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Unit 10 Chemical Bonding

Evaluation

I. Choose the best answer.

1. In which of the following Compounds does the central atom obey the octet rule?
   a) XeF_4 b) $AlCl_3$
   c) SF_6 d) SCl_2

2. In the molecule $O_A = C = O_B$, the formal charge on O_A, C and O_B are respectively.
   a) -1, 0, + 1 b) +1, 0, -1
   c) -2,0,+2 d) 0,0,0

3. Which of the following is electron deficient?
   a) PH_3 b) $(CH_3)_2$
   c) BH_3 d) NH_3

4. Which of the following molecule contain no π bond?
   a) SO_2 b) NO_2
   c) CO_2 d) H_2O

5. The ratio of number of sigma (σ) and pi (π) bonds in 2- butynal is
   a) 8/3 b) 5/3
   c) 8/2 d) 9/2

6. Which one of the following is the likely bond angles of sulphur tetrafluoride molecule?
   a) 120°,80° b) 109°.28
   c) 90° d) 89°,117°

7. **Assertion:** Oxygen molecule is paramagnetic.
   Reason : It has two unpaired electron in its bonding molecular orbital
   a) both assertion and reason are true and reason is the correct explanation of assertion
   b) both assertion and reason are true but reason is not the correct explanation of assertion
   c) assertion is true but reason is false
   d) Both assertion and reason are false

8. According to Valence bond theory, a bond between two atoms is formed when
   a) fully filled atomic orbitals overlap
   b) half filled atomic orbitals overlap
   c) non- bonding atomic orbitals overlap
   d) empty atomic orbitals overlap

9. In ClF_3 ,NF_3 and BF_3 molecules the chlorine, nitrogen and boron atoms are
   a) sp^3 hybridised
   b) sp^3 ,sp^3 and sp^2 respectively
   c) sp^2 hybridised
   d) sp^3d, sp^3 and sp^2 hybridised respectively

10. When one s and three p orbitals hybridise,
    a) four equivalent orbitals at 90° to each other will be formed
    b) four equvivalent orbitals at 109° 28' to each other will be formed.

c) four equivalent orbitals, that are lying the same plane will be formed

d) none of these

11. Which of these represents the correct order of their increasing bond order.

a) $C_2 < C_2^{2-} < O_2^{2-} < O_2$

b) $C_2^{2-} < C_2^{+} < O_2 < O_2^{2-}$

c) $O_2^{2-} < O_2 < C_2^{2-} < C_2^{+}$

d) $O_2^{2-} < C_2^{+} < O_2 < C_2^{2-}$

12. Hybridisation of central atom in PCl_5 involves the mixing of orbitals.

a) s, p_x, p_y, d_{x2}, d_{x2-y2}

b) s, p_x, p_y, p_{xy}, d_{x2-y2}

c) s, p_z, p_y, p_x, d_{x2-y2}

d) s, p_x, p_y, d_{xy}, d_{x2-y2}

13. The correct order of O-O bond length in hydrogen peroxide, ozone and oxygen is

a) $H_2O_2 > O_3 > O_2$

b) $O_2 > O_3 > H_2O_2$

c) $O_2 > H_2O_2 > O_3$

d) $O_3 > O_2 > H_2O_2$

14. Which one of the following is diamagnetic.?

a) O_2 b) O_2^{2-}

c) O_2^{+} d) None of these

15. Bond order of a species is 2.5 and the number of electons in its bonding molecular orbital is formd to be 8 The no. of electons in its antibonding molecular orbital is

a) three b) four

c) Zero d) can not be calculated from the given information.

16. Shape and hybridisation of IF_5 are

a) Trigonal bipyramidal, Sp^3d^2

b) Trigonal bipyramidal, Sp^3d

c) Square pyramidal, Sp^3d^2

d) Octahedral, Sp^3d^2

17. Pick out the incorrect statement from the following

a) Sp^3 hybrid orbitals are equivalent and are at an angle of 109^0 28' with eachother

b) dsp^2 hybrid orbitals are equivalent and bond angle between any two of them is 90^0

c) All five sp^3d hybrid orbitals are not equivalent out of these five sp^3d hybrid orbitals, three are at an angle of 120^0, remainir two are perpendicular to the plane containing the other three

d) none of these

18. The molecules having same hybridisation, shape and number of lone pairs of electons are

a) SeF_4, XeO_2F_2 b) SF_4, XeF_2

c) $XeOF_4$, TeF_4 d) $SeCl_4$, XeF_4

19. In which of the following molecules / ions BF_3, NO_2^-, H_2O the central atom is sp^2 hybridised?

a) NH_2^- and H_2O

b) NO_2^- and H_2O

c) BF_3 and NO_2^-

d) BF_3 and NH_2^-

20. Some of the following properties of two species, NO_3^- and H_3O^+ are described below. which one of them is correct?

a) dissimilar in hybridisation for the central atom with different structure.

b) isostructural with same hybridisation for the Central atom.

c) different hybridiration for the central atom with same structure

d) none of these

21. The types of hybridiration on the five carbon atom from right to left in the, 2,3 pentadiene.

a) $sp^3, sp^2, sp, sp^2, sp^3$

b) sp^3, sp, sp, sp, sp^3

c) $sp^2, sp, sp^2, sp^2, sp^3$

d) $sp^3, sp^3, sp^2, sp^3, sp^3$

22. XeF_2 is isostructural with

a) $SbCl_2$ b) $BaCl_2$

c) TeF_2 d) ICl_2^-

23. The percentage of s-character of the hybrid orbitals in methane, ethane, ethene and ethyne are respectively

a) 25, 25,33.3,50

b) 50,50,33.3,25

c) 50,25,33.3,50

d) 50,25,25,50

24. Of the following molecules, which have shape similar to carbon dioxide?

a) $SnCl_2$ b) NO_2

c) C_2H_2 d) All of these.

25. According to VSEPR theory, the repulsion between different parts of electrons obey the order.

a) l.p – l.p > b.p–b.p> l.p–b.p

b) b.p–b.p> b.p–l.p> l.p–b.p

c) l.p–l.p> b.p–l.p > b.p–b.p

d) b.p–b.p> l.p–l.p> b.p–l.p

26. Shape of ClF_3 is

a) Planar triangular

b) Pyramidal

c) 'T' Shaped

d) none of these

27. Non- Zero dipole moment is shown by

a) CO_2

b) p-dichlorobenzene

c) carbontetrachloride

d) water.

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

a) the contributing structure must have the same number of unpaired electrons

b) the contributing structures should have similar energies

c) the resonance hybrid should have higher energy than any of the contributing structure.

d) none of these

29. Among the following, the compound that contains, ionic, covalent and Co-ordinate linkage is

a) NH_4Cl b) NH_3

c) NaCl d) none of these

30. CaO and NaCl have the same crystal structure and approximately the same radii. It U is the lattice energy of NaCl, the approximate lattice energy of CaO is

a) U b) 2U c) U/2 d) 4U