


Chapter 2

CHEMICAL BONDING AND MOLECULAR STRUCTURE



INTRODUCTION

1. In general, the highest/lowest electronegative element occupies the central position.
2. Formal charge (F.C.) charge formula is -
3. Formal charge indicates real charge separation within the molecule. T/F
4. Generally the lowest energy structure is the one with the highest/smallest formal charge.
5. Difference bt. Van der wall and covalent radius is -
6. Bond angle of water is -
7. Isoelectronic molecules have identical bond orders. T/F
8. In resonance, the molecule exists for a certain fraction of time in one canonical form and for other fractions of time in other canonical forms. T/F
9. Dipole moment = $A \times B$. Tell A and B.
10. $|D| = \text{_____ Cm}$
11. In chemistry, the dipole moment direction is from +ve to -ve. T/F
12. The smaller the size of cation, greater will be the covalent character. T/F
13. The larger the size of anion, smaller will be the covalent character. T/F
14. The greater charge on cation means greater covalent character. T/F
15. Transition metals are more polarising than alkali and alkaline earth metals. T/F
16. Greater the polarizability of anion, lesser the covalent character. T/F

VSEPR

17. lp-lp repulsion is less than lp-bp repulsion. T/F (NEET)
18. Ex. of molecules with T-shape -
19. BrF_5 shape is -
20. Bond angle in NH_3 is-
21. SF_4 most stable shape is -
22. Most stable structure of ClF_3 is _____ shaped.

HYBRIDISATION

23. Extent of p-p overlapping is more than s-s overlapping. T/F
24. Angle in sp^2 hybridisation - (NEET)

25. Angle is sp^3 hybridisation - (NEET)
26. The energies of 3p and 4s are comparable. T/F
27. Hybridisation in $[Ni(CN)_4]^{2-}$ -
28. Hybridisation in SF_6 -
29. Hybridisation in BrF_5 -
30. Hybridisation in $[CrF_6]^{3-}$ -
31. Axial bond pairs suffer more repulsive interaction from the equatorial bond pairs. T/F

MOT & HYDROGEN BONDING

32. Energy of σ_{2pz} molecular orbital is higher than that of π_{2px} and π_{2py} molecular orbitals in C_2 . T/F
33. C_2 exists. T/F
34. Bond order of C_2 -
35. In C_2 , one bond is sigma, and the other is pie. T/F
36. Bond order of Li_2 -
37. 2s-2p mixing is present in -
38. 2s-2p mixing is absent in -
39. B_2 , C_2 , N_2 order of e- filling is - (NEET)
40. O_2 , F_2 , Ne_2 order of e- filling is - (NEET)
41. Hydrogen bonding is seen b.t. H and - (3)
42. H bonding is maximum in the solid state and minimum in the gaseous state. T/F
43. Intramolecular H bonding is seen in -
44. B_2 is diamagnetic/paramagnetic. T/F
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ANSWERS

• INTRODUCTION

1. Lowest
2. total number of valence electrons in the free atom
- total number of non bonding (lone pair) electrons
- (1/2) total number of bonding (shared) electrons
3. F
4. Smallest
5. Covalent radius is the radius of an atom's core which is in contact with the core of an adjacent atom in a bonded situation. van der Waals radius represents the overall size of the atom which includes its valence shell in a nonbonded situation
6. 104.5°
7. T
8. F
9. Charge \times distance
10. 3.33564×10^{-30} Cm
11. T
12. T
13. F
14. T
15. T
16. F

• VSEPR

17. F
18. ClF_3
19. Square pyramidal
20. 107°

21. See-saw

22. T-shaped

• HYBRIDISATION

23. T
24. 120°
25. 109.5°
26. F
27. dsp^2
28. sp^3d^2
29. sp^3d^2
30. D_{2sp^3}
31. T

• MOT

32. T
33. T
34. 2
35. F, both the bonds are pie bonds
36. 1
37. B_2 , C_2 , N_2
38. O_2 , F_2 , Ne_2
39. $\sigma_{1s} < \sigma_{1s}^* < \sigma_{2s} < \sigma_{2s}^* < (\pi_{2px} = \pi_{2py}) < \sigma_{2pz} < (\pi_{2px}^* = \pi_{2py}^*) < \sigma_{2pz}^*$
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41. F, O, N
42. T
43. ortho-nitrophenol
44. paramagnetic