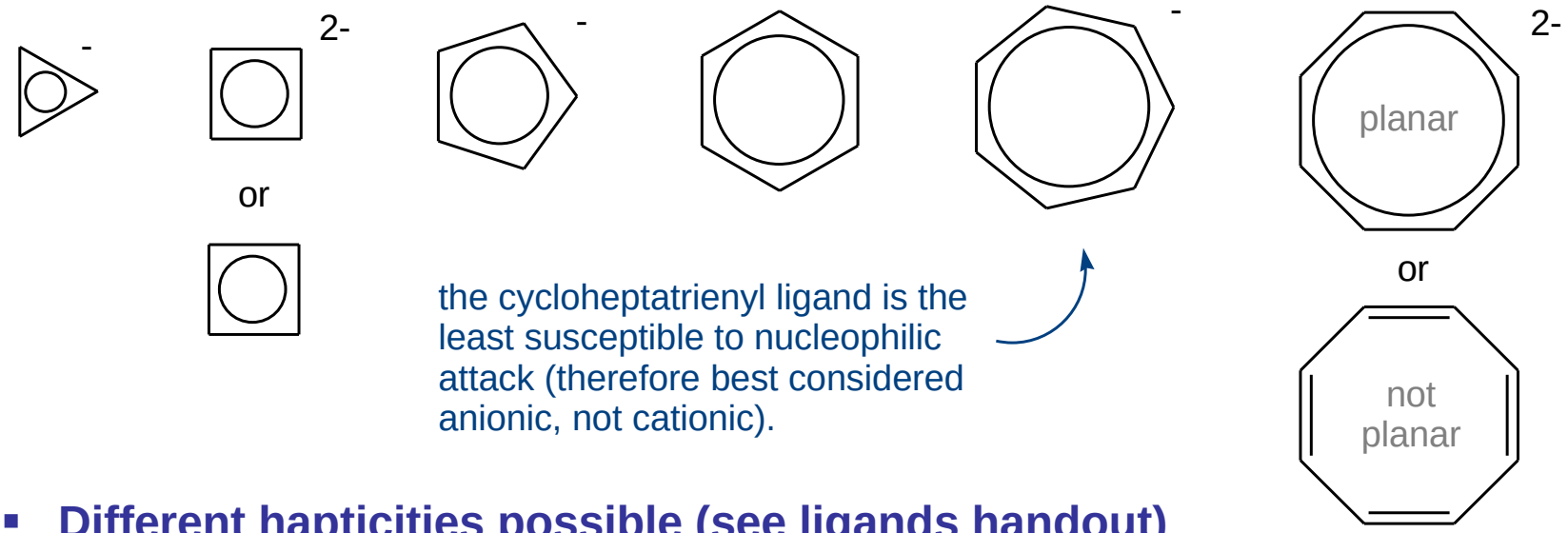
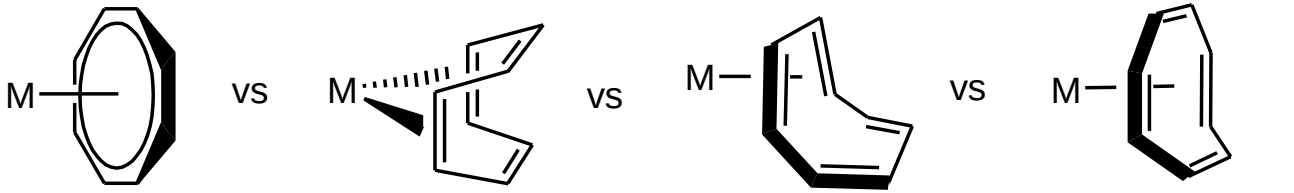
CYCLIC π-Ligands



the cycloheptatrienyl ligand is the least susceptible to nucleophilic attack (therefore best considered anionic, not cationic).

- **Different hapticities possible (see ligands handout)**



charge = -2
10 electron donor

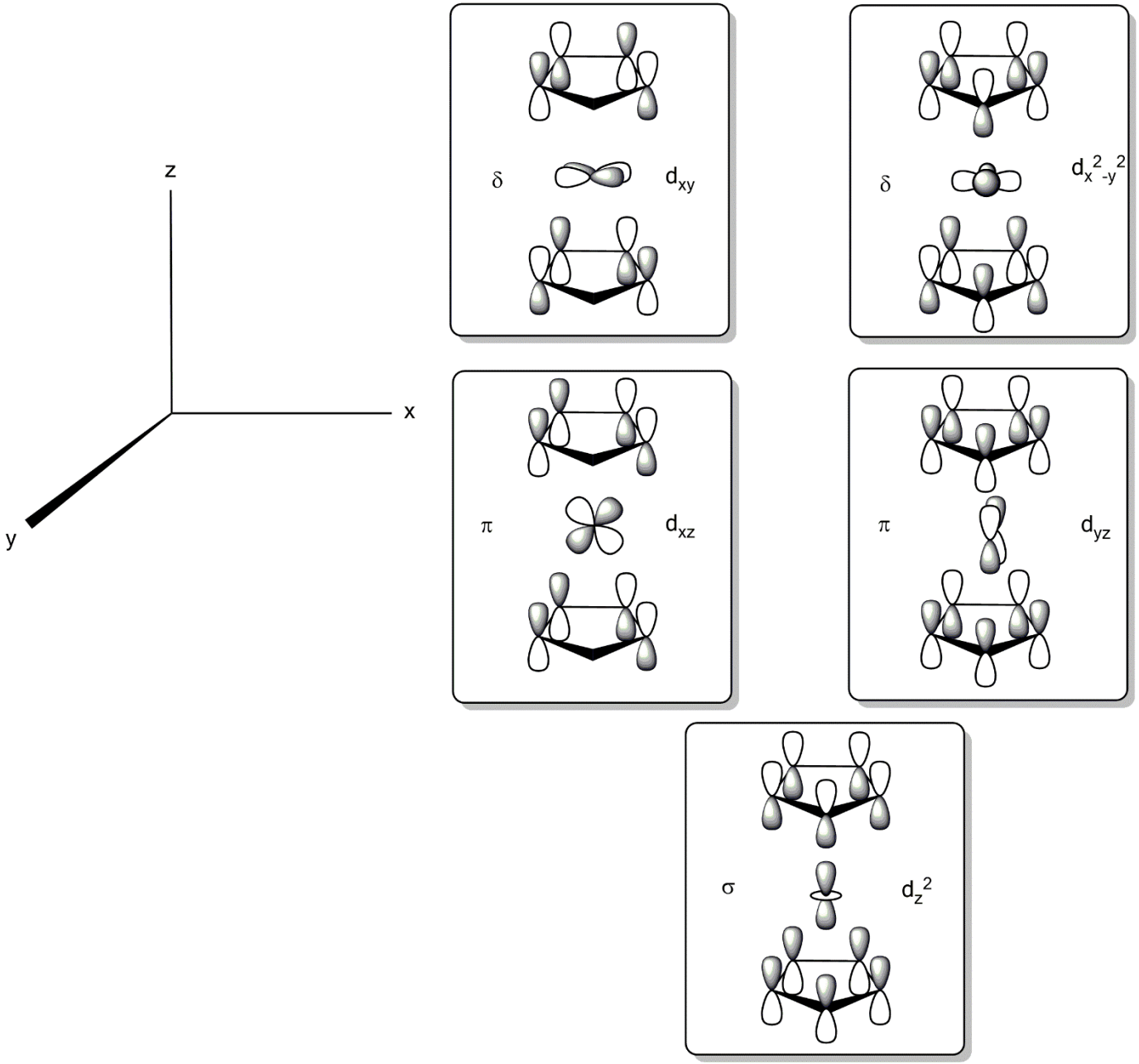
charge = 0
4 electron donor

charge = 0
4 electron donor

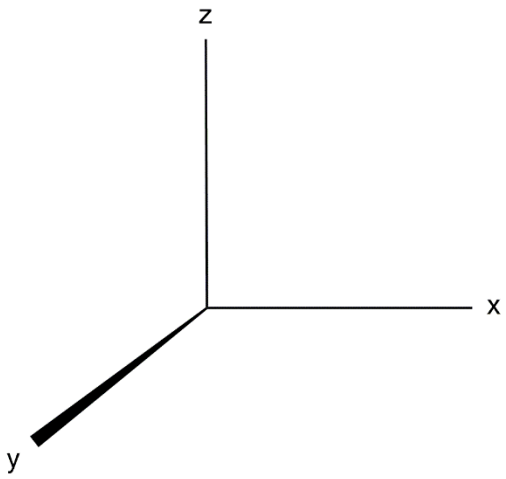
charge = 0
6 electron donor

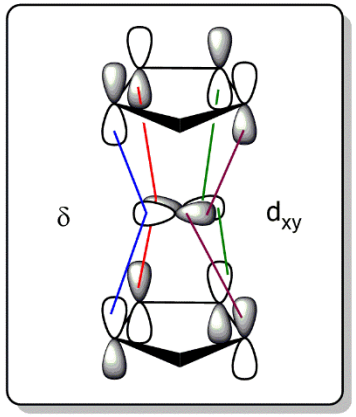
- **Elschenbroich & Salzer, Chapter 15 is very useful for cyclic π-ligands.**

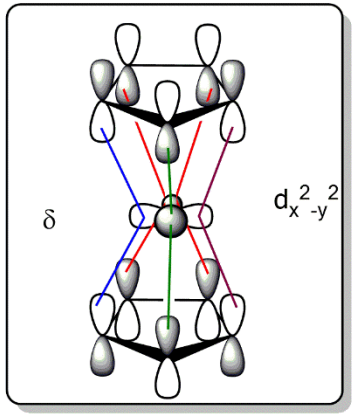
Molecular Orbitals for M–Cp

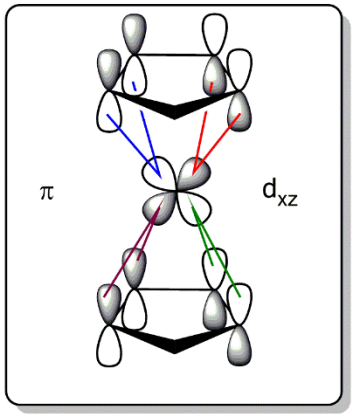


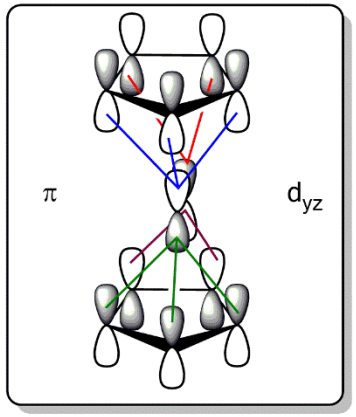
Molecular Orbitals for M–Cp

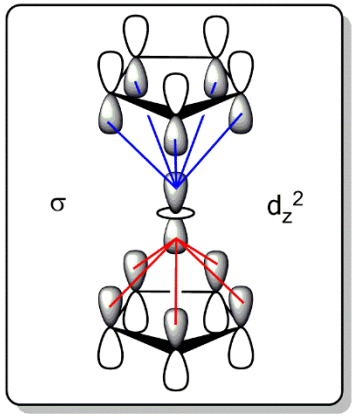




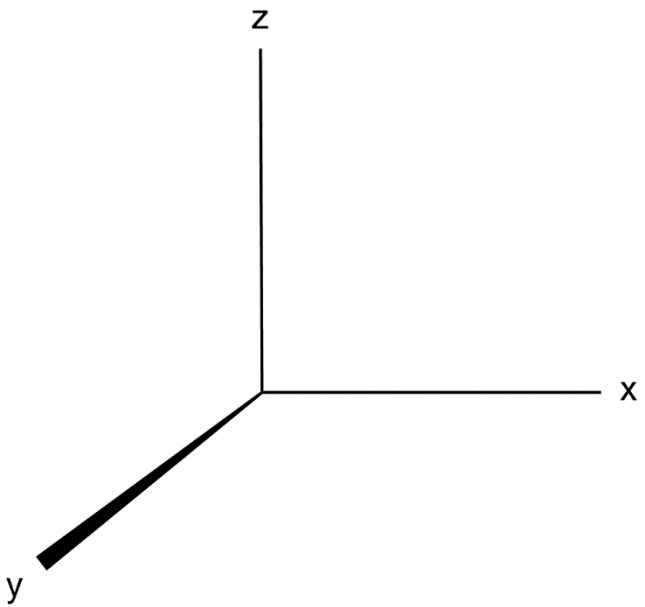


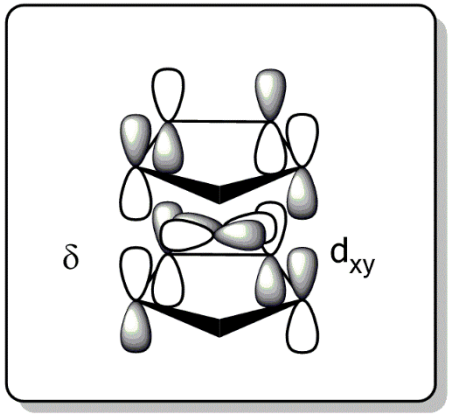


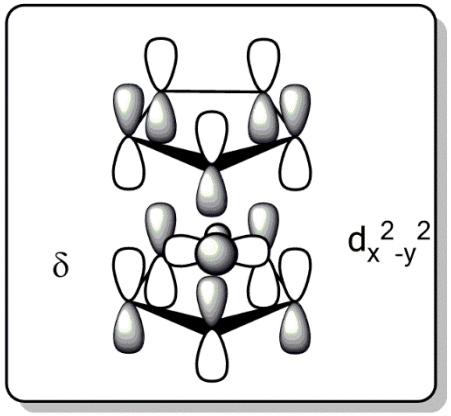


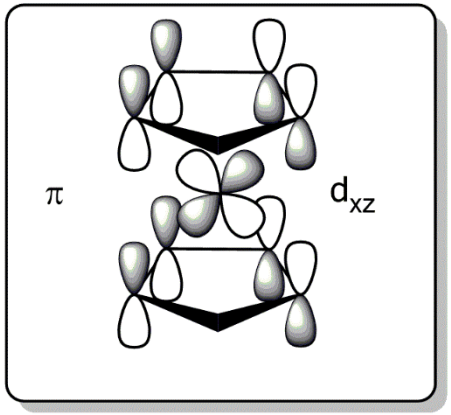


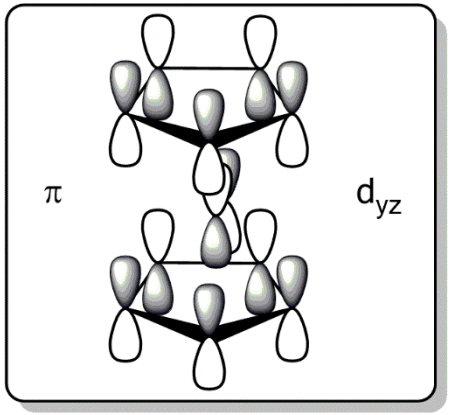
Molecular Orbitals for M–Cp

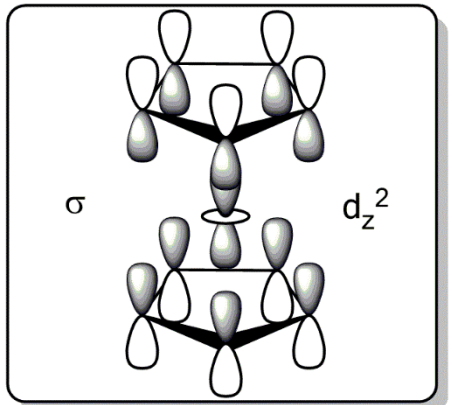










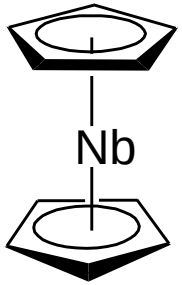


Cyclopentadienyl Complexes

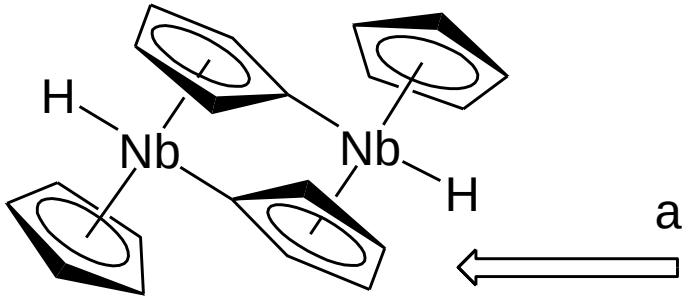
- **$C_5R_5^-$ ligands are not particularly effective in enforcing the 18-electron rule.**

VCp_2	$CrCp_2$	$MnCp_2$	$FeCp_2$	$CoCp_2$	$NiCp_2$
Purple	Scarlet	Brown	Orange	Purple-Black	Green
15	16	17	18	19	20

- **$RuCp_2$ and $OsCp_2$ are also known, but most other 2nd or 3rd row analogues are unstable.**



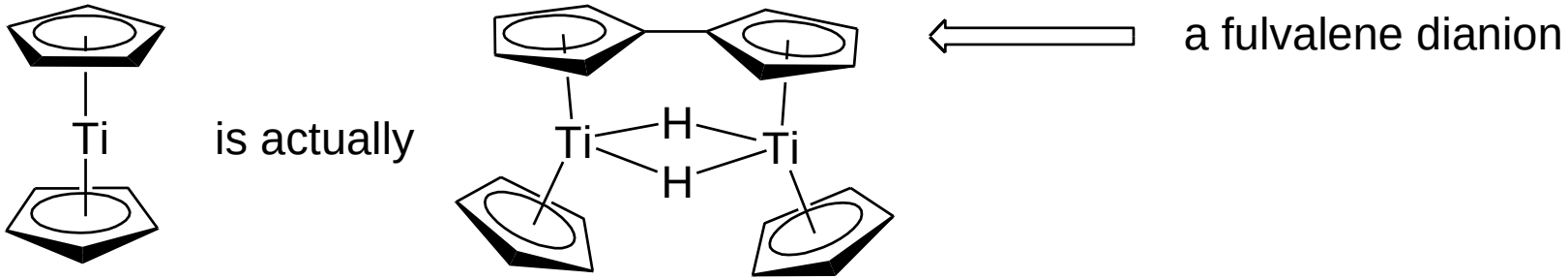
is actually



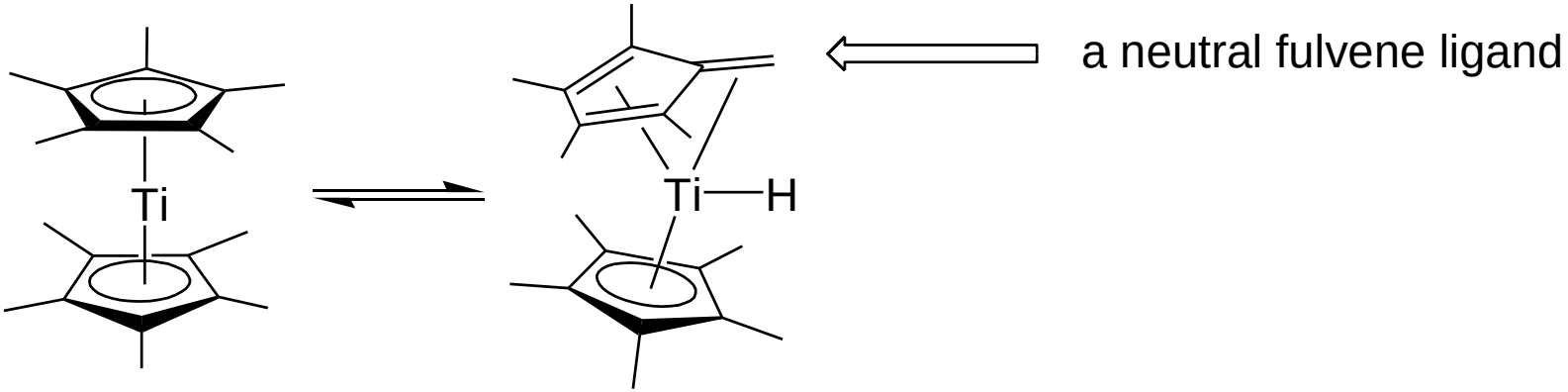
a cyclopentadiendiyl ligand

Cyclopentadienyl Complexes

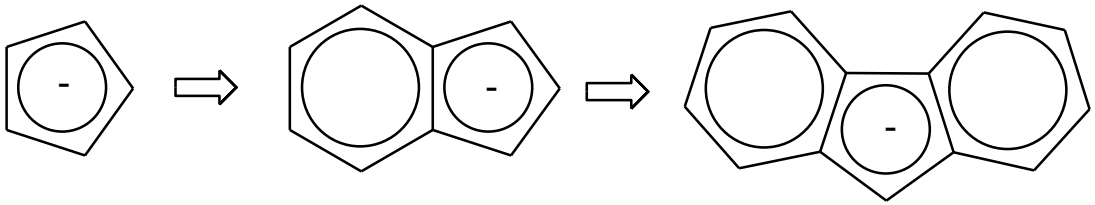
- **What about $TiCp_2$?**



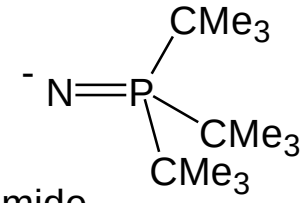
- **Can $[Ti(\eta^5\text{-}C_5R_5)_2]$ be isolated if Cp* ligands are used?**



Ligands related to $C_5R_5^-$



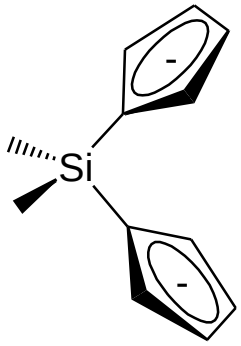
Cyclopentadienyl Indenyl Fluorenyl



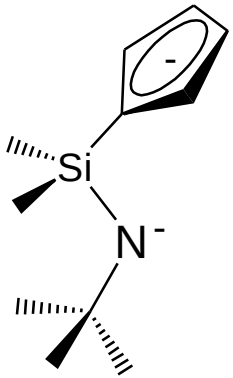
Phosphinimide

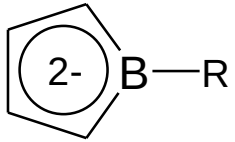
More prone to η^3-coordination

More prone to η^3- or η^1-coordination

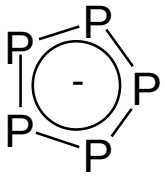


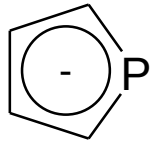
ansa-Cp



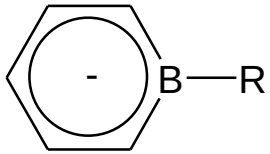


Borole

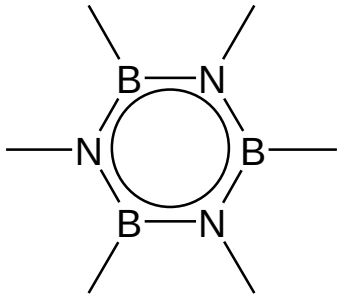




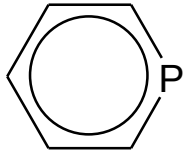
Phospholide



Boratabenzene



Borazine



Phosphabenzene