Chapter 9: Molecular geometry and bonding theories

.

1. Use electronegativities to determine if a bond is polar, and use bond polarities and molecular shape to predict whether a molecule has a dipole moment.
2. Predict the electron-pair geometry and the molecular shape of a molecule or ion with VSEPR theory. Know that single bonds act similarly to multiple bonds in determining molecular shape.
3. Explain the fundamental basis of valence bond theory, and explain why hybrid orbital are often used to Describe bonding in molecules rather than pure atomic orbital.
4. Describe the relationship between the electronegativity difference and the percent ionic character of a bond.
5. Describe covalent bond formation in terms of overlap of atomic orbitals
6. Describe the formation of hybrid orbitals for atomic
7. Write hybridization schemes for the formation of sp, sp^2, sp^3. sp^3d, and sp^3d^2, hybrid orbital; predict the geometrical shapes of molecules in terms of the pure and hybrid orbital used in bonding.
8. Describe multiple bonds between second period elements in terms of the overlap of sp, sp^2, $sp^3$and pure 2p orbital to form π bonds, and the sidewise overlap of p orbital to form bonds.
9. Explain the fundamental basis of molecular orbital theory.
10. Know that two atomic orbital combine to form a bonding and an anti bonding molecular orbital and sketch these molecular orbital.
11. Assign probable electron configurations, determine bond orders, and predict magnetic properties of the diatomic molecules and ions of the first and second period elements.
12. Describe the bonding in the benzene molecule (C_6H_6), or other conjugated system through Lewis structures, valence bond theory, and molecular orbital theory.
13. Explain why a single valence structure is inadequate to explain the bonding in a resonance hybrid.
14. Explain what is meant by a de-localized molecular orbital and how such orbital are used to Describe resonance hybrids.