

Chemistry 462 2017 MYD

Organometallic Chemistry with Applications to Homogeneous Catalysis.

Fundamental Concepts/ Backgrounds/ Definitions Needed

- a) s, p, d orbitals; shapes and phases
- b) ligand; soft vs. hard
- c) dative bond
- d) coordination complex
- e) oxidation state vs. formal charge
- f) Classical or Werner complex
- g) Geometries: linear, trigonal, tetrahedral, sq. planar, Trigonal Bipyramid, Sq Py , Oh
- h) Hybrid orbitals to match Geometries:
- i) chelate effect
- j) formation constant; ΔG , ΔH , ΔS , ΔG^\ddagger , ΔH^\ddagger , ΔS^\ddagger
- k) isomers: geometrical; structural; linkage; optical
- l) Trans effect vs. trans influence
- m) Crystal field theory / d-orbital splitting patterns
- n) High spin vs. low spin; strong vs. weak Field
- o) Magnetism; $\mu_{s.o.}$, para- vs. diamagnetism
- p) Inert vs Labile Coordination
- q) Spectrochemical series; the Ligand field
- r) Back-bonding
- s) Frontier Orbitals: LUMO / HOMO / SOMO
- t) π -donor Ligands vs. π -ligands
- u) π -complexes vs. σ - complexes
- v) Ambidentate Ligands
- w) Spectator vs. Actor Ligands
- x) Non-innocent ligands vs. Redox-Active Ligands
- y) Hemi-labile Ligands
- z) N-heterocyclic Carbene ligand