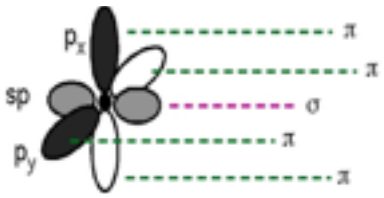
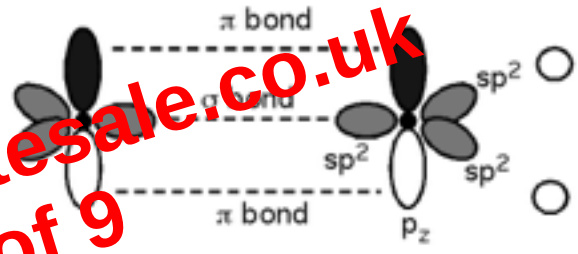
- in a mixture of compounds, relative peak intensity indicates the number of components, by measuring the absorbance of several concentrations and using the Beer-Lambert Law to determine the ε for the electronic transition.
- for single compounds it indicates the kind of electronic transition involved

Electronic structure

- electrons orbit around the nucleus and their energy is quantised i.e. related to the radius of the orbit by giving it a principal quantum number 'n'.
- when the atom absorbs light the electron jumps to a higher energy.
- the jump is related to frequency and wavelength of the light absorbed by $\Delta E = h\nu = hc / \lambda$
- if there is light with a frequency to correspond to the energy change between the inner orbit and outer orbit, that light will be absorbed
- three p orbitals for each principal quantum number : p_x, p_y, p_z
- molecular orbitals form by combining atomic orbitals together
- the angular momentum dictates the orbital shape
- sp^3 orbitals = $s+p_x+p_y+p_z$ (tetrahedral shape)



-sp^2 = $s+p_x+p_y$ p_z is unhybridised and forms π bonds by overlapping sideways (trigonal planar)



- sp = s + p_x while p_z and p_y form 2 bonds, which gives a triple bond.

Transitions

- π to π* transitions lie in the UV range (200-300nm) for simple organic molecules.
- λ_{max} = 163 nm in ethene
- orbitals can interact along the polyunsaturated chain.
- transition shifts to longer wavelength as chain length increases. 30nm per additional C=C bond.
- π to π* energy is smaller as there are more bonding and anti bonding energy levels in the same space.
- the transition will move to smaller energy

Benzene

- sp^2 hybridised planar molecule
- λ_{max} = 203 nm (between this and 295 if there are substituents)