

VSEPR and Hybridization

17. According to the VSEPR theory, the arrangement of lone pairs of an atom containing a total of four such pairs is
(a) linear (b) tetrahedron (c) square planar (d) octahedron
18. According to the VSEPR theory, the arrangement of lone pairs of an atom containing a total of three such pairs is
(a) linear (b) trigonal planar (c) tetrahedron (d) octahedron
19. According to the VSEPR theory, the arrangement of lone pairs of an atom containing a total of five such pairs is
(a) trigonal planar (b) tetrahedron (c) trigonal bipyramidal (d) octahedron
20. According to the VSEPR theory, the molecule IF_5 which contains 5 bonding pairs and one lone pair has a shape of
(a) tetrahedron (b) trigonal bipyramid (c) pentagonal bipyramid (d) octahedron
21. Hybridization involves
(a) the mixing up of atomic orbitals centred on different atoms
(b) the mixing up of atomic orbitals centred on the same atom
(c) removal of an electron pair
(d) addition of an electron pair
22. The bonding of S with Cl in SCl_4 molecule involves
(a) sp orbitals (b) sp^2 orbitals (c) sp^3 orbitals (d) sp^3d orbitals
23. The geometry arrangement of CN groups around Ni in $[\text{Ni}(\text{CN})_4]^{2-}$ is
(a) tetrahedron (b) square planar (c) trigonal bipyramid (d) octahedron
24. The geometry arrangement of F atoms around P in PF_5 is
(a) tetrahedron (b) square planar (c) trigonal bipyramid (d) octahedron
25. The geometrical arrangement of NH_3 groups around Co in $[\text{Co}(\text{NH}_3)_6]^{3+}$ is
(a) tetrahedron (b) square planar (c) trigonal bipyramid (d) octahedron
26. The sp^3d hybridization of central atom of a molecule would lead to
(a) square planar geometry (b) tetrahedral geometry
(c) trigonal bipyramidal geometry (d) octahedral geometry
27. The sp^3d^2 hybridization of central atom of a molecule would lead to
(a) square planar geometry (b) trigonal bipyramidal geometry
(c) tetrahedral geometry (d) octahedral geometry
28. The bond angle in PH_3 is expected to be
(a) 90° (b) 105° (c) 109° (d) 120°

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29. The hybridization of N in NO_2^+ , NO_3^- and NH_4^+ respectively are
 (a) sp, sp^2, sp^3 (b) sp, sp^3, sp^2 (c) sp^2, sp, sp^3 (d) $sp^3; sp^2, sp$
30. Which of the following molecules does not involve tetrahedral structure?
 (a) SO_4^{2-} (b) SF_4 (c) SeO_4^{2-} (d) SO_2Cl_2
31. Which of the following species involves sp^2 hybridization?
 (a) CO_2 (b) N_2O (c) SO_2 (d) H_2S
32. The species ClO_2^- involves
 (a) sp -hybridization (b) sp^2 hybridization (c) sp^3 hybridization (d) dsp^2 hybridization
33. Which of the following species involves sp^3 hybridization?
 (a) PCl_3 (b) SO_3 (c) NO_3^- (d) BF_3
34. The species ClO_3^- involves
 (a) sp hybridization (b) sp^2 hybridization (c) sp^3 hybridization (d) dsp^3 hybridization
35. Which of the following statements is correct?
 (a) BF_3 involves sp^3 hybridization and NF_3 involves sp^2 hybridization
 (b) BF_3 involves sp^2 hybridization and NF_3 involves sp^3 hybridization
 (c) Both BF_3 and NF_3 involve sp^3 hybridization
 (d) Both BF_3 and NF_3 involve sp^2 hybridization
36. The hybridization in OF_2 is
 (a) sp (b) sp^2 (c) sp^3 (d) dsp^2
37. The bond distance of S—O in SO_2 is 145 pm and its bond moment is 5.8×10^{-30} C m. Its per cent ionic character is about
 (a) 12 (b) 25 (c) 21 (d) 23
38. Which of the following species involves the smallest bond angle?
 (a) NH_3 (b) H_2O (c) BeF_2 (d) CH_4
39. Which of the following species involves the largest bond angle?
 (a) H_2Se (b) H_2S (c) H_2O (d) SO_2

Handwritten calculations:
 $2 + \frac{1}{2}(7 - 4 + 1)$
 $3 + \frac{1}{2}(7 - 6 + 1)$
 $= 4, sp^3$

Handwritten calculations:
 $2 + \frac{1}{2}(6 - 2)$
 $= 4, sp^3$