

Chemical Bonding and Molecular Structure

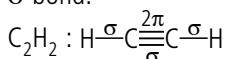


TRY YOURSELF

- In solid NaCl, the Na^+ and Cl^- ions occupy fixed positions and do not have the mobility.
- $\text{BeH}_2 \longrightarrow \text{H}:\text{Be}:\text{H}$ (Be has only 4 electrons.)
 $\text{BCl}_3 \longrightarrow \begin{array}{c} :\ddot{\text{Cl}}: \\ :\ddot{\text{Cl}}:\text{B}:\ddot{\text{Cl}}: \end{array}$ (B has only 6 electrons.)
- The tendency of atoms to achieve eight electrons in their outermost shell is known as octet rule. Sulphur atom gains two electrons to achieve octet.
- TeF_6 , BeF_2 and BF_3 will have zero dipole moment due to their symmetric shape.
- $:\text{N} \equiv \overset{\cdot}{\text{N}} - \overset{\cdot}{\text{O}}: \longleftrightarrow :\ddot{\text{N}} = \overset{\cdot}{\text{N}} = \overset{\cdot}{\text{O}}:$
- CuS is more covalent than CuO . This is because S^{2-} ion has larger size than O^{2-} and hence is more polarised than O^{2-} ion.
- The decreasing order of repulsion is
 Lone pair - Lone pair > Lone pair - Bond pair
 > Bond pair - Bond pair
- NH_2^- - Angular; H_3O^+ \longrightarrow Pyramidal
 GeF_2 - Angular; HgBr_2 \longrightarrow Linear
- (i) Lewis concept considers the formation of covalent bond by mutual sharing of electrons. VB theory considers the formation of covalent bond by overlap of half-filled atomic orbitals.
 (ii) Lewis concept does not provide explanation for different shapes of molecules but VB theory does explain molecular shapes.
 (iii) Lewis concept does not explain the bond strength but VB theory is able to explain it.

ANSWERS

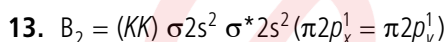
10. No, π bond cannot be formed without the formation of σ bond.



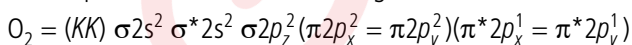
σ -bonds in acetylene = 3; π -bonds in acetylene = 2

- (i) An equilateral triangle $\longrightarrow sp^2$
 (ii) A regular tetrahedron $\longrightarrow sp^3$
 (iii) A trigonal pyramidal $\longrightarrow sp^3$

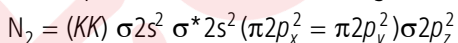
12. sp^3d^2 , octahedral



Two unpaired electrons \Rightarrow Paramagnetic



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No unpaired electrons \Rightarrow Diamagnetic

14. The bond order of N_2 is 3 while that of N_2^+ is 2.5. Thus, the dissociation energy of N_2 is higher than that of N_2^+ .

15. (a) The H-bonding between $\text{C}_2\text{H}_5\text{OH}$ and H_2O is stronger than the H-bonding between the like molecules of the individual compounds, consequently when the two compounds are mixed, the molecules come more closer than when they are present separately and hence shrinkage in volume occurs.

(b) Effects of hydrogen bonding are :

- Molecular association
- Increase in melting and boiling points
- Influence on the physical state
- Solubility of covalent compounds

