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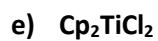
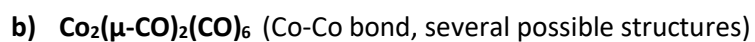
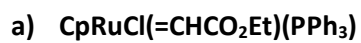
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CHEM.524

Homework 1

1st semester 1445

1) Sketch structures for the following:



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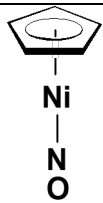
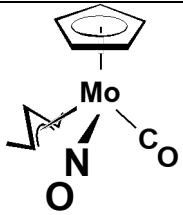
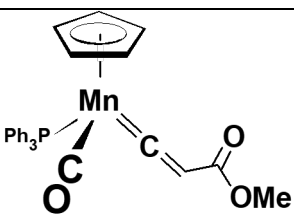
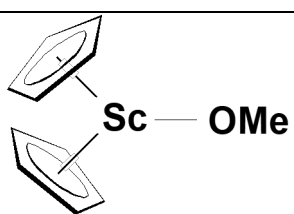
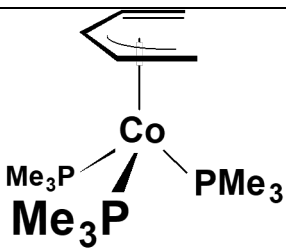
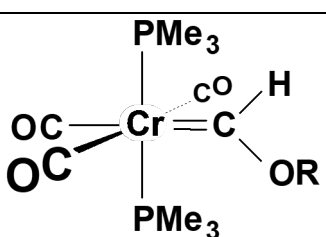
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2) Show the electron counting for the following:

a)	
b)	
c)	
d)	
e)	
f)	
g)	

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h)	
i)	
j)	
k)	
l)	
m)	
n)	

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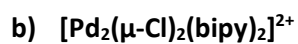
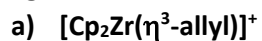
o)	
p)	
q)	
r)	
s)	
t)	

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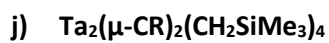
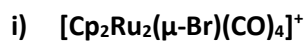
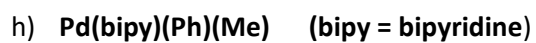
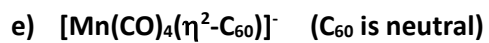
u)	
v)	
w)	

3) 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 (see the phosphine ligand section).



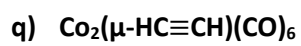
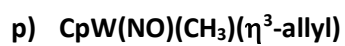
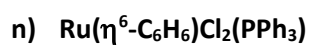
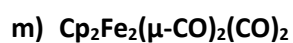
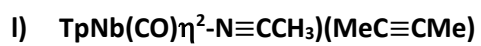
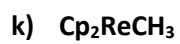
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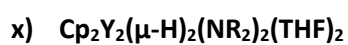
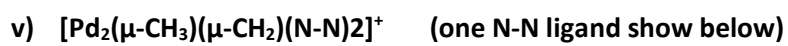
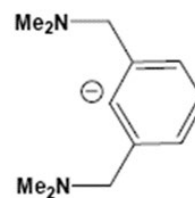
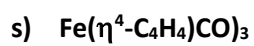
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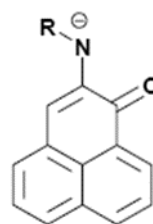
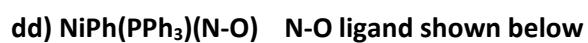
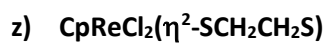
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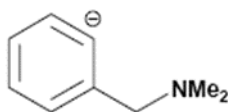
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ff) $[\text{Ru}(\text{C}_6\text{H}_6)(\text{C-N})(\text{N}\equiv\text{CCH}_3)]^+$ C-N below



gg) $\text{Cp}_2\text{Fe}_2(\mu\text{-C}\equiv\text{C})(\text{CO})_4$

hh) $[\text{Cp}_2\text{Fe}]^+$

ii) $(\text{C}_6\text{H}_6)\text{Cr}(\text{CO})_3$

jj) $\text{Co}_2(\mu\text{-CO})_2(\text{CO})_6$

4) Propose an 18e- structure for the following metal/ligand combinations. Use at least one of each metal and ligand listed. Complexes should be neutral. Don't use more than 2 metal centers. 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) Hf, Cp, H, PMe₃

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b) Nb, O, OMe, NR, Me₂NCH₂CH₂NMe₂

c) Mo, Cp, CH₃

d) Re, Tp (tris(pyrazol))(borate), allyl, NR₂

e) Tc, Cp, O, P(OMe)₃

f) Ni, dmpe (chelating), μ-CO, CO

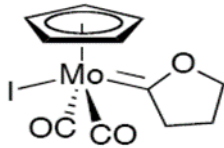
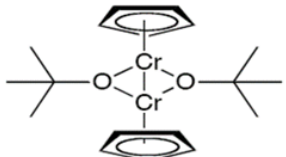
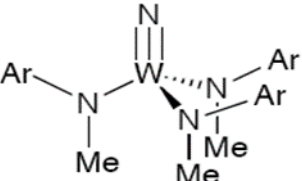
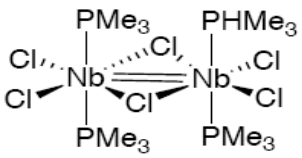
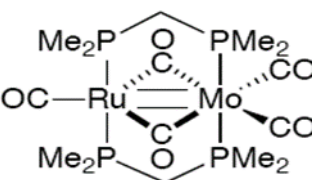
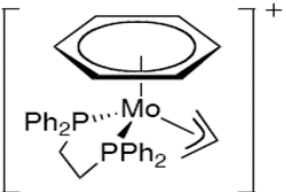
g) Ta, Cp, C-R

h) Cr, Cl, C≡NMe

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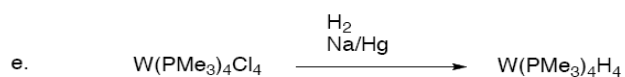
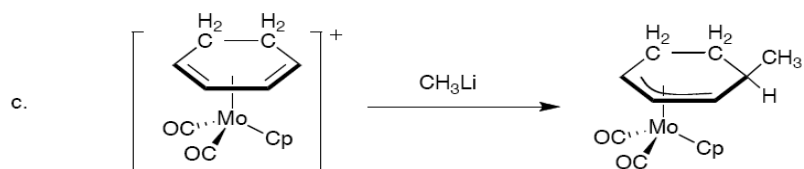
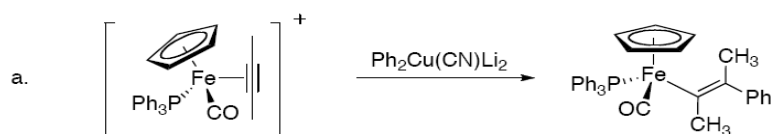
- 5) For each complex below, provide the oxidation state of the metal, the number of d electrons, and the total electron count for the complex. If there is more than one metal center, consider each separately.

a)	
b)	
c)	
d)	
e)	
f)	

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6) For each of the following reactions, indicate whether the metal is oxidized, reduced, or retains the same oxidation state?



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7) For each problem below, determine the correct number of ligands to give a stable, neutral metal complex. Draw this complex with the correct 3-dimensional geometry.

