same.

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36. SnF_4 has boiling point 705° C while $SnCl_4$ has 114° C -explain

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37. The solubility of silver halides in water decreases from AgF to AgI. Explain.

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38. Calculate the $\%$ of ionic character of a bond having bond length $= 0.92\overset{\circ}{A}$ & 1.91 D as its observed dipole moment.

A. 35.55

B. 43.25

C. 17.3

D. 71.3

Answer: B

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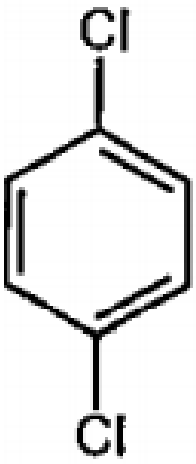
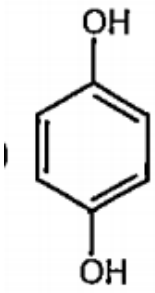
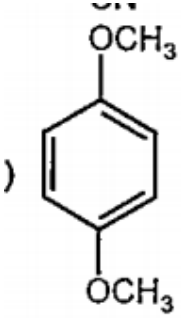
39. Which of the following have zero dipolemoment

A.



B.

C. 

D. 

Answer: A::B

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40. Dipole moment of HCl is 1.03 D and its bond length is $1.257\overset{\circ}{A}$. Calculate its percent ionic character.

A. $35.12\ \%$

B. $20.03\ \%$

C. $17.09\ \%$

D. $20.73\ \%$

Answer: C

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41. Certain bond has $76.81\ \%$ ionic character. If the bond length is 159.6 pm then calculate the dipole moment of the molecule (1D=3.335×10^{-30} Cm).

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

A. $CH_3Cl > CH_3F > CH_3Br > CH_3I$

B. $CH_3F > CH_3Cl > CH_3Br > CH_3I$

C. $CH_3Cl > CH_3Br > CH_3I > CH_3F$

D. $CH_3F > CH_3Cl > CH_3I > CH_3Br$

Answer: A

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

A. NF_3

B. CO_2

C. SO_2

D. NH_3

Answer: B

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44. Which of the following is not correct ?

A. Lone pair of e^- present on central atom can give rise to dipole moment

B. Dipole moment is vector quantity

C. Difference in electronegativity of combining atoms can lead to dipole moment

D. CO_2 molecule has dipole moment

Answer: D

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45. Write the significance/applications of dipole moment ?

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46. Which out of NH_3 and NF_3 has higher dipole moment and why ?

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47. Which of the following compounds contain ionic, covalent, coordinate covalent and hydrogen bonds ?

A. NH_4Cl

B. KCN

C. $CuSO_4 \cdot 5H_2O$

D. NaOH

Answer: C

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48. Which of the following compounds would have significant intermolecular hydrogen bonding HF, CH_3OH, N_2O_4, CH_4 ?

A. HF, N_2O_4

B. HF, CH_4, CH_3OH

C. HF, CH_3OH

D. CH_3OH, CH_4

Answer: C

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49. Which one of the following does not have intermolecular H-bonding ?

A. H_2O

B. o-nitro phenol

C. HF

D. CH_3COOH

Answer: B

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50. Ethanol has a higher boiling point than dimethyl ether through they have the same molecular weight. This is due to

A. resonance

B. coordinate bonding

C. hydrogen bonding

D. ionic bonding

Answer: C

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51. Explain the important aspects of resonance to the CO_3^{2-} ion.

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52. Write the resonance structures for NO_2

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53. Write the resonance structures for NO_3^-

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54. Compare the bond length O-O in following molecules: $KO_2, O_2, O_2[AsF_6]$

A. 1.5, 2, 2.5

B. 2, 2, 2.5

C. 1.5, 2, 1.5

D. 2.5, 2, 1.5

Answer: A

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55. Which of the following species has bond order of zero

A. He_2^+

B. O_2^+

C. Ne_2

D. N_2^+

Answer: C

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56. Use molecular orbital theory to explain why the Be_2 molecule does not exist.

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57. Compare the relative stability of the following species and indicate their magnetic properties.

O_2, O_2^+, O_2^- (Superoxide), O_2^{2-} (peroxide)

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58. Among the following isostructural compounds, the compound, with highest lattice energy is

A. LiF

B. LiCl

C. NaCl

D. MgO

Answer: D

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59. An electrovalent compound does not exhibit space isomerism because of

A. Presence of oppositively charged ions

B. High melting points

C. Non directional nature of the bond

D. Crystalline nature

Answer: C

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60. The correct increasing order of Ionic character among the following compounds

$Nacl, CaCl_2, MgCl_2, MgO$

A. $CaCl_2 < MgCl_2 < MgO < NaCl$

B. $MgCl_2 < MgO < CaCl_2 < NaCl$

C. $NaCl < MgO < CaCl_2 < MgCl_2$

D. $MgO < CaCl_2 < MgCl_2 < NaCl$

Answer: A

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61. The pair of elements which on combination are most likely to form an ionic compound is

A. Na and Ca

B. K and O_2

C. O_2 and Cl_2

D. Al and I_2

Answer: B

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62. Sodium sulphate is soluble in water but barium sulphate is sparingly soluble because :

A. Lattice energy of barium sulphate is less than its hydration energy

B. Lattice energy of barium sulphate is more than its hydration energy

C. The lattice energy has no role to play in solubility

D. The hydration energy of sodium sulphate is less than its lattice energy

Answer: B

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63. The types of bond present in N_2O_5 vapour state

A. Only covalent

B. only ionic

C. ionic and covalent

D. covalent & coordinate

Answer: D

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64. In which of the following compounds, breaking of covalent bond takes place?

A. Boiling of H_2O

B. Melting of KCN

C. Boiling of CF_4

D. Melting of SiO_2

Answer: D

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65. The valency of sulphur in sulphuric acid is

A. 2

B. 8

C. 4

D. 6

Answer: D

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66. when 2s-2s,2p-2p and 2p-2s orbitals overlap, the bond strength decreases in the order:

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

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

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

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

Answer: B

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67. The ratio of σ and π bonds in benzene is:

A. 2

B. 6

C. 4

D. 8

Answer: C

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68. Indicate the wrong statement

A. A sigma bond has free rotation around its axis

B. p-orbitals always have only sideways overlap

C. s-orbitals never from π-bonds

D. There can not be more than one sigma bond between two atoms

Answer: B

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69. Which of the following molecules does not have coordinate covalent bonds?

A. $CH_3 - NC$

B. CO

C. O_3

D. CO_3^2

Answer: D

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70. Which of the following has been arranged in increasing order of size of the hybrid orbitals?

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

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

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

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

Answer: A

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71. With respect to carbon, the correct order of electronegativity:

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

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

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

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

Answer: A

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72. Carbon atoms in $C_2(CN)_4$ are:

A. sp-hybridized

B. $sp^2 - hybridized$

C. sp and sp^2 hybridized

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

Answer: C

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73. CO_2 has the same geometry as:

(i)$HgCl_2$ (ii) NO_2 (iii) $SnCl_4$ (iV) C_2H_2

A. I and III

B. II and IV

C. I and IV

D. III and IV

Answer: C

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74. Which molecule is T shaped

A. BeF_2

B. BCl_3

C. NH_3

D. ClF_3

Answer: D

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75. Which of the following pairs is isostructural?

A. SF_4 and SiF_4

B. SF_6 and SiF_6^{2-}

C. PCl_3 and ClF_3

D. XeF_6 and TeF_6

Answer: B

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76. The correct order of increasing X-O-X bond angle is (X=H,F OR Cl):

A. $H_2O > Cl_2O > F_2O$

B. $Cl_2O > H_2O > F_2O$

C. $F_2O > Cl_2O > H_2O$

D. $F_2O > H_2O > Cl_2O$

Answer: B

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77. Which of the followings has lowest melting point?

A. NaF

B. NaCl

C. NaBr

D. Nal

Answer: D

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78. Which of the following anhydrous chlorides sublimes?

A. $NaCl$

B. $CaCl_2$

C. $MgCl_2$

D. $AlCl_3$

Answer: D

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79. Which of the following has lowest melting point?

A. NaCl

B. KCl

C. RbCl

D. CsCl

Answer: D

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80. The experimental value of the dipole moment of HCl is 1.03D. The length of the H-CI bond is 1.275 A. The percentage of ionic character in HCl is:

A. 43

B. 21

C. 17

D. 7

Answer: C

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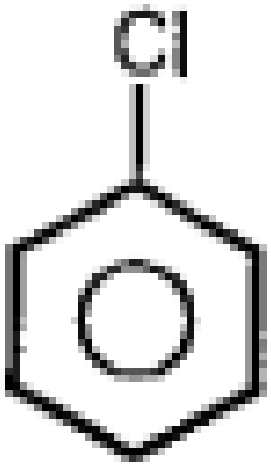
81. The dipole moment of



is

A. 0 D

B. 1.5 D

C. 2.86 D

D. 2.25 D

Answer: A

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82. Which of the following exhibit H-bonding ?

A. HCl

B. H_2Se

C. CH_3COOH

D. H_2S

Answer: C

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83. The volatility of HF is low because of:

A. its low polarizability

B. the weak dispersion interaction between the molecules

C. its smaller molecular mass

D. its strong hydrogen bonding

Answer: D

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84. Intramolecular hydrogen bonding is found in

A. Salicylaldehyde

B. Water

C. Acetaldehyde

D. Phenol

Answer: A

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85. Among liq. NH_3, liq. HF,CH_4, CH_3OH and N_2O_4 intermolecular hydrogen bond is expected in

A. all the molecules

B. all except one

C. three molecules

D. none of these

Answer: C

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86. Two ice cubes are pressed over each other and unite to form one cube. Which force is responsible for holding them together

A. Vander waals forces

B. Covalent attraction

C. Hydrogen bond formation

D. Dipole-dipole attraction

Answer: C

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87. Nitrous oxide has dipole moment

A. Zero

B. small

C. Large

D. variable

Answer: B

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88. What is the formal charge on sulphur in H_2SO_4?

A. +1

B. -1

C. 0

D. +6

Answer: C

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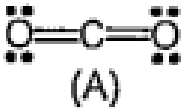
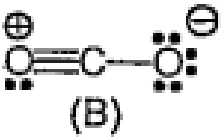
89. Out of the following four resonance structures for the CO_2 molecules, which are important for describing the bonding in the molecule?


(A)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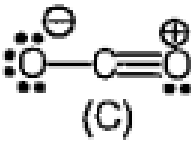
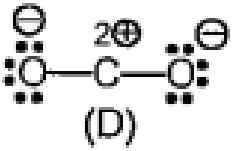

(C)


(D)

A. A,B

B. A,B,C

C. C,D

D. D

Answer: B

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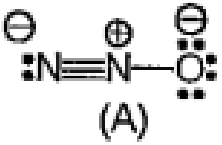
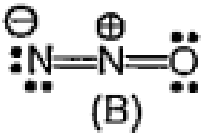
90. Which among the following structures can not respresent resonance form for N_2O


(A)


(B)


(C)


(D)

A. A

B. B

C. C,D

D. D

Answer: D

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91. Regarding the most stable resonating form which of the following is correct

A. Non-polar molecules are always more stable as compared to polar(charged) molecules

B. Canonical form having more number of covalent bonds is more stable

C. Conical form having negative charge on electronegative atom and positive charge on electropositive atom is more stable

D. all of them

Answer: D

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92. Which of the following order of energies of molecular orbitals of N_2 is correct?

A. $(\pi 2p_y) < (\sigma 2p_z) < (\pi 2p_x) \approx (\pi 2p_y)$

B. $(\pi 2p_y) > (\sigma 2p_z) < (\pi 2p_x) \approx (\pi 2p_y)$

C. $(\pi 2p_y) < (\sigma 2p_z) > (\pi 2p_x) \approx (\pi 2p_y)$

D. $(\pi 2p_y) > (\sigma 2p_z) < (\pi 2p_x) \approx (\pi 2p_y)$

Answer: A

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93. Which of the following statements is not correct from the view point of molecular theory?

A. Be_2 is not a stable molecule

B. He_2 is not stable but He_2^+ is expected to exist

C. Bond strength of N_2 is maximum among homonuclear diatomic molecules belonging to second period

D. The order of energies of molecular orbitals in N_2 molecule is

Answer: D

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94. Which of the following options represents the correct bond order?

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

B. $O_2^- < O_2 < O_2^+$

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

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

Answer: B

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95. Main axos of a diatomic molecule is Z orbitals P_x and P_y of two atoms overlap to form which of the following orbitals?

A. πm.o.

B. σm.o.

C. δm.o.

D. no bond will form

Answer: A

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96. In a molecule of ethyne, the number of π antibondding molecular orbitals is

A. 1

B. 2

C. 3

D. 4

Answer: B

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97. In diborane `(B_2H_6) the stability of B-H-B (3c-2e) bond can be explained by

A. V.B theory

B. Octet theory

C. M.O. theory

D. none of the above

Answer: C

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98. Which of the following combination will give the strongest ionic bond ?

A. Na^+ and Cl^-

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

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

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

Answer: D

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99. In NO_3^- ion, the number of bond pairs and lone pairs of electrons on nitrogen atom are:

A. 2,2

B. 3,1

C. 1,3

D. 4,0

Answer: D

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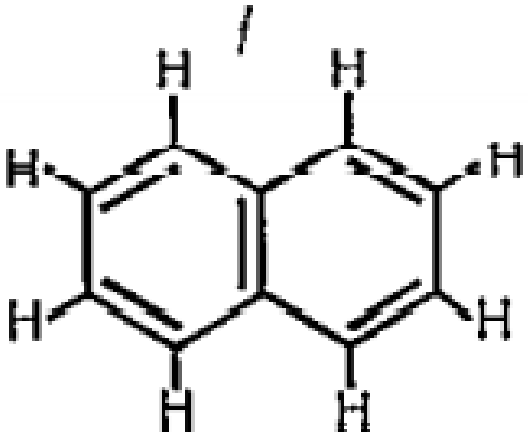
100. Number of σ-bonds and π-bonds in the following structure is



A. 19,6

B. 20,4

C. 19,5

D. 20,5

Answer: C

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

A. XeF_4

B. BF_4^-

C. C_2H_4

D. SiF_4

Answer: C

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102. If the electronic configuration of an element is $1s^2 2s^2 2p^6 3s^2 3p^6 3d^2 4s^2$, the four electrons involved in chemical bond formation will be:

A. $3p^6$

B. $3p^6, 4s^2$

C. $3p^6, 3d^2$

D. $3d^2, 4s^2$

Answer: D

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103. Stable form of A may be represented by formula [A is a member of inert group]

A. A

B. A_2

C. A_3

D. A_4

Answer: A

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104. Stable form of C may be represented by formula [C is a member of halogen group]

A. C

B. C_2

C. C_3

D. C_4

Answer: B

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105. The molecular formula of the compound formed between B and C will be [B and C are the member of group 15 and group 17 respectively]

A. BC

B. B_2C

C. BC_2

D. BC_3

Answer: D

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106. The bond between B and C will be [B and C are the member of group 15 and group 17 respectively]

A. ionic

B. covalent

C. hydrogen

D. coordinate

Answer: B

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107. Which of the following would result in the formation of strongest π-bond if the molecular axis is x-axis ?

A. $2p_x + 2p_x$

B. $2p_y + 2p_y$

C. $2py + 3d_{xy}$

D. $2p_z + 4p_z$

Answer: B

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108. The type of d-orbital involved in sp^3d hybridisation is

A. d_{z^2}

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

C. d_{yz}

D. any of these

Answer: A

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109. In which of the following there is change in the type of hybridization ?

A. $CH_3^- + H^+ - \rightarrow CH_4$

B. $NH_3 + H^+ \rightarrow NH_4^+$

C. $H_2O + H^+ \rightarrow H_3O^+$

D. $AlH_3 + H^- \rightarrow AlH_4^-$

Answer: D

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110. If MX_3 is T shaped, then the number of lone pair around M is

A. Zero

B. Two

C. Three

D. Five

Answer: B

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111. Which of the following species have same shape and same bond order ?

A. N_3^- and I_3^-

B. N_3^- and CO_2

C. CO_2 and SO_2

D. I_3^- and SO_2

Answer: B

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112. Isostructural species are those which have the same shape and hybridisation. Among the given species identify the isostructural pairs :

A. $[NF_3$ and $BF_3]$

B. $[BF_4^-$ and $NH_4^+]$

C. $[BCl_3$ and $BrCl_3]$

D. $[NH_3$ and NO_3^-

Answer: B

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113. The types of hybrid orbitals of nitrogen in NO_2^+ NO_3^- and NH_4^+ respectively are expected to be :

A. sp, sp^3 and sp^2

B. sp, sp^2 and sp^3

C. sp^2, sp and sp^3

D. sp^2, sp^3 and sp

Answer: B

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114. Which of the following species has tetrahedral geometry ?

A. BH_4^-

B. NH_2^-

C. CO_3^-

D. $H_3\overset{+}{O}$

Answer: A

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115. Which of the following angle corresponds to sp^2 hybridisation ?

A. 90°

B. 120°

C. 180°

D. 109°

Answer: B

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116. Maximum change in percentage of s-character of bonding orbital of central atom occurs in which of the following transformations (consider the underlined product) ?

A. $BF_3 + F^- \rightarrow \underline{BF_4^-}$

B. $NH_3 + H^+ \rightarrow \underline{NH_4^+}$

C. $N_2O_5 \rightarrow \underline{NO_2^+} \cdot NO_3^-$

D. $BeF_2 \rightarrow \left[\underline{\underline{BeF_4}}\right]^{-2}$

Answer: D

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117. The correct decreasing order of nearest bond angle:

A. $ClF_3 > PF_3 > NF_3 > BF_3$

B. $BF_3 > PF_3 > NF_3 > ClF_3$

C. $BF_3 > ClF_3 > PF_3 > NF_3$

D. $BF_3 > NF_3 > PF_3 > ClF_3$

Answer: D

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118. In which of the following, all central atom-surrounding bond is not of equal length ?

A. XeF_2

B. XeF_4

C. PF_5

D. BF_3

Answer: C

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119. In which of the following bond angle around underline atom is 120° ?

A. $\underline{N}(CH_3)_3$

B. $\underline{N}(GeH_3)_3$

C. $\underline{P}(CH_3)_3$

D. $\underline{P}(SiH_3)_3$

Answer: B

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120. Percentage of p-character in each orbital of central atom used for bonding in NH_3 is

A. $25\ \%$

B. $75\ \%$

C. More than $75\ \%$

D. $33.3\ \%$

Answer: C

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121. If Na^+ ion is larger than Mg^{2+} and S^{2-} ion is larger than Cl^-, which of the following will be least soluble in water ?

A. NaCl

B. Na_2S

C. MgS

D. $MgCl_2$

Answer: C

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122. Which of the following is correct regarding the covalent character of the ionic bonds ?

A. $LiF > LiCl$

B. $NaCl > LiCl$

C. $FeCl_3 > FeCl_2$

D. $NaI > LiI$

Answer: C

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123. In which of the following cases trans isomer has higher dipole moment than cis ?

A. 1,2-dichloroethene

B. But-2-ene

C. Pent-2-ene

D. 1-chloropropene

Answer: D

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124. Polarity in a molecule and hence the dipole moment depends primarily on electronegativity of the constituent atoms and shape of molecule. Which of the following has the highest dipole moment ?

A. CO_2

B. HI

C. H_2O

D. SO_2

Answer: C

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125. o-hydroxybenzaldehyde although contains phenolic group but does not give test of group with $FeCl_3$ because :

A. It is steam volatile

B. of intermolecular H-bonding

C. of intramolecular Hydrogen bonding

D. Resonance

Answer: C

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126. Hydrogen bonds are formed in many compounds e.g., H_2O, HF, NH_3. The boiling point such compounds depends to a large extent on the strength of hydrogen bond and the number of hydrogen bonds. The correct decreasing order of boiling points of above compounds is

A. $HF > H_2O > NH_3$

B. $H_2O > HF > NH_3$

C. $NH_3 > HF > H_2O$

D. $NH_3 > H_2O > HF$

Answer: B

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127. In which of the following substances will hydrogen bond be strongest ?

A. HCl

B. H_2O

C. HI

D. H_2S

Answer: B

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128. Consider the following statements

(i)In gaseous phase, the vapour pressure of CH_3COOH is less than expected

(ii)In benzene, acetic acid dimerises

(iii)CH_3OH is more viscous than H_2O

(iv)CH_3OCH_3 is non-polar but soluble in water

Select the correct set of codes using T for true and F for false statements in given sequence.

A. F T F T

B. F T F F

C. T F T T

D. T T F F

Answer: D

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129. In $PO_4(3-)$ ion, the formal charge on the oxygen atom of P-O bonds is

A. $+1$

B. -1

C. -0.75

D. $+0.75$

Answer: B

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130. Which molecule or ion out of the following does not contain unpaired electrons ?

A. N_2^+

B. O_2

C. O_2^{2-}

D. B_2

Answer: C

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

A. $N_2 \rightarrow N_2^{\oplus}$

B. $C_2 \rightarrow C_2^{\oplus}$

C. $NO \rightarrow NO^{\oplus}$

D. $O_2 \rightarrow O_2^{\oplus}$

Answer: C

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132. Isostructural among the following pairs is

A. CH_3^+, BH_3

B. H_3O^+, NH_4^+

C. CH_3^-, H_2O

D. BH_4^-, NH_3

Answer: A

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133. The type of hybridization present in ClO_2^- and ClO_3^- is respectively

A. sp^2, sp^3

B. sp^2, sp^2

C. sp, sp^3

D. sp^3, sp^3

Answer: D

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134. 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. CO_3^{2-} , SO_3

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

Answer: A

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135. The hybridization of Cl in ClF_3 is

A. sp^2

B. sp^3

C. dsp^2

D. sp^3d

Answer: D

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136. The N_2 molecule consists of

A. 3σ bonds

B. 3π bonds

C. $2\sigma \text{ and } \pi$ bonds

D. 1σ and 2π bonds

Answer: D

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137. Which compound among the following has more covalent character ?

A. NaI

B. MgI_2

C. AlI_3

D. $AlCl_3$

Answer: C

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138. The bond order between P and O in PO_4^{3-} is

A. 1

B. 1.25

C. 1.33

D. 4

Answer: B

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139. The molecule having permanent dipole moment is

A. SF_4

B. CO_2

C. BF_3

D. SiF_4

Answer: A

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140. The bond order is maximum in

A. H_2

B. H_2^+

C. He_2

D. He_2^+

Answer: A

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141. Where is an electron added to, during the change of O_2 to O_2^- ?

A. σ-orbital

B. π-orbital

C. $\sigma \star$ orbital

D. $\pi \star$-orbital

Answer: D

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142. Which of the following species have linear geometry ?

A. I_3^-

B. XeF_2

C. I_3^+

D. ICI_2^+

Answer: A::B

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143. In which of the following species the hybridization of underlined atom(s) is/are changed ?

A. $\underline{P}Cl_5$ dissociates into PCl_4^+ and PCl_6^-

B. $\underline{N}H_3$ is protonated

C. $\underline{N}H_3$ is deprotonated

D. $\underline{B}F_3$ reacts with F^- to form BF_4^-

Answer: A::D

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144. sp^3d hybridization is used in :

A. I_3^-

B. XeF_2

C. ClF_3

D. $(CH_3)_3N$

Answer: A::B::C

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145. Which of the following species has/have distorted geometries ?

A. SF_6

B. XeF_6

C. SeF_4

D. SiF_6^{2-}

Answer: B::C

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146. Which of the following pairs[s] is/are not correctly named ?

A. XeF_4-Tetrahedral

B. ICl_2^- Linear

C. XeO_3-Pyramidal

D. ICl_3-Triangular planar

Answer: A::D

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147. Resonating structures of a molecule shouid have

A. identical atomic arrangement

B. Identical bonding

C. Nearly same energy

D. Same number of paired electrons

Answer: A::C

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148. Which of the following are non-polar?

A. NH_3

B. SF_4

C. XeF_4

D. SiF_4

Answer: C::D

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149. Which of the following ions has/have fractional bond order[s]?

A. CO_3^{2-}

B. NO^+

C. PO_4^{3-}

D. O_2^-

Answer: A::C::D

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150. In which of the following the bond order is 3?

A. NO

B. CO

C. N_2

D. NO^-

Answer: B::C

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151. Which of the following species have similar bond order?

A. O_2^+

B. NO

C. N_2^-

D. C_2^{2-}

Answer: A::B::C

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152. PCl_5 is an important halide. In crystalline state it exists in ionic form.

On reaction with water it forms different compounds

Answer the following questions based on above passage:

In crystalline state PCl_5 exists as

A. $[PCl_4]^+Cl^-$

B. $[PCl_4]^+[PCl_6]^-$

C. $[PCl_3]^{2+} + 2Cl^-$

D. $[PCl_6]^+[PCl_4]^-$

Answer: B

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153. PCl_5 is an important halide. In crystalline state it exists in ionic form.

On reaction with water it forms different compounds

Answer the following questions based on above passage:

In presnce of small amount of water, PCl_5 hydrolyses to form :

A. PCl_3

B. POCl

C. $POCl_3$

D. H_3PO_3

Answer: C

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154. Bond order is associated with strength of bond and bond length. Higher the bond order smaller will be bond length and stronger will be bond.

Answer the following questions based on above passage:

Arrange the O_2^{2+}, O_2^+, O_2^- and O_2 and O_2^{2-} in order of increasing bond order:

A. $O_2 < O_2^{\prec} O_2^{2-} < O_2^{2+}$

B. $O_2^{2-} < O_2^{\prec} O_2 < O_2^+$

C. $O_2^{\prec} O_2(2-) < O_2^+ < O_2$

D. $O_2^{2-} < O_2^+ < O_2^{\prec} O_2$

Answer: B

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155. Bond order is associated with strength of bond and bond length. Higher the bond order smaller will be bond length and stronger will be bond.

Answer the following questions based on above passage:

Which of the following species has longest O-O bond ?

A. O_2

B. O_2^+

C. O_2^-

D. O_2^{2-}

Answer: D

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156. Which of the following is not correctly matched ?

	Unpaired electrons
(1) O_2	2
(2) O_2^+	1
(3) O_2^-	1
(4) O_2^{2-}	2

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157. Which is not correctly matched ?

	Bond order
(1) CO	3
(2) NO	2.5
(3) B_2	0
(4) O_2^-	1.5

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158. Match Column-I (Molecular/ion) with Column-II (Bond order) and select the correct answer using the codes given below the list:

List-I	List-II
(P) H_2^+	(1) 1
(Q) O_2^+	(2) 0.5
(R) C_2	(3) 2.5
(S) F_2	(4) 2
	(5) 1.5

Codes :

	P	Q	R	S
(1)	2	3	4	1
(2)	1	2	3	4
(3)	2	1	3	5
(4)	5	1	4	2

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159. Which of the following is not correctly matched ?

Bond angle(F-Xe-F)

(1)	XeF_2	180°
(2)	XeF_4	90°
(3)	XeF_6	72°, 90°
(4)	$XeOF_4$	$\approx 90°$

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160. Match Column-I (ions) with Column-II (shapes) and select the correct answer using the codes given below the list:

Column-I		Column-II	
(P)	ICl_2^-	(1)	Linear
(Q)	BrF_2^+	(2)	Pyramidal
(R)	ClF_4^-	(3)	Tetrahedral
(S)	$AlCl_4^-$	(4)	Square planar
		(5)	Angular

Codes :

	P	Q	R	S
(1)	1	5	4	3
(2)	2	1	3	5
(3)	2	3	4	1
(4)	4	3	2	1

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161. Maximum number of replacable hydrogen atom in B_2H_6.

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162. The number of π bonds in crotonaldehyde is

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163. The number of lone pair of electrons present on Xe in XeF_4 is

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164. The maximum possible number of hydrogen bonds in which a water (H_2O) molecule can participate

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165. How many type(s) of bonds is/are present in PCl_5

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166. Explain unusual stability of chloral hydrate though hydrates of aldehyde or ketone are usually unstable.

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167. BCl_3 is planar while NH_3 is pyramidal. Explain.

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168. In XeF_2, Xe is sp^3d hybridized but the shape is linear. Explain

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169. Arrange the following in the order of increasing

dipole moment : H_2O, H_2S, BF_3

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170. Arrange the following in the order of increasing

O, F, S, Cl, N in the order of increasing strength of hydrogen bonding

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171. Arrange the following in the order of increasing

NO_2^+, NO_2^-, NO_3^- in order of increasing N-O bond length.

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172. Arrange the following in the order of increasing

NO, NO^+ and NO^- in the increasing order of bond length.

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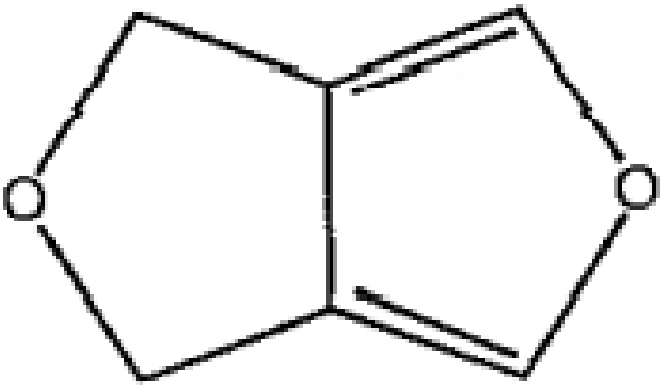
173. Consider the following structure



Find the total number of hybridised orbitals of oxygen in the given structure.

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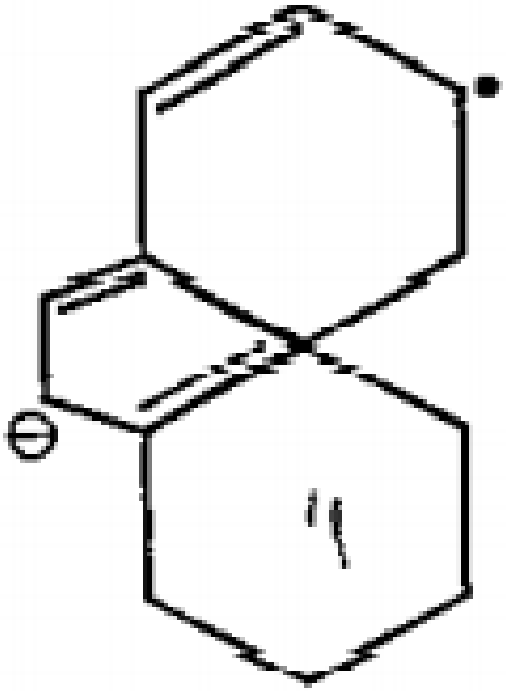
174. Find the total number of π electrons in the following compound.



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175. In methanoic acid, one carbon oxygen bond length is 123 pm and another of 136 pm, but in methanoate ion both carbon-oxygen bond length are same. Explain

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176. Ammonium salts are much more soluble in water than the corresponding sodium salts. Explain.

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177. Amongst o-hydroxybenzalaldehyde and p-hydroxybenzaldehyde which is more soluble in water and why ?

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178. o-nitrophenol is steam volatile but p nitrophenol is not. Explain.

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179. In which of the following solvents, KI has highest solubility ? The dielectric constant (ε) of each liquid is given in parentheses

A. $C_6H_6(\varepsilon = 0)$

B. $(CH_3)_2CO(\varepsilon = 2)$

C. $CH_3OH(\varepsilon = 32)$

D. $CCl_4(\varepsilon = 0)$

Answer: C

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180. Which is the most ionic ?

A. LiF

B. Li_2O

C. Li_3N

D. All same

Answer: A

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181. The correct order of the increasing ionic character is

A. $BeCl_2 < MgCl_2 < CaCl_2 < BaCl_2$

B. $BeCl_2 < MgCl_2 < BaCl_2 < CaCl_2$

C. $BeCl_2 < BaCl_2 < MgCl_2 < CaCl_2$

D. $BaCl_2 < MgCl_2 < CaCl_2 < BeCl_2$

Answer: A

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182. Which of the following pair of elements form a compound with maximum ionic character ?

A. Na and F

B. Cs and F

C. Na and F

D. Cs and I

Answer: B

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183. pπ-dπ back bonding occurs between oxygen and

A. Phosphorous in P_4O_6

B. Chlorine in $HClO_4$

C. Nitrogen in N_2O_5

D. Carbon in CO_2

Answer: B

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184. What is the no. of sigma and pi bonds presents in a molecule of H_2SO_4 ?

A. $6\sigma, 2\pi$

B. $6\sigma, 0\pi$

C. $2\sigma, 4\pi$

D. $2\sigma, 2\pi$

Answer: A

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185. The molecule which contain ionic, covalent and co-ordinate bond is

A. $NaCl$

B. CCl_4

C. NH_4Cl

D. SO_2

Answer: C

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186. Which of the following halides has different bond lengths ?

A. BCl_3

B. CCl_4

C. $BeCl_2$

D. PCl_5

Answer: D

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187. Which of the following is isostructural with NH_3 ?

A. N_3H

B. H_2O

C. NO_2

D. XeO_3

Answer: D

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188. H-B-H bond angle in BH_4^- is

A. 180°

B. 120°

C. 109°

D. 90°

Answer: C

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189. The pair of species having identical shape is

A. CF_4, SF_4

B. PCl_3, BF_3

C. XeF_2, CO_2

D. PCl_5, IF_5

Answer: C

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190. Structure of ICl_2^- is

A. Trigonal

B. Linear

C. Octahedral

D. Square Planar

Answer: B

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191. The shape of sulphate ion is

A. hexagonal

B. square planar

C. trigonal bipyramidal

D. tetrahedral

Answer: D

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192. Which of the following is isoelectronic as well as isostructural with N_2O ?

A. N_3H

B. H_2O

C. NO_2

D. CO_2

Answer: D

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193. Carbon atoms in $C_2(CN)_2$ are:

A. All sp-hybridised

B. sp^3, sp^2, sp-hybridised

C. sp^2, sp, sp^3-hybridised

D. sp, sp^3, sp^2-hybridised

Answer: A

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194. The hybridisation of orbitals of N atom in NO_3^-, NO_2^+ and NH_4^+ are respectively

A. sp, 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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195. Among the following species, identify the isostructural pairs

A. $\left[NF_3, NO_3^-\right]$ and $\left[BF_3, H_3O^+\right]$

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

C. $\left[NF_3, H_3O^+\right]$ and $\left[NO_3^-, BF_3\right]$

D. $\left[NF_3, H_3O^+\right]$ and $\left[HN_3, BF_3\right]$

Answer: C

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196. Molecular shape of SF_4, CF_4 and XeF_4 are

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

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

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

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

Answer: D

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197. CO_2 has the same geometry as:

(a) $HgCl_2$ (b) NO_2

(c) $SnCl_2$ (d) C_2H_2

(1) a and c (2) b and d

(3) a and d (4) c and d

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198. The ONO angle is maximum in :

A. NO_3^-

B. NO_3^+

C. NO_2^-

D. NO_2

Answer: B

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199. Which combination will show maximum polarising power & maximum polarisability ?

A. Mn^{2+}, F^-

B. Mn^{7+}, I^-

C. Mn^{2+}, I^-

D. Mn^{7+}, F^-

Answer: B

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200. Which one of the following arrangements of molecule is correct on the basis of their dipole moments ?

A. $BF_3 > NH_3 > NF_3$

B. $BF_3 > NH_3 > NF_3$

C. $BF_3 > NF_3 > NH_3$

D. $NH_3 > NF_3 > BF_3$

Answer: D

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201. The correct order of dipole moment is

A. $CH_4 < NF_3 < NH_3 < H_2O$

B. $NF_3 < CH_4 < NH_3 < H_2O$

C. $NH_3 < NF_3 < CH_4 < H_2O$

D. $H_2O < NH_3 < NF_3 < CH_4$

Answer: A

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202. Dipole moment is highest for

A. $CHCl_3$

B. CH_4

C. CHF_3

D. CCl_4

Answer: C

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203. The forces of attraction in liquid helium are

A. Ionic

B. Metallic

C. Vander Waals

D. Covalent

Answer: C

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204. The nature of intermolecular forces among benzene (C_6H_6) molecules is

A. dipole-dipole attraction

B. dispersion force

C. ion-dipole attraction

D. hydrogen bonding

Answer: B

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205. The types of bonds present in $CuSO_4 \cdot 5H_2O$ are

A. electrovalent and covalent

B. electrovalent and coordinate covalent

C. covalent and coordinate covalent

D. electrovalent, covalent and coordinate covalent, hydrogen bond

Answer: D

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206. Arrange the following in correct order of solubility in H_2O

(i) $CH_3 - NH_2$

(ii) $(CH_3)_2NH$

(iii) $(CH_3)_3N$

A. $i > ii > iii$

B. $ii > i > iii$

C. $iii > ii > i$

D. $i > iii > ii$

Answer: A

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207. Arrange the following in order of decreasing boiling point

(I) n-Butane

(II) n-Butanol

(III) n-Butyl chloride

(IV) Isobutane

A. $IV > III > II > I$

B. $IV > II > III > I$

C. $I > II > III > IV$

D. $II > III > I > IV$

Answer: D

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208. The formal charge on the central oxygen atom in O_3 molecule is

A. 0

B. +1

C. -1

D. -2

Answer: B

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209. Resonance structures of a molecule do not have:

A. identical arrangement of atoms

B. nearly the same energy content

C. same number of paired electron

D. identical bonding

Answer: D

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210. Which species doesn't exhibit paramagnetism ?

A. N_2^+

B. O_2^-

C. CO

D. NO

Answer: C

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211. Which species contains odd electron bond ?

A. He_2^+

B. N_2

C. CN^-

D. Ne_2

Answer: A

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212. Which of the following molecular orbital has two nodal planes ?

A. σ_{2s}

B. $\pi_{2py}^\star$

C. σ_{2pz}

D. $\sigma_{2px}^\star$

Answer: B

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213. Correct order of bond energy is

A. $N_2 > N_2^+ > N_2^- > N_2^{2-}$

B. $N_2^+ > N_2^- > N_2^{2-} > N_2$

C. $N_2 > N_2 \equiv N_2^+ > N_2^{2-}$

D. $N_2^- > N_2 = N_2^+ > N_2^{2-}$

Answer: A

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

A. KO_2 only

B. NO_2^+ and BaO_2

C. KO_2 and AlO_2^-

D. BaO_2 only

Answer: A

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215. In which species number of lone pair on iodine and number of d-orbitals used in hybridisation by iodine is same ?

A. ICl_2^+

B. ICl_2^-

C. IF_7

D. ICl_4^-

Answer: D

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216. 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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217. Which of the following overlapping results degenerated orbitals in O_2 molecule formation, when Z-axis is internuclear axis ?

(I)$2s - 2s$

(II) $2p_x - 2p_x$

(III) 1s-1s

(IV) $2p_y - 2p_y$

(V)$2p_z - 2p_z$

A. I, III

B. II, V

C. II, IV

D. IV, V

Answer: C

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218. The incorrect order of bond angle :

A. $CO_2 > CO_3^{2-} > CF_2Cl_2$

B. $NO_2^+ > NO_3^- > NO_2^-$

C. $XeF_2 > XeF_4 > XeO_4$

D. $PH_3 > AsH_3 > SbH_3$

Answer: C

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219. In which of the following pairs, the hybridisation of central atoms is same, but geometry is not the same ?

A. SO_3, CO_3^{2-}

B. SO_3^{2-}, NH_3

C. $PCl_5, POCl_3$

D. XeF_2, ICl_3

Answer: D

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220. In a $AB_yL_x(sp^3d$-hybridisation of A) have "T" shaped geometry. What will be the geometry of molecule if A form AB_yL_x type molecule ?

(B=Bond, L=Lone pair)

A. "T" shape

B. Sea-saw

C. T.B.P.

D. Linear

Answer: D

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221. In which of the following molecule/ion there is a coordinate type π-bond is present ?

A. CO

B. NH_4^+

C. BF_4^-

D. All of these

Answer: A

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222. Which among the following attraction is strongest ?

A. $HF - - - - - H_2O$

B. $Na^+ - - - - - Cl - Cl$

C. $H_2O - - - - - Cl - Cl$

D. $Cl - Cl - - - - - Cl - Cl$

Answer: A

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223. In the formation of N_2^+, the electron is lost from :

A. σ-orbital

B. π-orbital

C. $\sigma \star$ -orbital

D. $\pi \star$ -orbital

Answer: A

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224. Which of the following statements is/are correct for lattice energy ?

A. It is directly proportional to charge

B. It is inversely proportional to charge

C. It is inversely proportional to size

D. It is directly proportional to size

Answer: A::C

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225. Which of the following is/are electron deficient compound(s) ?

A. $NaBH_4$

B. B_2H_6

C. $AlCl_3$

D. $LiAlH_4$

Answer: B::C

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226. The species which contain(s) an odd number of valence electrons are paramagnetic is/are

A. NO

B. NO_2

C. ClO_2

D. N_2O_4

Answer: A::B::C

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227. Which is/are linear shape ?

A. ICl_2^-

B. XeF_2

C. I_3^-

D. I_3^+

Answer: A::B::C

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228. Which is true about OF_2 & Cl_2O ?

A. Both are sp^3 hybridised

B. Bond Angle in OF_2 less than $109^\circ 28'$

C. Bond Angle in Cl_2O is greater than $109^\circ 28'$

D. Bond Angle in both cases are $109^\circ 28'$

Answer: A::B::C

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229. Identify the correct option(s)

A. $NH_4^+ > NH_3 > NH_2^-$: order of bond angle

B. $(CH_3)_3B$ is a trigonal planar molecule

C. In NH_4Cl 'N' atom is in sp^3d hybridization

D. In S_8 molecule a total of 16 electrons are left on all the 'S' atoms after bonding

Answer: A::B

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230. Which of the following conduct electricity in the fused state ?

A. $BeCl_2$

B. $MgCl_2$

C. $SrCl_2$

D. $BaCl_2$

Answer: B::C::D

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231. Intramolecular hydrogen bonds occur in

A. 2-chlorophenol

B. salicylic acid

C. the enol form of acetylacetone

D. paranitrophenol

Answer: A::B::C

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232. C_6H_5COOH forms a dimer in benzene solution because of

A. molecular association of benzene which occurs through the intermolecular H-bond

B. the strong van der Waal's force between two molecules of C_6H_5COOH

C. a pair of Carboxylic acid molecules are held by two hydrogen bonds

D. none of these

Answer: A::C

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233. Which of the following is/are correct ?

A. During N_2^+ formation, one electron is removed from the bonding molecular orbitals.

B. During O_2^+ formation, one electron is removed from the antibonding molecular orbitals.

C. During O_2^- formation, one electron each is added to the bonding molecular orbitals.

D. O_2 is paramagnetic in nature

Answer: A::B::D

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234. This question has statement I and Statement II. Of the four choices given after the statements, choose the one that best describes the two Statements.

(1) Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

(2) Statement-I is true, Statement-II is true,Statement-II is not a correct explanation of Statement-I

(3)Statement-I is a true , Statement-II is false

(4) Statement-I is false, Statement-II is true

Statement-I: All F-S-F angles in SF_4 are greater than 90° but less than 180°

Statement-II: The lone pair-lone pair repulsion is greater than pair-bond pair repulsion.

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235. This question has statement I and Statement II. Of the four choices given after the statements, choose the one that best describes the two Statements.

Statement-I: H-S-H bond angle in H_2O is 104.5°

Statement-II: lp-lp repulsion is stronger in H_2S than in H_2O

(1) Statement-I is true, Statement-II is true, Statement-II is a correct

explanation of Statement-I

(2) Statement-I is true, Statement-II is true,Statement-II is not a correct explanation of Statement-I

(3)Statement-I is a true , Statement-II is false

(4) Statement-I is false, Statement-II is true

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236. This question has statement I and Statement II. Of the four choices given after the statements, choose the one that best describes the two Statements.

(1) Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

(2) Statement-I is true, Statement-II is true,Statement-II is not a correct explanation of Statement-I

(3)Statement-I is a true , Statement-II is false

(4) Statement-I is false, Statement-II is true

Statement-I: Na^+ and Al^{3+} are isoelectronic but the magnitude of the ionic radius of Al^3 is less than that of Na^+

Statement-II: The magnitude of the effective nuclear charge on the outer shell electrons in Al^{3+} is greater than that in Na^{+}

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237. This question has statement I and Statement II. Of the four choices given after the statements, choose the one that best describes the two Statements.

(1) Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

(2) Statement-I is true, Statement-II is true,Statement-II is not a correct explanation of Statement-I

(3)Statement-I is a true , Statement-II is false

(4) Statement-I is false, Statement-II is true

Statement-I : LiCl is predominantly a covalent compound.

Statement-II: Electronegativity difference between Li and Cl is too small.

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238. This question has statement I and Statement II. Of the four choices given after the statements, choose the one that best describes the two Statements.

(1) Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

(2) Statement-I is true, Statement-II is true,Statement-II is not a correct explanation of Statement-I

(3)Statement-I is a true , Statement-II is false

(4) Statement-I is false, Statement-II is true

Statement-I: The dipole moment helps to predict whether a molecule is polar or non-polar

Statement-II: The dipole moment helps to predict the geometry of molecules.

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239. This question has statement I and Statement II. Of the four choices given after the statements, choose the one that best describes the two Statements.

(1) Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

(2) Statement-I is true, Statement-II is true,Statement-II is not a correct explanation of Statement-I

(3)Statement-I is a true , Statement-II is false

(4) Statement-I is false, Statement-II is true

Statement-I: Boiling points of cis-isomers are higher than trans-isomers.

Statement-II: Dipole moments of cis isomers are higher than trans-isomers.

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240. This question has statement I and Statement II. Of the four choices given after the statements, choose the one that best describes the two Statements.

(1) Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

(2) Statement-I is true, Statement-II is true,Statement-II is not a correct explanation of Statement-I

(3)Statement-I is a true , Statement-II is false

(4) Statement-I is false, Statement-II is true

Statement-I: The HF_2^- ion exists in the solid state and also in the liquid state but not in aqueous solution.

Statement-II: The magnitude of hydrogen bonds in between HF-HF molecules is weaker than that in between HF and H_2O molecules.

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241. This question has statement I and Statement II. Of the four choices given after the statements, choose the one that best describes the two Statements.

(1) Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

(2) Statement-I is true, Statement-II is true,Statement-II is not a correct explanation of Statement-I

(3)Statement-I is a true , Statement-II is false

(4) Statement-I is false, Statement-II is true

Statement-I: Nitrogen is unreactive at room temperature but becomes

reactive at elevated temperatures (on heating or in the presence of cataalysts).

Statement-II : In nitrogen molecule, there is extensive delocalisation of electrons.

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242. This question has statement I and Statement II. Of the four choices given after the statements, choose the one that best describes the two Statements.

(1) Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

(2) Statement-I is true, Statement-II is true,Statement-II is not a correct explanation of Statement-I

(3)Statement-I is a true , Statement-II is false

(4) Statement-I is false, Statement-II is true

Statement-I : Bond order can assume any value including zero.

Statement-II : Higher the bond order, shorter is the bond length and greater is the bond energy.

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243. This question has statement I and Statement II. Of the four choices given after the statements, choose the one that best describes the two Statements.

(1) Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

(2) Statement-I is true, Statement-II is true,Statement-II is not a correct explanation of Statement-I

(3)Statement-I is a true , Statement-II is false

(4) Statement-I is false, Statement-II is true

Statement-I : B_2 molecule is diamagnetic.

Statement-II: The highest occupied molecular orbital is of π-type.

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244. This question has statement I and Statement II. Of the four choices given after the statements, choose the one that best describes the two

Statements.

(1) Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

(2) Statement-I is true, Statement-II is true,Statement-II is not a correct explanation of Statement-I

(3)Statement-I is a true , Statement-II is false

(4) Statement-I is false, Statement-II is true

Statement 1 : Water is specially effective in screening the electrostatic interactions between the dissolved ions.

Statements 2: The force of ionic interactions depends upon the dielectric constant (ε) of the solvent.

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245. What happens when Cu_2Cl_2 reacts NaOH?

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246. This question has statement I and Statement II. Of the four choices given after the statements, choose the one that best describes the two Statements.

(1) Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

(2) Statement-I is true, Statement-II is true,Statement-II is not a correct explanation of Statement-I

(3)Statement-I is a true , Statement-II is false

(4) Statement-I is false, Statement-II is true

Statement 1 : There are ten valence electrons on the sulphur atom In SF_4 molecule.

Statement 2 : The structure of SF_4 molecule is based on a distorted trigonal bipyramidal.

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247. This question has statement I and Statement II. Of the four choices given after the statements, choose the one that best describes the two

Statements.

(1) Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

(2) Statement-I is true, Statement-II is true,Statement-II is not a correct explanation of Statement-I

(3)Statement-I is a true , Statement-II is false

(4) Statement-I is false, Statement-II is true

Statement 1: The geometry of formaldehyde molecule is trigonal planar.

Statement 2 : In H_2CO molecule, the carbon atom is surrounded by 3 sigma bonding electron pairs.

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248. This question has statement I and Statement II. Of the four choices given after the statements, choose the one that best describes the two Statements.

(1) Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

(2) Statement-I is true, Statement-II is true,Statement-II is not a correct

explanation of Statement-I

(3)Statement-I is a true , Statement-II is false

(4) Statement-I is false, Statement-II is true

Statement 1 : Silicon tetrafluoride, SiF_4 is non polar even though fluorine is much more electronegative than silicon.

Statement 2: The four bond dipoles cancel one another in SiF_4.

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249. This question has statement I and Statement II. Of the four choices given after the statements, choose the one that best describes the two Statements.

(1) Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

(2) Statement-I is true, Statement-II is true,Statement-II is not a correct explanation of Statement-I

(3)Statement-I is a true , Statement-II is false

(4) Statement-I is false, Statement-II is true

Statement 1 : H_2 molecule is more stable than He molecule.

Statement 2: The occupation of antibnding orbitals stabilises the molecules.

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250. This question has statement I and Statement II. Of the four choices given after the statements, choose the one that best describes the two Statements.

(1) Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

(2) Statement-I is true, Statement-II is true,Statement-II is not a correct explanation of Statement-I

(3)Statement-I is a true , Statement-II is false

(4) Statement-I is false, Statement-II is true

Statement 1 : In case the central atom in a molecule is surrounded only by shared pairs of electrons, the molecule has a regular geometry.

Statement 2: The shared pair of electrons repel each other with equal force so all bonds are equidistant from each other.

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251. This question has statement I and Statement II. Of the four choices given after the statements, choose the one that best describes the two Statements.

(1) Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

(2) Statement-I is true, Statement-II is true,Statement-II is not a correct explanation of Statement-I

(3)Statement-I is a true , Statement-II is false

(4) Statement-I is false, Statement-II is true

Statement 1 : The bond order in a molecule can have any value, positive or negative, integral or fractional or zero.

Statement 2 : The bond order of a molecule depends upon the number of electrons in the bonding and antibonding molecular orbitals.

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252. This question has statement I and Statement II. Of the four choices given after the statements, choose the one that best describes the two Statements.

(1) Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

(2) Statement-I is true, Statement-II is true,Statement-II is not a correct explanation of Statement-I

(3)Statement-I is a true , Statement-II is false

(4) Statement-I is false, Statement-II is true

Statement 1 : Fluorine molecule has bond order one .

Statement 2 : The number of electrons in antibonding molecular orbital is two less than that of bonding molecular orbitals.

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253. This question has statement I and Statement II. Of the four choices given after the statements, choose the one that best describes the two Statements.

(1) Statement-I is true, Statement-II is true, Statement-II is a correct explanation of Statement-I

(2) Statement-I is true, Statement-II is true,Statement-II is not a correct explanation of Statement-I

(3)Statement-I is a true , Statement-II is false

(4) Statement-I is false, Statement-II is true

Statement 1 : 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.

Statement 2 : In ice each water molecule forms four hydrogen bonds as each molecule forms four hydrogen bonds as each molecule is fixed in the space.

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254. Quantum mechanical calcuations show that mathematical mixing of certain combinaaation of orbitals in a given atom forms hybrid orbitals. The spatial orientations of these new orbitals lead to more stable bonds and are consistent with the observed molecular shapes . The process of

orbital mixing is called hybridization and the new atomic orbitals are called hybrid orbitals.-

Conditions

(i) The no. of hybrid orbitals equal the number of atomic orbitalsmixed.

(ii)The type of hybrid orbitals obtained varies with the type of atomic orbitals mixed.

Rules to determine hybrid orbitals.

Method i:Count no .of atoms directiy attached to central atom + lone pairs+single electrons.

Method II: Count σ- bonds+co-ordinate bonds+ lone pair+single electrons.

If the number comes one to be

$2 \Rightarrow sp\ 5 \Rightarrow sp^3 \frac{d}{d} sp^3$

$3 \Rightarrow sp^2\ 6 \Rightarrow sp^3 \frac{d^2}{d^2} sp^3$

$4 \Rightarrow s \frac{p^3}{d} sp^2\ 7 \Rightarrow sp^3 d^3$

Answer the following questions based on above passage :

Phosphorous pentachloride in gaseous state exists as a momomer. In solid state, it exists as $PCl_5^+ . PCl_6^-$ ions. The hybrid state of P atom in

PCl_5 is sp^3d. The hybrid state of P atoms in PCl_4^+ and PCl_6^- will be respectively

A. sp^3d, sp^3d^2

B. sp^3, sp^3d

C. sp^3, sp^3d^2

D. sp^3d^2, sp^3d

Answer: C

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255. Quantum mechanical calcuations show that mathematical mixing of certain combinaaation of orbitals in a given atom forms hybrid orbitals. The spatial orientations of these new orbitals lead to more stable bonds and are consistent with the observed molecular shapes . The process of orbital mixing is called hybridization and the new atomic orbitals are called hybrid orbitals.-

Conditions

(i) The no. of hybrid orbitals equal the number of atomic orbitalsmixed.

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Method i:Count no .of atoms directiy attached to central atom + lone pairs+single electrons.

Method II: Count σ- bonds+co-ordinate bonds+ lone pair+single electrons.

If the number comes one to be

$2 \Rightarrow sp\ 5 \Rightarrow sp^3\frac{d}{d}sp^3$

$3 \Rightarrow sp^2\ 6 \Rightarrow sp^3\frac{d^2}{d^2}sp^3$

$4 \Rightarrow s\frac{p^3}{d}sp^2\ 7 \Rightarrow sp^3d^3$

Answer the following questions based on above passage :

Hybrid states of Xe in XeF_2, XeF_4 and XeF_6 respectively are :

A. sp^2, Sp^3d, sp^3d^2

B. sp^3d, sp^3d^2, sp^3d^3

C. sp^3d^2, sp^3d, sp^3d^3

D. sp^2, sp^3, sp^3d

Answer: B

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256. In polyatomic molecules the bond energy of of similar bond may differ due to the difference in the chemical enviornment around central atom. Bond order is given by the numbers of bond between the two atoms in a molecule. Iso electronic molecules and ions will have identical orders. In general as bond orders increases and bond length decreases.

Answer the following question based on above passage :

Which of the following shows maximum bond order ?

A. H_2

B. N_2

C. O_2

D. F_2

Answer: B

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257. In polyatomic molecules the bond energy of of similar bond may differ due to the difference in the chemical enviornment around central atom. Bond order is given by the numbers of bond between the two atoms in a molecule. Iso electronic molecules and ions will have identical orders. In general as bond orders increases and bond length decreases.

Answer the following question based on above passage :

Identify the pair which show similar bond order ?

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

B. O_2^- , N_2

C. O_2^{2-} , F_2

D. F_2, N_2

Answer: C

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258. Match the column-I (ions) with Column-II (shapes) and select the correct answer using the codes given below the lists.

Column-I	Column-II
(A) ICl_2^-	(P) Linear
(B) BrF_2^+	(Q) Angular
(C) ClF_4^-	(R) T-shape
(D) ClF_3	(S) Square planar

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259. Match the column-I (compound) with Column-II (molecular shape) and select the correct answer using the codes given below the lists.

Column-I	Column-II
(A) XeF_4	(P) Tetrahedral
(B) XeO_4	(Q) Square planar
(C) XeO_3	(R) Pyramidal
(D) XeF_6	(S) Distroted octahedral

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260. Match the column-I (species) with Column-II (type of hybridisation) and select the correct answer using the codes given below the lists.

Column-I	Column-II
(A) NO_2^+	(P) sp^3
(B) NO_2^-	(Q) sp^2
(C) NO_2	(R) sp
(D) NO_3^-	(S) dsp^2

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261.

https://d10lpgp6xz60nq.cloudfront.net/physics_images/PAT_CHE_0XI_B05_C11_

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262. The number of $d\pi - p\pi$ bonding in SO_3 molecule

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263. The number of P-P bond in P_4O_{10} is

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264. The number of hybrid orbitals at 120° in BF_3 is

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265. The number of water molecules that are directly bonded with Fe in $FeSO_4.7H_2O$ is

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266. The number of lone pair on central atom in ClF_3

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267. Draw the molecular structures of XeF_2, XeF_4 and XeO_2F_2 indicating the location of lone pair(s) of electrons.

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268. Using VSEPR theory, identify the type of hybridisation and draw the structure of OF_2. What are oxidation states off O and F?

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269. In SF_4 molecule, the lone pair of electrons occupy equatorial position in preference to axial position, why ? Predict shape of the molecule?

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270. Apart from tetrahedral geometry, another possible geometry for CH_4 is square planar with four H atoms at the corners of the square and the C atom at its centre. Explain why CH_4 is not square planar

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271. Arrange the bonds in the order of increasing ionic character in the molecules:

LiF, K_2O, N_2, SO_2 and ClF_3

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272. Calculate the % ionic character in HCI molecule. Given bond length of HCI is 1.275 A and $\hat{} \mu HCl = 1.03$ debye.

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273. The dipole moment of LiH is 1.964×10^{-29} Cm and the intermolecular distance between Li and H is 1.596 A. What is percentage of ionic character in the molecule?

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274. A diatomic molecule has a dipole moment equal to 1.2.D. If bond distance is $1.0\overset{\circ}{A}$, what fraction of electronic charge 'e' exists on each atom?

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275. The intermolecular interaction that is dependent on the inverse cube of distance between the molecules is

A. ion-dipole interaction

B. London force

C. Hydrogen bond

D. ion-ion interaction

Answer: C

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276. The number of lone pair of electrons on the central atoms of H_2O, $SnCl_2$, PCl_3, and XeF_2 respectively, are

A. 2,1,1,3

B. 2,2,1,3

C. 3,1,1,2

D. 2,1,2,3

Answer: A

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277. In the following compound, the number of 'sp' hybridisation carbon is

CH2=C=CH−CH(CN)−C≡CH

A. 2

B. 3

C. 4

D. 5

Answer: C

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278. Decreasing stability of O_2, O_2^-, O_2^{2+} and O_2^{-2}

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

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

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

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

Answer: A

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279. Hydrogen bonding does not play a central role in the following phenomena

A. Ice floats in water

B. Higher Lewis basicity of primary amines than tertiary amines in aqueous solutions

C. Formic acid is more acidic than acetic acid

D. Dimerisation of acetic acid in benzene

Answer: C

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280. A list of species having the formula XZ_4 is given below

$XeF_4, SF_4, SiF_4, BF_4^-, BiF_4^-, \left[Cu(NH_3)_4\right]^{2+}, [FeCl_4\}^{2-}$ and $[PtCl_4]^{2-}$

Defining shape on the basis of the location of X and Z atoms, the total number of species having a square planar shape is

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281. Which one of the following properties is not shown by NO ?

A. It is diamagnetic in gaseous state

B. It is a neutral oxide

C. It combines with oxygen to form nitrogen dioxide

D. It's bond order is 2.5

Answer: B::C::D

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282. The hydrides of the elements in groups 15-17 namely NH_3, H_2O and HF respectively show abnormally high values for melting and boiling points. This is due to

A. small size of N, O and F

B. the ability to form extensive intermolecular H-bonding

C. the ability to form extensive intramolecular H- bonding

D. effective van der walls interaction

Answer: C

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283. In case of heteronuclear diatomics of the type AB, where A is more electronegative than B, bonding molecular orbital resembles the character of A more than that of B. The statement

A. is false

B. is true

C. can not be evaluated since data is not sufficient

D. is true only for certain systems

Answer: C

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284. The bond angle in NF_3 (102.3°) is smaller than NH_3 (107.2°). This is because of

A. large size of F compared to H

B. large size of N compared to F

C. opposite polarity of N in the two molecules

D. small size of H compared to N

Answer: C

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285. The structure of XeF_6 is experimentally determined to be distorted octahedron. Its structure according to VSEPR theory is

A. Octahedral

B. Trigonal bipyramid

C. Pentagonal bipyramid

D. Tetragonal bipyramid

Answer: C

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

A. N_3^-

B. NO_3^-

C. NO_2^-

D. CO_2

Answer: B

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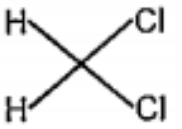
287. The compound that will have a permanent dipole moment among the following is



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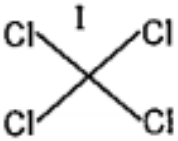
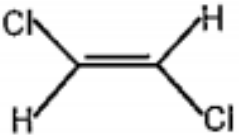
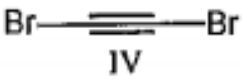


III



II



IV

A. I

B. II

C. III

D. IV

Answer: A

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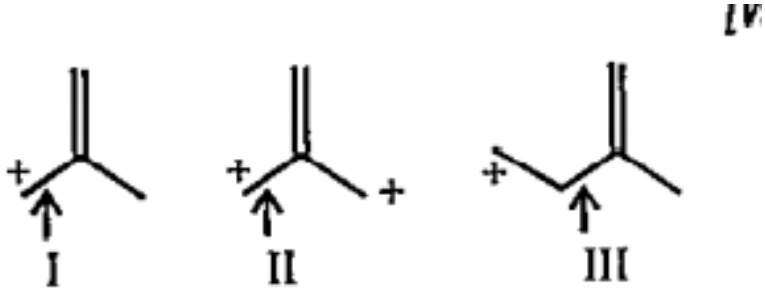
288. The correct order of decreasing length of the bond as indicated by the arrow in the following structures is



A. $I > II > III$

B. $II > I > III$

C. $III > II > I$

D. $I > III > II$

Answer: C

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289. The pair of compounds having identical shapes for their molecules is

A. CH_4, SF_4

B. BCl_3, CIF_3

C. $XeF_2, ZnCl_2$

D. SO_2, CO_2

Answer: C

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290. The correct arrangement of the species in the decreasing order of the bond length between carbon and oxygen in them is

A. $CO, CO_2, HCO_2^-, CO_3^{2-}$

B. $CO_2, CO, CO_3^{2-}, HCO_2^-$

C. $CO_3^{2-}, HCO_2^- {}^C O_2, CO$

D. $CO, CO_3^{2-}, CO_2HCO_2^-$

Answer: C

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291. Which of the following is the correct order for strength of C-X bond ?

A. $CH_3F < CH_3Cl < CH_3Br < CH_3I$

B. $CH_3F > CH_3Cl > CH_3Br > CH_3I$

C. $CH_3I > CH_3F > CH_3Cl > CH_3Br$

D. $CH_3Cl > CH_3Br > CH_3F > CH_3I$

Answer: B

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292. What is the geometry of molecule of bromine penta fluoride ?

A. Square planar

B. Trigonal bipyramidal

C. Square Pyramidal

D. Octahedral

Answer: C

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

A. F_2

B. O_2

C. Be_2

D. Li_2

Answer: C

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294. The bond order in the superoxide ion $\left(O_2^-\right)$ is

A. 2.5

B. 2

C. 1.5

D. 1

Answer: C

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295. The ion which is not tetrahedral in shape is

A. BF_4^-

B. NH_4^+

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

D. $NiCl_4^{2+}$

Answer: C

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296. Dipole-induced dipole interactions are present in which of the following pairs ?

A. H_2O and alcohol

B. Cl_2 and CCl_4

C. HCl and He atoms

D. SiF_4 and He atoms

Answer: C

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297. Which one of the following molecules contain no π-bond ?

A. CO_2

B. H_2O

C. SO_2

D. NO_2

Answer: B

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298. Which one of the following is paramagnetic?

A. CO

B. O_2^-

C. CN^-

D. NO^+

Answer: B

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299. Geometry of SF_2Cl_2 molecule is

A. tetrahedral

B. octahedral

C. squre pyramidal

D. trigonal bipyramidal

Answer: D

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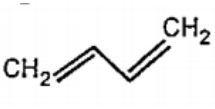
300. Which of the following represents the given mode of hybridisation $sp^2 - sp^2 - sp - sp$ from left to right ?

A. $H_2C = CH - C \equiv CH$

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

C. $H_2C = C = C = CH_2$

D. 

Answer: A

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301. Which of the following is least stable ?

A. Li^-

B. Be^-

C. B^-

D. C^-

Answer: B

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302. Which of the following will have the maximum dipole moment

A. CH_3F

B. CH_3Cl

C. CH_3Br

D. CH_3I

Answer: B

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303. The volume of oxygen liberated 0.68 g of H_2O_2 is

A. 112 mL

B. 224 mL

C. 56 mL

D. 336 mL

Answer: B

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304. The number of π-bond in

$CH_2 = CH - CH = CH - C \equiv CH$ is

A. 2

B. 5

C. 4

D. 3

Answer: C

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305. Hydrogen bonding is maximum in

A. ethyl chloride

B. triethyl amine

C. ethanol

D. diethyl ether

Answer: C

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306. Covalent compounds have low melting point because

A. covalent molecules are held by weak van der Waals' force of attraction

B. covalent bond is less exothermic

C. covalent bond is weaker than ionic bond

D. covalent molecules have definite shape

Answer: C

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307. The valency of noble gases is

A. 1

B. 2

C. 0

D. 3

Answer: C

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308. The shape of IF_5 is

A. pentagonal bipyramidal

B. square pyramidal

C. Octahedral

D. trigonal planar

Answer: B

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309. The number of double bonds in gammexane is

A. 0

B. 1

C. 2

D. 3

Answer: A

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

A. $10\sigma, 3\pi$

B. $10\sigma, 2\pi$

C. $9\sigma, 3\pi$

D. $11\sigma, 2\pi$

Answer: A

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311. The hybridisation present in IF_3 is

A. sp^3d

B. sp^3

C. sp^3d^2

D. sp^3d^3

Answer: A

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

A. two unpaired electrons in π_b MO

B. two unpaired electrons in $\pi^\star$ MO

C. two unpaired electrons in $\sigma^\star$ MO

D. two unpaired electrons in σ_b MO

Answer: A

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313. CO is practically non-polar since

A. the σ-electron drift from C to O is almost nullified by the π- electron drift from O to C

B. the σ-electron drift from C to O is almost nullified by the π- electron drift from C to O

C. the bond moment is low

D. there is triple bond between C to O

Answer: A

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314. The state of hybridisation of the central atom and the number of lone pairs over the central atom in $POCl_3$ are

A. sp, 0

B. sp^2, 0

C. sp^3, 0

D. $dsp^2, 1$

Answer: C

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315. The molecule having smallest bond angle is

A. NCl_3

B. $AsCl_3$

C. $SbCl_3$

D. PCl_3

Answer: C

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

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

B. PCl_4^+ and $SiCl_4$

C. PF_3 and BrF_5

D. AlF_6^{3-} and SF_6

Answer: C

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317. The hydrogen bonds are encountered in HF, H_2O, NH_3 and HF_2^- .

The relative order of energies of hydrogen bonds is

A. $HF > H_2O > NH_3 > HF_2^-$

B. $H_2O^- > HF_2^- > HF > NH_3$

C. $HF > HF_2^- > H_2O > NH_3$

D. $HF_2^- > HF > H_2O > NH_3$

Answer: D

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318. The polarizability of the following anions, N^{3-}, O^{2-} and F^{-}, follow the order

A. $N^{3-} > F^{-} > O^{2-}$

B. $O^{2-} > N^{3-} > F^{-}$

C. $O^{2-} > F^{-} > N^{3-}$

D. $N^{3-} > O^{2-} > F^{-}$

Answer: D

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319. As per molecular orbital theory, which can't exist in stable state ?

A. H_2

B. H_2^+

C. H_2^-

D. He_2

Answer: D

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320. Which of the following forms stable coordinate bonds ?

A. NH_3, H_2O

B. NH_3, BF_3

C. $NaOH, HCl$

D. BF_3, BCl_3

Answer: B

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321. An element forms X_2 with triple bond. The configuration of the element is

A. $1s^2, 2s^2$

B. $1s^2, 2s^2, 2p^5$

C. $1s^2, 2s^2, 2p^2$

D. $1s^2, 2s^2, 2p^3$

Answer: D

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322. The molecule which contain ionic, covalent and co-ordinate bond is

A. NaCl

B. NaCN

C. NaNC

D. NaOH

Answer: C

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323. The percentage of p-character of the hybrid orbitals in graphite and diamond are respectively

A. 50 and 75

B. 67 and 75

C. 33 and 75

D. 33 and 25

Answer: B

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324. Which of the following order for bond angles is correct ?

A. $BF_3 > NF_3 < PF_3 < CIF_3$

B. $BF_3 > NF_3 < PF_3 > CIF_3$

C. $CIF_3 < PF_3 < NF_3 < BF_3$

D. $BF_3 \approx NF_3 < PF_3 < CIF_3$

Answer: C

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325. Which of the following is diamagnetic ?

A. H_2

B. H_2^-

C. H_2^+

D. He_2^+

Answer: A

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326. A diatomic molecule has a dipole moment equal to 1.2.D. If bond distance is $1.0\overset{\circ}{A}$, what fraction of electronic charge 'e' exists on each atom?

A. $25\ \%$ of e

B. $50\ \%$ of e

C. $60\ \%$ of e

D. $75\ \%$ of e

Answer: A

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327. Bond polarity of diatomic molecule is because of

A. Difference in electron affinites of two atoms

B. Difference in electronegativities of two atoms

C. Difference in ionisation potentials

D. All of the above

Answer: B

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328. Which one of the following pairs is isostructural (i.e., having the same shape and hybridisation) ?

A. [BCl_3 and $BrCl_3$]

B. [NH_3 and NO_3^-]

C. [NF_3 and BF_3]

D. [BF_4^- and NH_4^+]

Answer: D

Watch Video Solution

329. 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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330. Which of the following species contains three bond pairs 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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331. The pair of species with the same bond order is

A. O_2^+ , B_2

B. O_2^+ , NO^+

C. NO+ , CO

D. N_2, O_2

Answer: A

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332. During change of O_2 to O_2^- ion, the electron adds on which one of the following orbitals ?

A. π^*-orbital

B. π-orbital

C. σ^*-orbital

D. σ-orbital

Answer: A

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333. Four diatomic species are listed below. Identify the correct order in which the bond order is increasing in them

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

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

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

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

Answer: D

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334. The C-H bond and C-C bond in ethane are formed by which of the following types of overlap ?

A. $sp^2 - s$ and $sp^2 - sp^2$

B. $sp^2 - s$ and sp-sp

C. p-s and p-p

D. $sp^3 - s$ and $sp^3 - sp^3$

Answer: D

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335. Which of the following is not the characteristic of a covalent compound ?

A. No definite geometry

B. Insoluble in polar solvent

C. Small difference in electronegativity between the combining atoms

D. low melting point

Answer: A

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336. Which of the following forms stable coordinate bonds ?

A. NH_3, H_2O

B. NH_3, BF_3

C. $NaOH$

D. BF_3, BCl_3

Answer: B

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337. Hybridisation of C-1 and C-2 in the compound $CH_2 = \overset{2}{C}H - \overset{1}{C} \equiv N$ are

A. sp^2, sp

B. sp, sp^2

C. sp, sp

D. sp^3, sp^2

Answer: B

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338. All the four sigma bonds in perchlorate ion are

A. $sp^3 - sp^3$ bond

B. sp^3-p bond

C. $sp^2 - sp^2$ bond

D. sp^2-p bond

Answer: B

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339. In $XeOF_2$ molecule, the hybridisation of Xe orbitals is

A. sp^3d^3

B. sp^3d^2

C. sp^3d

D. sp^3

Answer: C

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340. Which molecule or ion out of the following does not contain unpaired electrons ?

A. `O_2^(2-)

B. B_2

C. N_2^+

D. O_2

Answer: A

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341. Which of the following is not tetrahedral ?

A. BF_4^-

B. NH_4^+

C. CO_3^{2-}

D. SO_4^{2-}

Answer: C

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342. During the formation of a chemical bond

A. Electron-electron repulsion becomes more than the nucleus-electron attraction

B. Energy of the system does not change

C. Energy increases

D. Energy decreases

Answer: D

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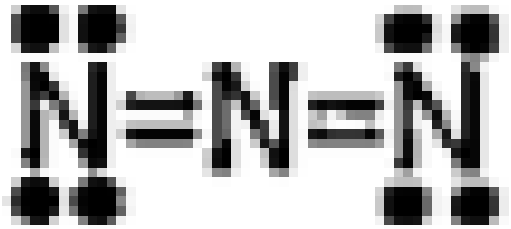
343. In the following electron-dot structure, calculate the formal charge from left to right nitrogen atom:



A. $-1,\ -1,\ +1$

B. $-1,\ +1,\ -1$

C. $+1,\ -1,\ -1$

D. $+1,\ -1,\ +1$

Answer: B

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344. Hybridisation of C_2 and C_3 of

$H_3C - C_{(2)}H = C_{(3)} = CH - CH_3$ are

A. $sp,\ sp^3$

B. sp^2, sp

C. sp^2, sp^2

D. sp, sp

Answer: B

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345. Which of the following Vitamin deficiency causes Beri-Beri?

A. (A)$Vita\ \min\ A$

B. (B)$Vita\ \min\ B_1$

C. (C)$Vita\ \min\ K$

D. (D)$Vita\ \min\ C$

Answer: C

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346. Which one of the following is paramagnetic?

A. N_2

B. NO

C. CO

D. O_3

Answer: B

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

A. $FeCl_2$

B. $SnCl_2$

C. $AlCl_3$

D. $MgCl_2$

Answer: C

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348. The hybridisation of orbitals of N atom in NO_3^-, NO_2^+ and NH_4^+ are respectively

A. sp, sp^2, sp^3

B. sp^2, sp, sp^3

C. sp, sp^3, sp^2

D. sp^2, sp^3, sp

Answer: B

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349. The structure of IF_7 is

A. square pyramidal

B. trigonal bipyramidal

C. Octahedral

D. pentagonal bipyramidal

Answer: D

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350. Which of the following has maximum number of lone pairs associated with Xe?

A. XeO_3

B. XeF_4

C. XeF_6

D. XeF_2

Answer: D

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351. The number of types of bonds between two carbon atoms in calcium carbide is

A. one sigma, two pi

B. one sigma, one pi

C. two sigma, one pi

D. two sigma, two pi

Answer: A

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352. Number of non-bonding electron pair on Xe in XeF_6, XeF_4 and XeF_2 respectively will be

A. 6,4,2

B. 1,2,3

C. 3,2,1

D. 0,3,2

Answer: B

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353. The number of sigma (σ) and pi (π) covalent bonds respectively in benzene nitrile are

A. 5, 13

B. 15, 3

C. 13, 5

D. 16, 2

Answer: C

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354. Hybridisation shown by carbon and oxygen of -OH group in phenol are respectively

A. sp^2, sp^2

B. sp^3, sp^3

C. sp, sp^2

D. sp^2, sp^3

Answer: A

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355. Intramolecular hydrogen bond is present in

water

o-nitrophenol

p-nitrophenol

methylamine

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356. Which of the following is not correct with respect to bond order of the species?

$C_2 > C_2^{2-}$

$B_2^+ > B_2, Li_2^+ > Li_2$

$N_2^+ > N_2$

$O_2 > O_2^-$

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357. When O_2 is converted into O_2^+

A. both paramagnetic character and bond order increases

B. bond order decreases

C. paramagnetic character increases

D. paramagnetic character decreases and the bond order increases

Answer: D

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

A. $C-H<C-O<C-C<C=C$

B. $C-H<C=C<C-O<C-C$

C. $C-C<C=C<C-O<C-H$

D. $C-O<C-H<C-C<C=C$

Answer: B

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359. Considering the state of hybridisation of carbon atoms, find out the molecule among the following which is linear?

A. $CH_3 - CH_2 - CH_2 - CH_3$

B. $CH_3 - CH = CH - CH_3$

C. $CH_3 - C = C - CH_3$

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

Answer: C

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360. Which of the two ions from the list given below that have the geometry that is explained by the same hybridisation 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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361. The geometry of electron pairs around I in IF_5 is

A. Octahedral

B. Trigonal bipramidal

C. Square pyramidal

D. Pentagonal planar

Answer: C

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362. The covalent bond length is the shortest in which one of the following bonds?

$C - O$

$C - C$

$C \equiv N$

$O - H$

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363. Among the follwing molecules: SO_2, SF_4, CIF_3, BrF_5 and XeF_4 Which of the following shapes does not describe any of the molecules mentioned?

Bent

Trigonal bipyramidal

See-saw

T-shape

Square pyramidal

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364. Hybridisation shown by carbon and oxygen of -OH group in phenol are respectively.

A. sP^2, sp^2

B. sp^3, sp^3

C. sp, sp^2

D. sp^2, sp^3

Answer: D

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365. The correct decreasing order of the dipole moment in CH_3Cl, CH_3Br and CH_3F is

A. $CH_3F > CH_3Cl > CH_3Br$

B. $CH_3 > CH_3Br > CH_3Cl$

C. $CH_3Cl > CH_3F > Ch_3Br$

D. $CH_3Cl > CH_3Br > CH_3F$

Answer: C

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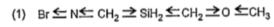
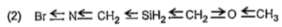
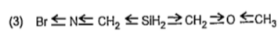
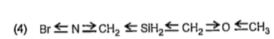
366. In the given structure of a compound, the correct various bond moment direction involving are shown as

A. (1) 

B. (2) 

C. (3) 

D. (4) 

Answer: C

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367. The typical range of molar enthalpies for the strongest intermolecular (hydrogen) bond is

A. 200-300 kJ

B. 300-500 Kj

C. 4-25 kJ

D. None of these

Answer: C

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368. When O_2 is converted into O_2^+

A. both paramagnetic character and bond order increases

B. bond order decreases

C. paramagnetic character increases

D. paramagnetic character decreases and the bond order increases

Answer: D

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369. The hydrogen bond is shortest in

$S - H - S$

$N - H - O$

$S - H - O$

$F - H - O$

$F - H_F$

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370. Among the triatomic molecules/ions, $BeCl_2, N_3^-, N_2O, NO_2^+, O_3, SCl_2^-, ICI_2^-, I_3^-$ and XeF_2 the total number of linear molecules(s)/ion(s) where the hybridizaation of the central atom does not have contribution from the d-orbital(s) is

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371. When O_2 is absorbed on a metallic surface, electron tansfer occurs from the metal to O_2 . The True statement (s) regarding the absorption is

(are)

A. O_2 is physisorbed

B. Heat is released

C. Occupancy, of π_{2p} of O_2 is increased

D. Bond length of O_2 is increased

Answer: B::C::D

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372. The total number of lone-pairs of electrons in melamine is

A. 4

B. 7

C. 6

D. 9

Answer: C

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373. The shape of XeO_2F_2 molecule is

A. trigonal bipyramidal

B. square planar

C. tetrahedral

D. see-saw

Answer: D

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374. The value of n in the molecular formula $Be_nAl_2Si_6O_{18}$ is

A. 1

B. 2

C. 3

D. 4

Answer: C

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