**Simple hydrocarbon structures & functional groups** [Daley & Daley ch 2]

*This presentation of the material covered within a topic or chapter is meant to give students a clear vision of the central concepts or big picture concepts that all other information expands upon, relates to or serves.  
Super concepts are the big picture, central concepts that should be completely obvious to you as we begin to cover them and when you reflect on the topic once we’ve covered it. Everyone who takes the course should be able to remember or recognize the super concepts years after having taken the course.*

*Each concept is an important “chunk” of a super concept. Each concept is a large enough idea to stand on its own. Good (B) students will remember and understand these concepts after taking the course.*

*The details are ideas, methods, or facts that you need to understand to solve problems and actually do chemistry. It’s likely that only the best (A) students will be able to remember and use the details years after taking the course.*

**Superconcepts:**

1. Hydrocarbons form the structural framework of organic molecules

… … …

1. Functional groups do the critical work of organic chemistry & biochemistry.

**Concepts:**

1. Alkanes and cycloalkanes are hydrocarbons with single bonds only.
2. Alkenes are hydrocarbons with one or more double bond.
3. Alkynes are hydrocarbons with one or more triple bond.
4. Arenes are rings with resonance.
5. Functional group’s reactivity is related to their polarity.
6. Isomers exist for most hydrocarbons.

**Details:**

1. Molecular frameworks can be described as acyclic, carbocyclic or heterocyclic.
2. Alkanes are saturated.
3. Alkanes, alkenes and alkynes can be linear, branched or cyclic.
4. General formulas describe alkanes, alkenes and alkynes and whether molecules are linear or cyclic.
5. Bonds in alkanes have free rotation, while rotation is constrained in cycloalkanes.
6. Typical bonding patterns for atoms frequently found in organic molecules.
7. Method for assessing bond polarity using electronegativity values.
8. How inductive and field effects can alter bond polarity (and thus reactivity).
9. Why some resonance structures contribute more than others.
10. Resonance hybrids are a more accurate representation than resonance structures.
11. Carbon has three basic hybridizations: sp3 (single bonds); sp2 (double bonds); sp (triple bonds).
12. Hybridizations lead to geometries: sp3 is tetrahedral; sp2 is trigonal planer; sp is linear.
13. Unbonded electrons occupy orbitals and affect polarity, geometry and reactivity.
14. The VSEPR (valence shell electron pair repulsion) chart is a useful tool for predicting molecular hybridization and shape.