From 161/261:

Remember alkanes, alkenes, alkynes, alcohols/ethers, alkyl halides.

Know structures (3-D), stereochemistry (determine R and S), and nomenclature.

Reactions:

Addition: H_2, H_2O or ROH

Elimination: E_1, E_2

Substitution: S_N1, S_N2

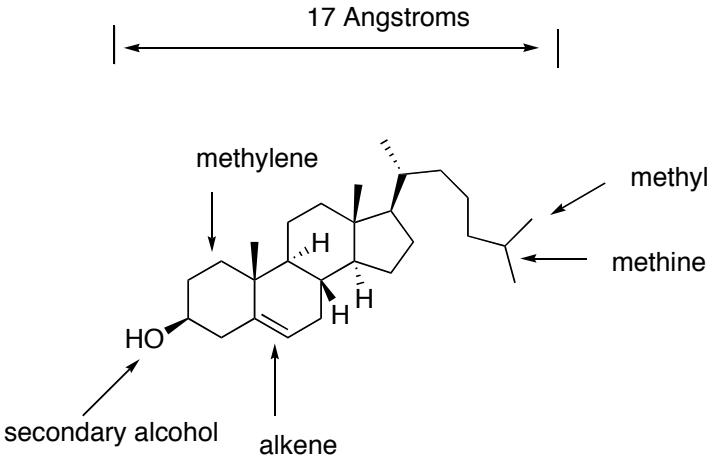
Concept of Acids and Bases

Chirality and Stereochemistry

A Molecule is a set of atoms connected in a fixed and discreet arrangement.

A Compound is a collection of molecules of a particular type.

Example: Cholesterol: essential in every mammalian cell membrane: be able to identify methyls, methylenes, methines, primary, secondary tertiary, quaternary carbons
Be able to draw full structure showing all atoms (carbons and hydrogens)



Cholesterol

1 Angstrom = Å = 10^{-8} cm

Cholesterol has 8 stereogenic centers – be able to determine R and S configuration

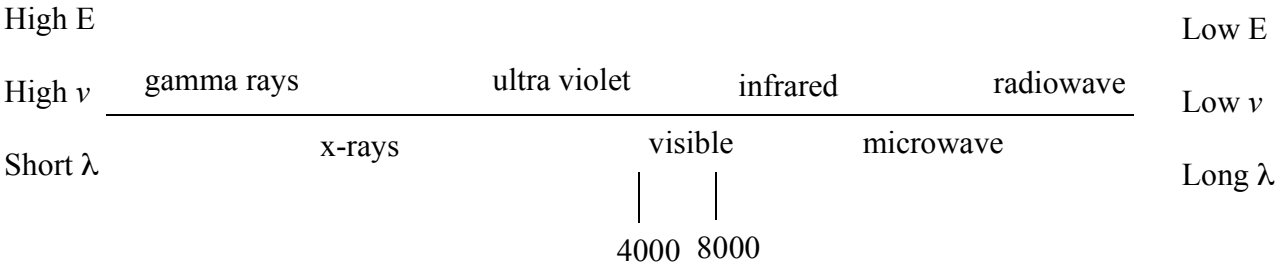
Chem 263 – Outline 1 start

Light and Energy

$$E = h\nu = \frac{hc}{\lambda}$$

Where:
- E = energy
- ν = frequency
- c = speed of light = 3×10^{8} ms^{-1}
- h = Planck's constant = 6.6×10^{-34} Js
- λ = wavelength

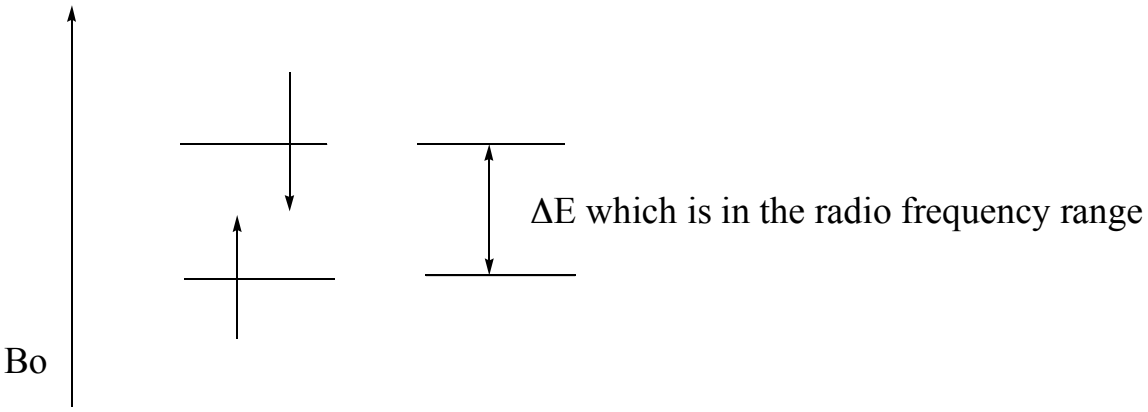
Electromagnetic Spectrum



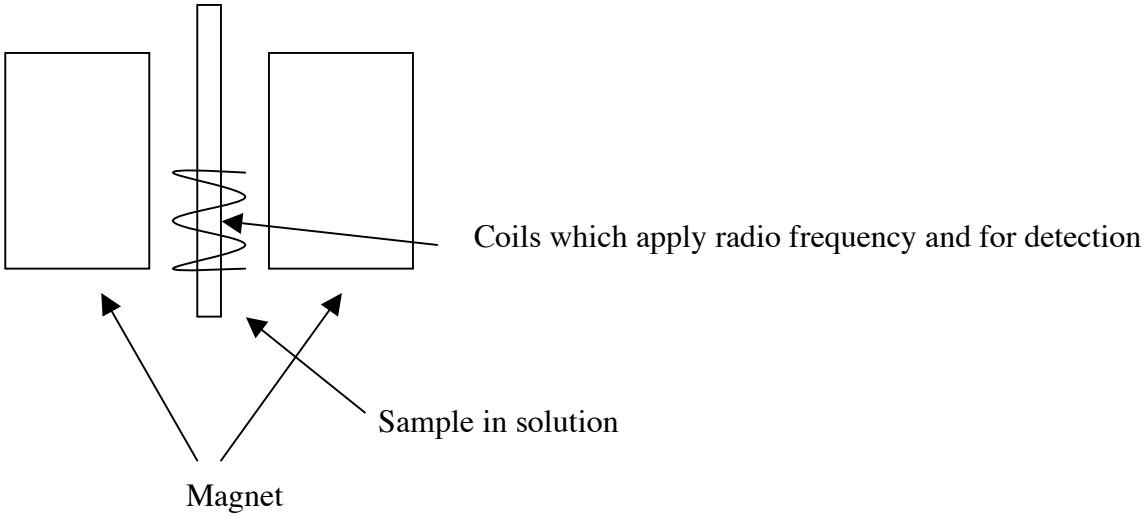
Nuclear Magnetic Resonance (NMR)

If you have an odd # of protons or and odd # of neutrons there is a nuclear magnetic moment.

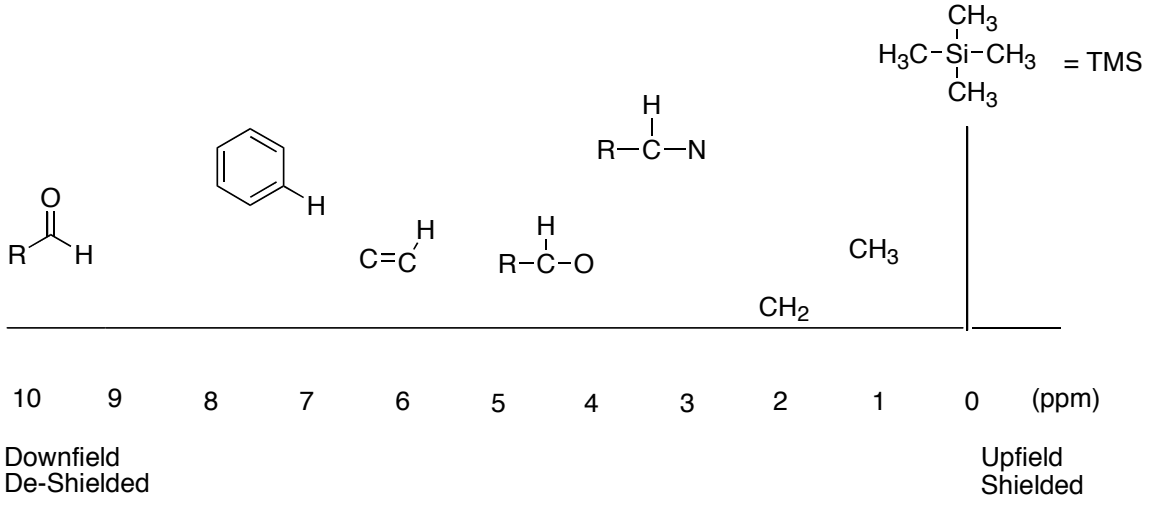
If you apply a magnetic field (B_O) to the nuclei there are two possible energy states, one with the spin aligned with the field and the other opposed.



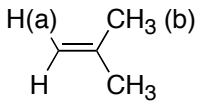
If you apply ΔE, then a spin flip will occur and energy absorption will occur. You can measure this absorption and a signal is produced.



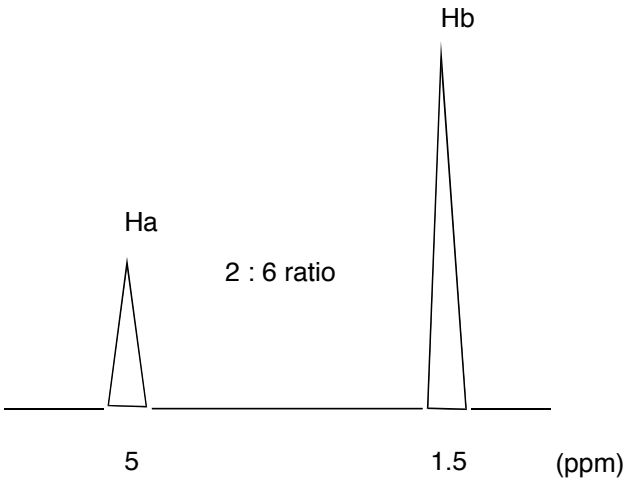
Chemical Shift is the change in position of absorption of a nuclear spin relative to a standard; for hydrogens this is usually tetramethylsilane (TMS).

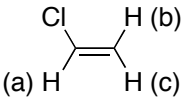


Energy differences, seen as changes in frequency of absorption, occur due to differences in electron density around the nuclei. Electron withdrawing groups (eg. carbonyl in aldehydes) pull electrons away from the hydrogen and expose those nuclei to the magnetic field more. This is a deshielding effect and moves the position of absorption downfield.



2-methylpropene





1-chloroethene

Should see 3 signals in proton NMR