Exam 1 Material to Include

Chapter 1 - Structure and Bonding

Covalent Bonding

- [x] ~~Polarity arrow points toward the more EN atom~~
  - [x] ~~For the purposes of anything done in this class, the $C-H$ bond is non-polar~~
- [x] ~~Formal Charge Equation~~
- [x] ~~Bonding Patterns Table - potential free points on Short answer or MCQ~~
- [x] ~~**Do not, under any circumstances, put more than 4 bonds on a Carbon Atom**~~
- [x] ~~Identify δ^+ and δ^- in a covalent bond~~

Resonance Rules

- [x] ~~Have as many atoms fill octet as possible~~
- [x] ~~Has as many bonds as possible~~
- [x] ~~Negative charge on the more EN atom~~
- [x] ~~Prevent excess charge separation (3 max)~~
- [x] ~~**Resonance is not one contributor at one time and the other at a different time**~~

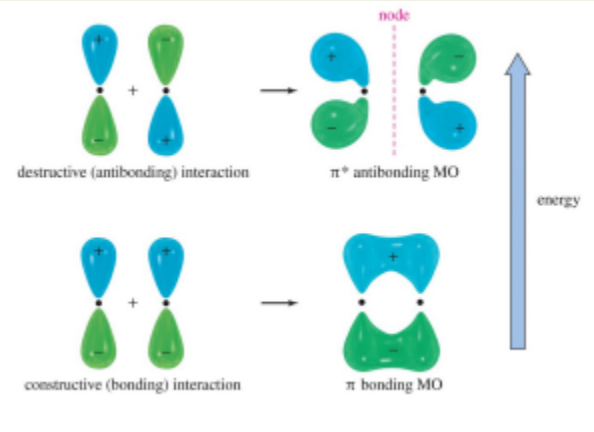
Orbitals (incl. Hybrid) and Overlap

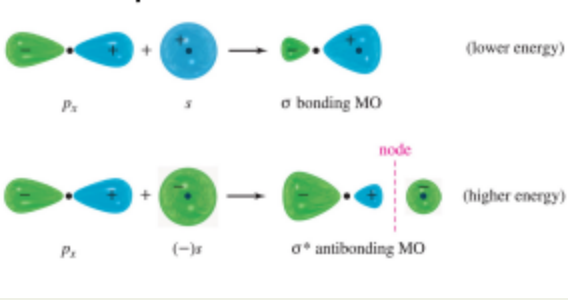
- [x] ~~When 2 orbitals overlap and are *out of phase*, they destructively overlap, forming an antibonding MO (molecular orbital)~~
- [x] ~~Constructively overlapped orbitals are *in phase* and form a bonding MO~~
  - [x] ~~Antibonding has higher energy~~

↖ Antibonding and Bonding MOs, and Nodes

These Concepts should be kept in mind when dealing with orbital overlap

- [x] ~~There is a node in between the two halves of a P orbital~~
  ~~*A node is defined as having a 0 probability of finding an electron*~~
- [x] ~~An antibonding orbital is created when the plus and minus of the orbital are aligned with each other~~





- [x] σ bonds are single bonds.π bonds are double/triple bonds
  ~~σ bonds are stronger than π bonds~~
- [x] ~~For orbital overlap, the "*" symbol is used to denote antibonding~~

- [x] ~~Hybridization Angle Summary~~

Less Energy is always going to be more stable

Chapter 2 - Acids and Bases

Dipole Moments

- [x] ~~Molecules can have polar bonds but have a net zero molecular dipole moment~~
- [x] ~~London dispersion forces are a result of induced dipoles, impact BP and MP~~
  - [x] ~~The more surface area a molecule has, or the less branched it is, is reflected by a higher BP as their are strong LDFs~~
- [x] ~~There must be an~~ $N-H$ or $O-H$. ~~The Hydrogen of a polar molecule, which has a~~ δ^+ ~~charge, is extremely attracted to the~~ δ^- ~~charge on the more EN atom~~
- [x] ~~Arrhenius Acids/Bases, Brønsted Lowrey Acids/Bases, and Lewis Acids/Bases~~
  ~~Know their relevance to the class and their differences~~
- [x] ~~Molecules with similar Intermolecular forces will mix freely~~
- [x] ~~Know how~~ pK_a ~~is related to~~ K_a. ~~Specifically that a lower~~ pK_a ~~correlates to a stronger acid~~
- [x] ~~Electronegative atoms on a conjugate base will stabilize the negative charge held by the atom~~
  ~~inductive effects and resonance stabilization makes stronger acids because their conjugate bases are more stable and therefore are stronger~~

Difference between Inductive effect and Resonance Stabilization

The resonance structures of a product is more favorable and stabilizes more than the inductive effect. The inductive effect stabilizes a molecule through the delocalization of e^- through the σ bond while the Resonance effect stabilizes through the π bond

- [x] ~~More %s character correlates to a lower~~ pK_a ~~which means a stronger acid~~
  ~~Closer to nucleus so more stable~~

- [x] ~~Lewis Acids (electrophiles) - Species that Accept a pair of electrons **Accepts!**~~
- [x] ~~Lewis Bases (nucleophiles) - species with available electrons to accepts **Donates!**~~
- [x] ~~Include Leaving group, The more EN atom, typically a Halogen, will receive the e^- when breaking a bond~~
- [x] ~~Arrow movement of electrons, specifically how electrons move between nucleo- and electrophiles~~

Functional Groups

- [x] ~~Include examples of all common functional groups~~
- [x] ~~Ethers and Esters cannot H-bond with themselves, but they can with water~~

Chapter 3 - Stereochemistry of Alkanes

- [x] ~~List all the different isomers and their definitions and how to distinguish~~
- [x] ~~Formal nomenclature, common names and cyclic structures w their angles~~
- [x] ~~Steric Strain vs Torsional Strain~~
- [x] ~~Sketches of PERFECT chair conformations and all the axial/equatorial bonds~~
- [x] ~~The reasoning behind the stability and lack thereof regarding the different orientations of Newman projections~~
    - ~~Totally Eclipsed vs Eclipsed~~
    - ~~Gauche interactions in cyclic and non-cyclic structures~~
    - ~~Anti conformations~~
    - [x] ~~Have all of these and their correlated energy with brief explanations~~