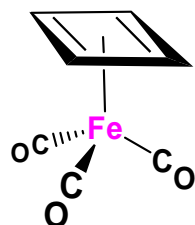
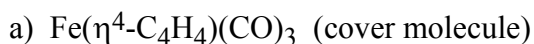


## Homework # 1: Due: February 8, 2007

Check the box to the right if you want your graded homework to be placed out in the public rack outside Prof. Stanley's office. Otherwise you will have to pick up your homework from Prof. Stanley in person:

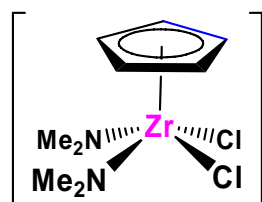


1. (38 pts) Sketch out a structure showing the geometry about the metal center as accurately as possible and clearly show the electron counting for the complexes below. Phosphine ligand abbreviations are defined in your notes (phosphine ligand section). Most molecules (some simplified) are from *Organometallics*, 2003, # 1 & 2, from the Chem Library or on-line at the Library E-Journal site (only accessible from a campus computer).

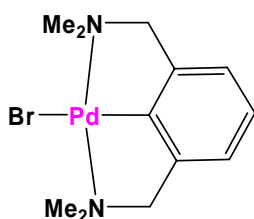


Fe(0)	d8
$\eta^4\text{-C}_4\text{H}_4$	4e-
3 CO	6e-
Total	18e-

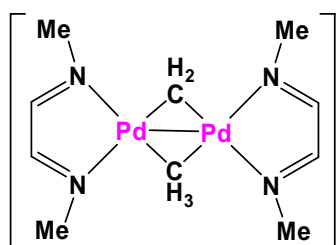
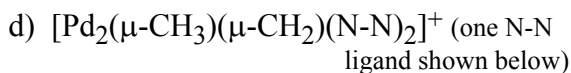
*C<sub>4</sub>H<sub>4</sub> is cyclobutadiene, a neutral 4e- donor*



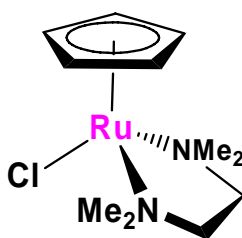
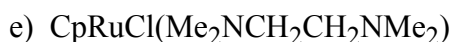
Zr(+4)	d0
Cp <sup>-</sup>	6e-
2 NMe <sub>2</sub> <sup>-</sup>	8e-
2 Cl <sup>-</sup>	4e-
Total	18e-



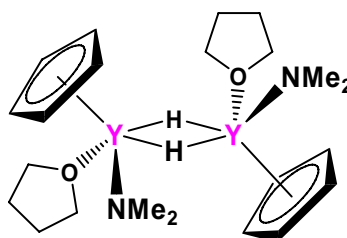
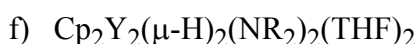
Pd(+2)	d8
NCN <sup>-</sup>	6e-
Br <sup>-</sup>	2e-
Total	16e-



Pd(+2)	d8
N-N	4e-
$\mu\text{-CH}_2^{2-}$	2e-
$\mu\text{-CH}_3^-$	1e-
Pd-Pd	1e-
Total	16e-

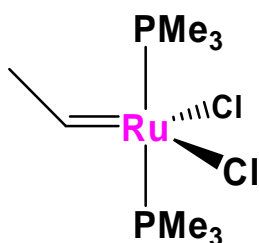


Ru(+2)	d6
Cp <sup>-</sup>	6e-
2 NR <sub>3</sub>	4e-
Cl <sup>-</sup>	2e-
Total	18e-



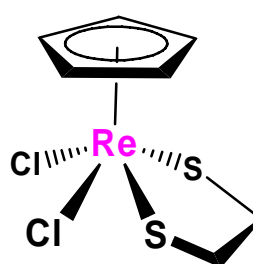
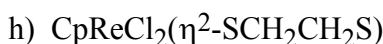
Y(+3)	d0
Cp <sup>-</sup>	6e-
2 $\mu\text{-H}^-$	2e-
THF	2e-
NMe <sub>2</sub> <sup>-</sup>	4e-
Total	14e-

*No Y-Y bonding due to d<sup>0</sup> electron count!*

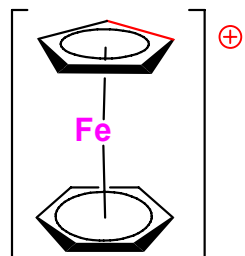
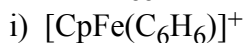


Ru(+4)	d4
=CHR <sup>2-</sup>	4e-
2 PR <sub>3</sub>	4e-
2 Cl <sup>-</sup>	4e-
Total	16e-

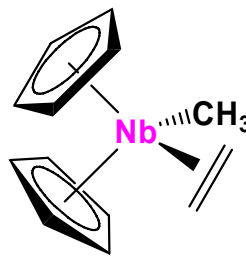
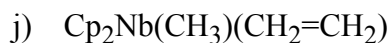
*Also OK to count the =CHR group as a neutral carbene that is a 2e- donor – you will still get the same total e-count*



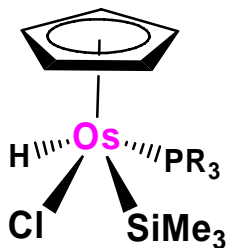
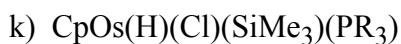
Re(+5)	d2
Cp <sup>-</sup>	6e-
2 SR <sup>-</sup>	4e-
2 Cl <sup>-</sup>	4e-
Total	16e-



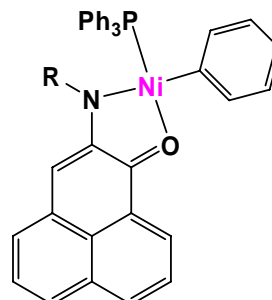
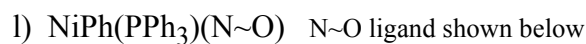
Fe(+2)	d6
C <sub>6</sub> H <sub>6</sub>	6e-
<u>Cp<sup>-</sup></u>	<u>6e-</u>
Total	18e-



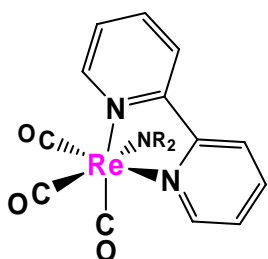
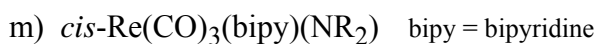
Nb(+3)	d2
2 Cp <sup>-</sup>	12e-
H <sub>2</sub> C=CH <sub>2</sub>	2e-
<u>CH<sub>3</sub><sup>-</sup></u>	<u>2e-</u>
Total	18e-



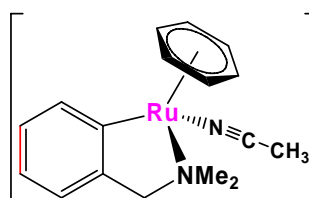
Os(+4)	d4
Cp <sup>-</sup>	6e-
SiR <sub>3</sub> <sup>-</sup>	2e-
H-	2e-
PR <sub>3</sub>	2e-
<u>Cl<sup>-</sup></u>	<u>2e-</u>
Total	18e-



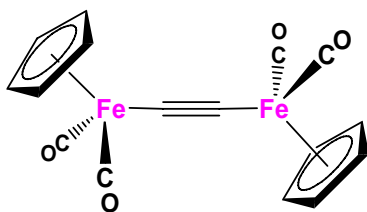
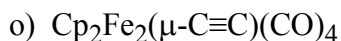
Ni(+2)	d8
N~O <sup>-</sup>	4e-
PPh <sub>3</sub>	2e-
<u>Ph<sup>-</sup></u>	<u>2e-</u>
Total	16e-



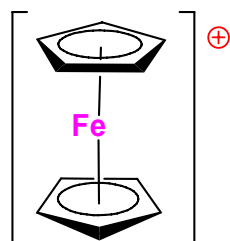
Re(+1)	d6
NR <sub>2</sub> <sup>-</sup>	2e-
bipy	4e-
<u>3 CO</u>	<u>6e-</u>
Total	18e-



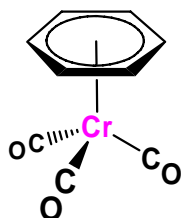
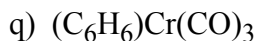
Ru(+2)	d6
C~N <sup>-</sup>	4e-
C <sub>6</sub> H <sub>6</sub>	6e-
<u>NCCH<sub>3</sub></u>	<u>2e-</u>
Total	18e-



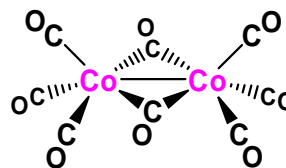
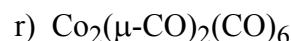
Fe(+2)	d6
Cp <sup>-</sup>	6e-
μ-C≡C <sup>2-</sup>	2e-
<u>2 CO</u>	<u>4e-</u>
Total	18e-



Fe(+3)	d5
<u>2 Cp<sup>-</sup></u>	<u>12e-</u>
Total	17e-



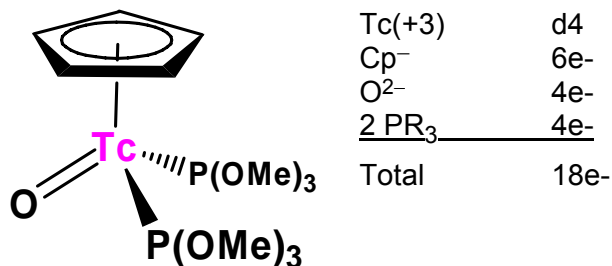
Cr(0)	d6
C <sub>6</sub> H <sub>6</sub>	6e-
<u>3 CO</u>	<u>6e-</u>
Total	18e-



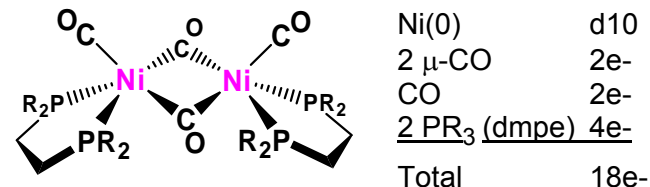
Co(0)	d9
2 μ-CO	2e-
3 CO	6e-
<u>1 Co-Co</u>	<u>1e-</u>
Total	18e-

2. (12 pts) Propose an *18e- structure* for the following metal/ligand combinations. Use at least one of each metal and ligand listed. Complexes must be neutral. Don't use more than 2 metal centers. Clearly show your electron counting. Ligands are shown without charges, please indicate the proper ligand charge in your electron counting. Draw a reasonable structure showing the geometry about the metal center(s).

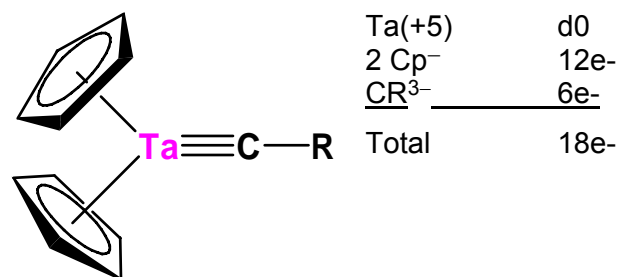
a) Tc, Cp, O, P(OMe)<sub>3</sub>



b) Ni, dmpe (chelating), μ-CO, CO



c) Ta, Cp, C-R



d) Cr, Cl, C≡NMe

