

Chemistry 333

Introduction and Review

1. atomic structure
 - a. isotopes
2. electronic structure of atoms
 - a. wave equations
 - b. wave functions
 - c. atomic orbitals (s, p, d, f)
 - i. nodes
 - ii. mathematical sign of wave function
 - iii. degenerate orbitals
 - d. electronic configuration of atoms
 - i. Pauli exclusion principle
 - ii. Hund's rule
 - iii. Aufbau principle
 - iv. valence electrons
3. molecular orbitals
 - a. linear combination of atomic orbitals (LCAO)
 - b. bonding, nonbonding, and antibonding orbitals
4. ionic bonding
 - a. octet rule/noble gas configuration
 - b. Coulombic attraction/repulsion
5. covalent bonding
 - a. orbital overlap
 - b. octet rule/noble gas configuration
 - c. sigma bonds
 - d. pi bonds
 - e. bond rotation/nonrotation
6. nonbonding electrons
7. hybridization (sp, sp², and sp³)
8. VSEPR rules
9. molecular shape

10. resonance structure and resonance hybrids
11. formal charge
12. bond dissociation enthalpy (BDE)
13. bond cleavage
 - a. homolysis
 - b. heterolysis
14. curved-arrow notation
 - a. half-headed arrows
 - b. full-headed arrows
15. properties
 - a. electronegativity
 - b. intermolecular forces
 - i. dipole-dipole
 - ii. hydrogen bonding
 - iii. London dispersion force
 - c. polarity
 - i. bond dipole moment
 - ii. molecular dipole moment
 - d. solubility
 - i. effect of polarity
 - e. acidity
 - i. Arrhenius
 - ii. Brønsted-Lowry
 - a. acid strength
 - b. base strength
 - c. structural factors affecting acid strength
 - iii. Lewis
 - a. electrophiles
 - b. nucleophiles
16. structural formulas
 - a. Lewis
 - b. condensed
 - c. line-angle
17. classes of organic compounds