

Hard and soft metals and ligands

- Hard Ligands

Cl⁻, H₂O, R₂O, OH⁻, RO⁻,
RCO₂⁻, CO₃²⁻, NO₃⁻, PO₄³⁻,
SO₄²⁻, ClO₄⁻, ox²⁻, NH₃, RNH₂

F⁻

- Hard Metal Centers

Li⁺, Na⁺, K⁺, Rb⁺, Cs⁺, Mn²⁺,
Zn²⁺, Al³⁺, Ga³⁺, In³⁺, Sc³⁺, Cr³⁺,
Fe³⁺, Co³⁺, Y³⁺, [VO]²⁺, [VO₂]⁺.

- Soft Ligands

H⁻, R⁻, CN⁻ (*C-bound*), CO
(*C-bound*), RNC, RSH, R₂S,
[RS]⁻, [SCN]⁻ (*S-bound*), R₃P,
R₃As, R₃Sb, alkenes, arenes

I⁻

- Soft Metal Centers

Zero oxidation state metals, Tl⁺,
Cu⁺, Ag⁺, Au⁺, [Hg₂]²⁺, Pb²⁺,
Hg²⁺, Cd²⁺, Pd²⁺, Pt²⁺, Tl³⁺.

- Intermediate

[N₃]⁻, py⁻, [SCN]⁻ (*N-bound*),
ArNH₂, [NO₂]⁻, [SO₃]²⁻

Br⁻

- Intermediate

Sn²⁺, Fe²⁺, Co²⁺, Ni²⁺, Cu²⁺,
Zn²⁺, Ru³⁺, Rh³⁺, Ir³⁺.