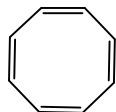
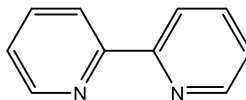


Common Ligands

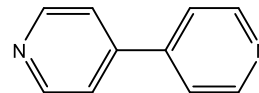
Anionic Ligands	Name		Neutral Ligands	Name
Br^-	bromo		NH_3	ammine
F^-	fluoro		H_2O	aqua
O^{2-}	oxo		NO	nitrosyl
OH^-	hydroxo		CO	carbonyl
CN^-	cyano		O_2	dioxygen
$\text{C}_2\text{O}_4^{2-}$	oxalato		N_2	dinitrogen
CO_3^{2-}	carbonato		$\text{C}_5\text{H}_5\text{N}$	pyridine
CH_3COO^-	acetato		$\text{H}_2\text{NCH}_2\text{CH}_2\text{NH}_2$	ethylenediamine



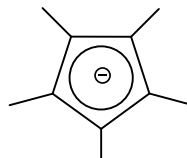
cyclooctatetraene
(COT)



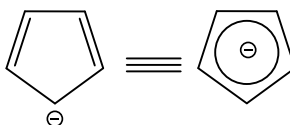
2,2'-bipyridine
(2,2'-bipy)



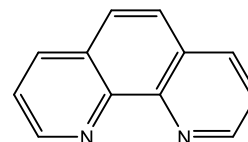
4,4'-bipyridine
(4,4'-bipy)



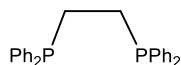
pentamethylcyclopentadienyl
(Cp*)



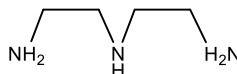
cyclopentadienyl
(Cp*)



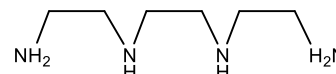
1,10-phenanthroline
(phen)



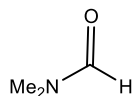
bis(diphenylphosphino)ethane
(diphos)



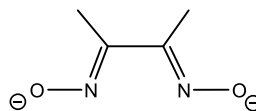
diethylenetriamine
(dien)



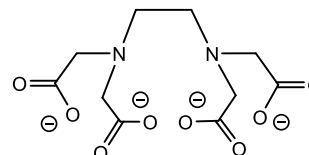
triethylenetetraamine
(trien)



dimethylformamide
(dmf)

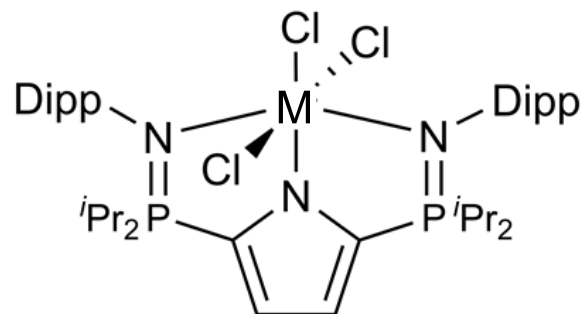


dimethylglyoximate
(dmg)



ethylenediaminetetraacetate
(edta)

Small vs. Large Metals




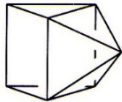

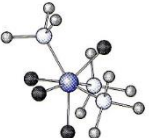

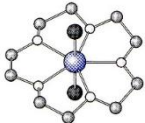
M = Ti, Zr, Hf

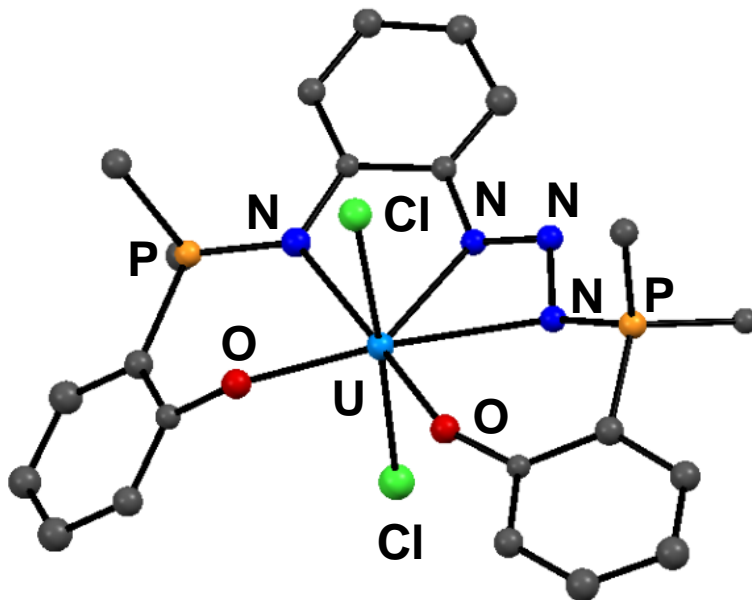
Bond (Å)	Ti	Zr	Hf
M-Cl	2.290(2)	2.440(2)	2.421(2)
M-Cl	2.347(2)	2.462(2)	2.444(2)
M-Cl	2.377(2)	2.476(2)	2.456(2)
M-N	2.088(5)	2.229(5)	2.204(7)
M-N	2.061(6)	2.187(5)	2.184(6)
M-N	2.060(5)	2.175(4)	2.173(5)

- Forfar, C.; Hayes, P. G. Unpublished work.

High Coordination Number Geometries

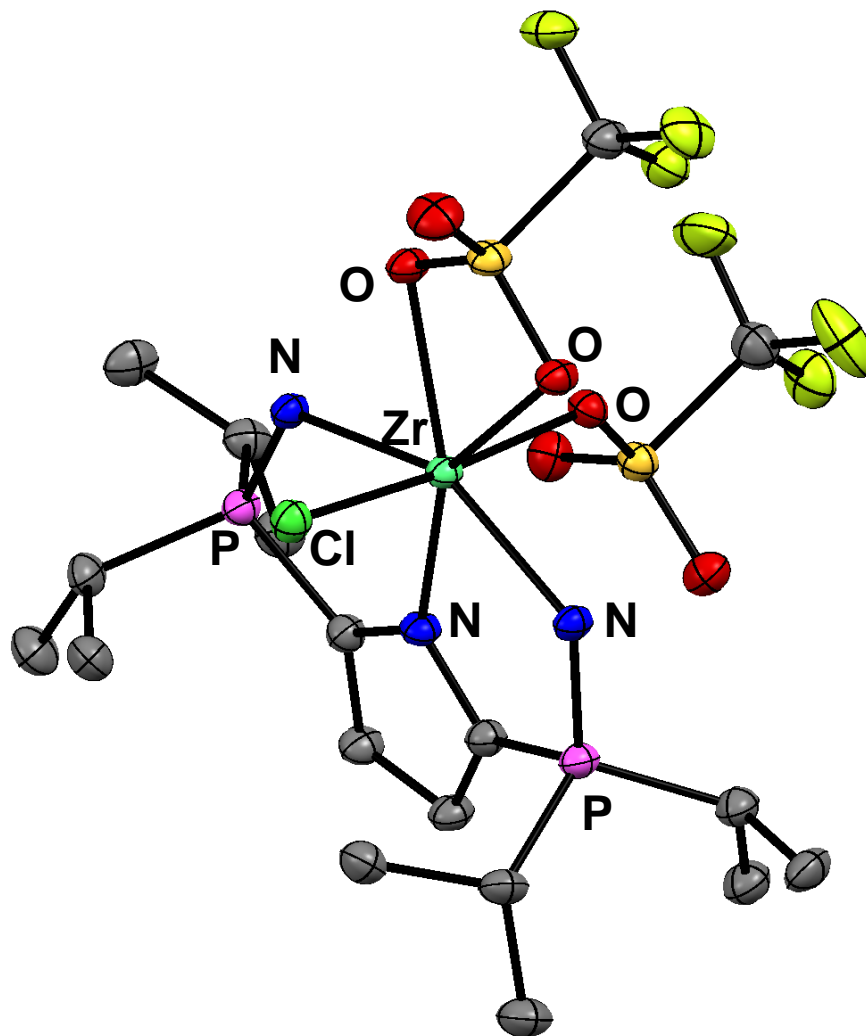
- C.N. 7: N.B. CN > 6 is relatively rare, usually when small ligands and large metals are involved

		
Monocapped Octahedron	Monocapped Trigonal Prism	Pentagonal Bipyramid
		
[TaCl₄(PMe₃)₃]	[ZrF₇]³⁻ or [NbF₇]²⁻	[ScCl₂(15-C-5)]⁻ or [NbF₇]³⁻



- Dickie, T. K. K.; MacNeil, C. S.; Hayes, P. G. *Dalton Trans.* **2020**, 49, ASAP.

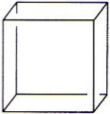


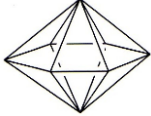
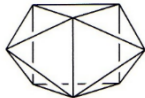
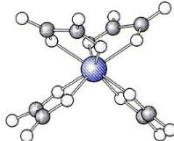
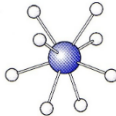
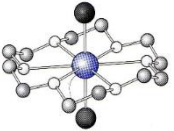
High Coordination Number Geometries

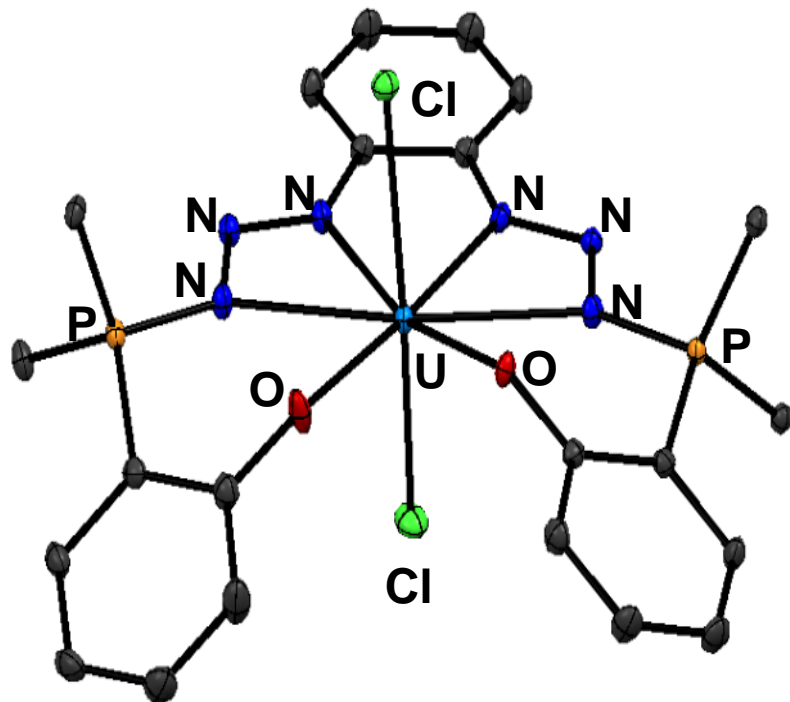


- Forfar, C.; Hayes, P. G. Unpublished work.

High Coordination Number Geometries

- C.N. 8:

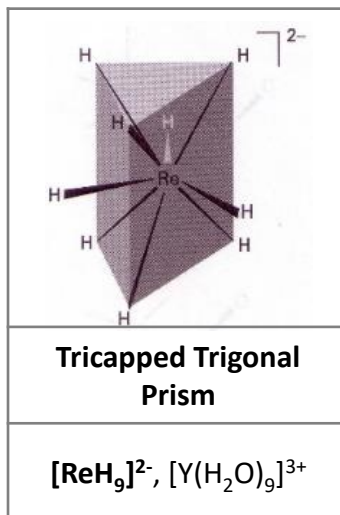
				
(Cube)	Square Antiprism	Dodecahedron	(Hexagonal Bipyramid)	(Bicapped Trigonal Prism)
-				-
$\text{Na}_3[\text{UF}_8]$	$[\text{Zr}(\text{acac})_4]$, $[\text{TaF}_8]^{3-}$	$[\text{Y}(\text{H}_2\text{O})_8]^{3+}$	$[\text{CdBr}_2(18\text{-C-6})]$	$[\text{ZrF}_8]^{4-}$



- How do you know if an atom is actually bound to the metal?

High Coordination Number Geometries

- C.N. 9:



- C.N. 10-12:

- Mostly *f*-block
- BH_4^- complexes are exceptions

