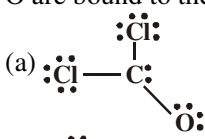
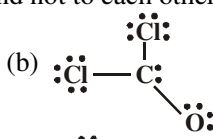
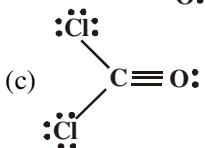
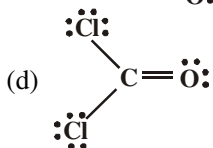
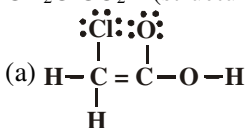
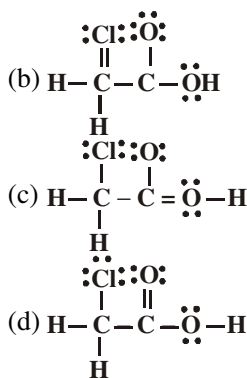


UNIT 2
CHEMICAL BONDING

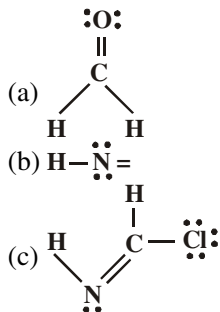
- Which of the following species would be paramagnetic ?
(a) SO_2 (b) BO_2
(c) NO_2 (d) NO_2^+
(e) NO
- Which factors tend to favour high melting points in an ionic solid ?
(a) small ionic radii
(b) large ionic charge
(c) large formula weight
(d) high charge density
- Which of these statements are true ?
(a) CO_2 is linear where as H_2O is a bent molecule
(b) CH_3Cl , CH_2Cl_2 and CHCl_3 all have dipole moments
(c) Ethane contains only σ bonded carbon and H-atoms
(d) None of these
- The hybridization of C-atom in formaldehyde (HCHO) is
(a) sp (b) sp^2
(c) sp^3 (d) sp^2 and sp^3
- Which one of the following would have a Lewis dot structure most like that of CO_3^{2-} ?
(a) CO_2 (b) SO_3^{2-}
(c) NO_3^- (d) NO_2^-
- The types of bonds present in $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ are only
(a) electrovalent and covalent
(b) electrovalent and co-ordinate
(c) covalent and co-ordinate covalent
(d) electrovalent, covalent and co-ordinate covalent
- If a molecule MX_3 has zero dipole moment, the sigma bonding orbitals used by M (at. No. 21) are
(a) pure p (b) sp
(c) sp^2 (d) sp^3
- The bond order of individual carbon-carbon bonds in benzene is
(a) one
(b) two
(c) between one and two
(d) one and two, alternately
- Given the three statements, pick the correct answer
(a) The main forces that make ionic solids stable and crystal lattice forces
(b) The main force holding covalent molecules together is the sharing of electrons between atoms
(c) The total number of valence electrons for CCl_4 is 32
(a)(a) and (B) are true, (C) is false
(b)(a) and (C) are true, (B) is false
(c)(b) and (C) are true, (A) is false
(d) all the three are true
(e) only (C) is true
- Which of the following bonds has the highest polarity ?
(a) H-O (b) H-F
(c) H-Cl (d) H-Br
(e) Si-O
- Which of the following bonds would be most polar ?
(a) N-O (b) C-O
(c) S-O (d) P-O
(e) H-I
- How many valence electrons are used in the Lewis structure of SO_4^{2-} ?
(a) 22 (b) 20
(c) 18 (d) 24
- The correct Lewis structure of CCl_2O is (the O are bound to the C and not to each other)
(a) 
(b) 
(c) 
(d) 
- Which is the best Lewis structure of $\text{CH}_2\text{ClCO}_2\text{H}$ (structure correct as given) ?
(a) 

QUEST TUTORIALS



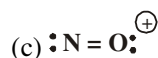
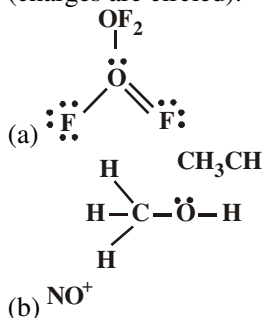
15. The molecule 1H_3 has
 (a) 2 bond pairs and 3 lone pairs
 (b) 3 bond pairs and 2 lone pairs
 (c) 3 bond pairs and 2 lone pairs
 (d) some number of lone and bond pairs not described in (a) – (d)

16. Given the three Lewis structures below which choice is correct ?



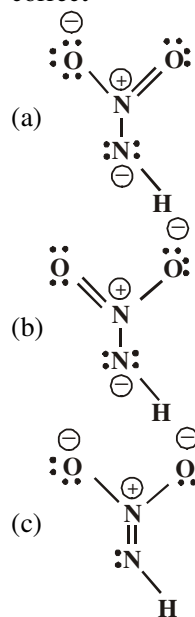
- (a) all three represent correct Lewis structures
 (b) (a) and (B) represent correct Lewis structures, (C) does not
 (c) (a) and (C) represent correct Lewis structures, (B) does not
 (d) (b) and (C) represent correct Lewis structures, (A) does not
 (e) only (A) represents a correct Lewis structure

17. A Lewis structure of three molecules is shown below. Pick the correct answer (charges are circled).



- (a) (a) and (C) are correct, (B) is not
 (b) (b) and (C) are correct, (A) is not
 (c) only (A) is correct
 (d) only (C) is correct
 (e) all are correct

18. Three possible resonance forms for $[\text{N}(\text{O})_2\text{NH}]^{-1}$ are shown below. Which choice is correct



- (a) (a) and (B) are correct resonance forms (C) is not and no other exist
 (b) (a) and (B) are not correct resonance forms. (C) is the only possible Lewis structures for this molecule
 (c) None of the Lewis structures shown are correct, one or more other Lewis structure(s) can be written
 (d) All the Lewis structures are correct resonance forms and no other exist
 (e) All of the Lewis structures are correct resonance forms but one or more others can also be written

19. In which of the following does one or more of the atoms have less than an octet of electrons ?

- (a) NO (b) NO^+
 (c) Cl_2 (d) SF_6
 (e) none of these

20. Given the three molecules below, which choice is correct ?

- (a) TeCl_2
 (b) GeF_4
 (c) SH_2

- (a) In both (A) and (B) the central atom has more than eight electrons about it (an expanded octet). (C) has 8 electrons around the S atom
- (b) In (A) the Te atom has more than 8 electrons (an expanded octet) around it (B) and (C) both place 8 electrons around the central atom
- (c) In (B) the Ge atom has more than 8 electrons (an expanded octet) around it, (A) and (C) both place 8 electrons around the central atom
- (d) In (A), (B) and (C) the central atom has more than 8 electrons around it.
21. What is the expected bond order for each C – C bond in C_6H_6 (the carbon atoms are arranged in a ring with one hydrogen atom bonded to each) ?
- (a) 1 (b) 2
(c) 3 (d) 3/2
(e) none of these
22. What is the approximate C1–C–Cl angle for Cl_2CO (note the 2 Cl atoms and the O atom are bound to the C and not to each other) ?
- (a) 90° (b) 109°
(c) 120° (d) 180°
(e) cannot be determined from the information given
23. Three statements are given below. Pick the correct answer
- (a) BCl_3 is a trigonal planar molecule
(b) SF_6 is an octahedral molecule
(c) PH_3 is a trigonal planar molecule
(a)(a) and (B) correct (C) is not
(b)(a) and (C) correct (B) is not
(c)(b) and (C) are correct, (A) is not
(d) all are true
(e) only (A) is true
24. Given the three statements below, pick the correct answer
- (a) $[AlCl_4]$ is tetrahedral
(b) The Cl–N–Cl angle in NCl_3 is about 120°
(c) The H–S–H angle in H_2S is about 109°
(a)(a) and (B) are true, (C) is false
(b)(a) and (C) are true (B) is false
(c)(b) and (C) are true (A) is false
(d) all the three are true
(e) only (A) is true
25. In the reaction $BH_3 + NH_3 \rightarrow H_3 B-NH_3$ the H–B–H bond angles change from
- (a) 109° to 120°
(b) 90° to 109°
(c) 120° to 109°
(d) are 109° in both reactant and product
(e) are 120° in both reactant and product
26. The C–F bond in H_3CF is most reasonably formed from overlap of
- (a) a p orbital on F with a sp hybrid orbital on C
(b) a p orbital on F with sp^2 hybrid orbital on C
(c) a p orbital on F with a sp^2 hybrid orbital on C
(d) a s orbital on F with a sp^2 hybrid orbital on C
(e) none of these
27. The fact that the BeF_2 molecule is linear implies that the Be–F bonds involve:
- (a) sp^3 hybrids on Be
(b) sp^2 hybrids on Be
(c) sp hybrids on Be
(d) resonance
(e) none of these
28. How many bonds are present in CO_2 molecule ?
- (a) 1 (b) 2
(c) 0 (d) 4
29. The C–C bond in H_3C-CN is most reasonably formed from overlap of
- (a) a p orbital on the CH_3 carbon atom with a sp hybrid orbital on the CN carbon atom
(b) a sp^2 hybrid on the CH_3 carbon atom with a sp hybrid orbital on the CN carbon atom
(c) a sp^2 hybrid orbital on the CH_3 carbon atom with a sp^2 hybrid orbital on the CN carbon atom
(d) a sp^3 hybrid orbital on the CH_3 carbon atom with a sp^2 hybrid orbital on the CN carbon atom
(e) none of these
30. The C–C sigma bond in $H_2C=CCl_2$ is most reasonably formed from overlap of
- (a) a sp^3 orbital on H_2C carbon atom and a sp^3 orbital on CCl_2 carbon atom
(b) a sp^2 orbital on H_2C carbon atom with a sp orbital on CCl_2 carbon atom
(c) a sp^3 orbital on H_2C carbon atom with a sp orbital on CCl_2 carbon atom

- (d) a sp^2 orbital on H_2C carbon atom with a sp^2 orbital on CCl_2 carbon atom
 (e) none of these
31. The C–C sigma bond in $HC=CCl$ is most reasonably formed from overlap of
- $$\begin{array}{c} \text{:O:} \\ \parallel \\ \text{H}-\text{C}-\ddot{\text{O}}-\text{H} \end{array}$$
- (a) a sp^2 orbital on HC carbon atom and a sp^2 orbital on CCl carbon atom
 (b) a sp orbital on HC carbon atom with a sp orbital on CCl carbon atom
 (c) a sp^2 orbital on HC carbon atom with a sp orbital on CCl carbon atom
 (d) a sp^3 orbital on HC carbon atom with a sp^3 orbital on CCl carbon atom
 (e) none of these
32. Three statements about the molecule $HCOOH$ (correct Lewis structure given above) are shown. Pick the correct answer
 (a) $HCOOH$ has 4 sigma bonds and one p-bond
 (b) The carbon atom is sp^2 hybridized
 (c) The O atom bonded to H atom is sp^3 hybridized
 (a)(a) and (B) are true (C) is false
 (b)(b) and (C) are true, (A) is false
 (c)(a) and (C) are true, (B) is false
 (d) all three are true
 (e) only (B) is true
33. The total number of type of bonds used in the molecule shown below (not a Lewis structure just the simplest structure) is
- $$\begin{array}{c} \text{N}-\text{H} \\ | \\ \text{C} \\ / \quad \backslash \\ \text{H} \quad \text{H} \end{array}$$
- (a) 2 pi and 3 sigma
 (b) 1 pi and 4 sigma
 (c) 1 pi and 3 sigma
 (d) 2 pi and 4 sigma
 (e) none of these
34. Three molecules are listed below. Pick the correct answer
 (a) PH_3
 (b) $HCCl_3$
 (c) AlH_3
 (a)(a) and (B) are polar, (C) is non polar
 (b)(b) and (C) are polar, (A) is non polar
 (c)(a) and (C) are polar, (B) is non polar
 (d) all the three are polar
- (e) some combination of polar and nonpolar not given in (a) – (d)
35. Which of the following is a non-polar molecule that contains polar bonds ?
 (a) H_2O (b) SO_2
 (c) CCl_4 (d) Cl_2
 (e) none of these
36. Given the three statements below. Pick the correct answer
 (a) Dipole-dipole forces are the main intermolecular force for I-Br
 (b) O_2 is a gas at room temperature because it is highly polarizable
 (c) London forces dominate the intermolecular bonding for Br_2
 (a) only (A) is true
 (b) only (B) is true
 (c) only (C) is true
 (d)(b) and (C) are true, (A) is false
 (e)(a) and (C) are true, (B) is false
37. A special type of bonding that takes place with the boranes (B_nH_m) is known as
 (a) highly polarized bonds
 (b) electron rich bonds
 (c) unsaturated bonds
 (d) three-centre, two-electron bonds
 (e) none of these
38. A property of O_2 that is explained by molecular orbital theory, but not Lewis structure is
 (a) O_2 is paramagnetic
 (b) O_2 is good oxidizing agent
 (c) O_2 is very abundant in the universe
 (d) The O–O bond order is 2
 (e) none of these
39. The O–O bond order in O_2^- is
 (a) 1 (b) 2
 (c) 1/2 (d) 3/2
40. Given the three statements below, pick the correct answer
 (a) Elemental sulfur is generally found in S_2 molecule
 (b) SO_2 is a linear molecule
 (c) the O–S–O bond angles, in SO_3 are 120°
 (a)(a) and (B) are true, (C) is false
 (b)(a) and (C) are true, (B) is false
 (c)(b) and (C) are true, (A) is false
 (d) all the three are true
 (e) only (A) is true

41. Given the three statements below, pick the correct answer
- (a) XeF_2 is a linear molecule
 - (b) Xe is the only group VIII A element to form molecules with other elements
 - (c) XeF_4 is a planar molecule
 - (a)(a) and (B) are true, (C) is false
 - (b)(a) and (C) are true, (A) is false
 - (c)(b) and (C) are true, (A) is false
 - (d) all the three are true
 - (e) only (A) is true
42. A diamond crystal is classified as
- (a) ionic
 - (b) molecular
 - (c) covalent
 - (d) metallic
 - (e) none of these
43. Given the three molecules listed below, which choice is correct ?
- (a) CH_3OH
 - (b) H_2S
 - (c) CH_3CH_3
 - (a) hydrogen bonding is the dominant intermolecular force only for (A)
 - (b) hydrogen bonding is the dominant intermolecular force for (A) and (B)
 - (c) hydrogen bonding is the dominant intermolecular force for (A), (B) and (C)
 - (d) Hydrogen bonding is not important for any of these molecules
 - (e) none of these choices is correct
44. Three molecules are listed below. Will hydrogen bonding be important for any of them ? Pick the correct answer
- (a) HBr
 - (b) CH_3OH
 - (c) NH_3
 - (a)(a) and (B) will form hydrogen bond (C) will not
 - (b)(a) and (C) will form hydrogen bond (B) will not
 - (c)(b) and (C) will form hydrogen bond (B) will not
 - (d) all these will form hydrogen bond
 - (e) only (C) will form hydrogen bond