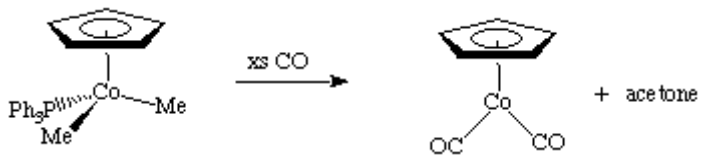
Problem set (exercise) 1

1. Which of the following mechanisms is **most** plausible for the following reaction? Why



○ a) loss of phosphine, b) addition of CO, c) insertion of CO, d) addition of excess CO with reductive elimination of acetone.

○ a) addition of CO, b) loss of phosphine, c) insertion of CO, d) addition of CO with reductive elimination of acetone.

○ a) addition of CO, b) insertion of CO, c) reductive elimination of acetone, d) addition of CO, e) loss of phosphine.

○ a) loss of phosphine, b) addition of CO, c) addition of CO, d) reductive elimination of acetone, d) addition of CO.

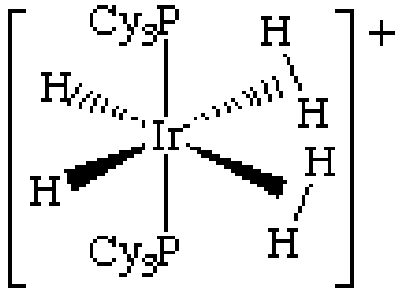
2. Which **one** of the following can **NOT** undergo oxidative addition of MeI? Why

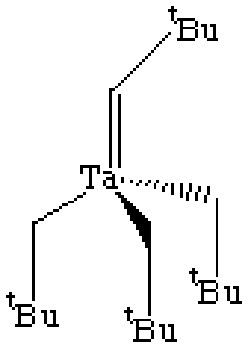
○ $Ir(PPh_3)_2(CO)Cl$ ○ $[RhI_2(CO)_2]^-$ ○ $Cp^*_2Zr(Me)Cl$ ○ $Na_2[Fe(CO)_4]$

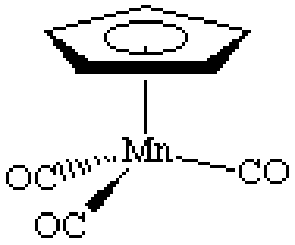
3. Which of the following will be **more** reactive towards oxidative addition of dihydrogen? Why?

○ $Rh(PPh_3)_3Cl$ ○ $Rh(PPh_3)_2(CO)Cl$

4. Name the oxidation states, d electron count, and valence electrons of the following complexes.

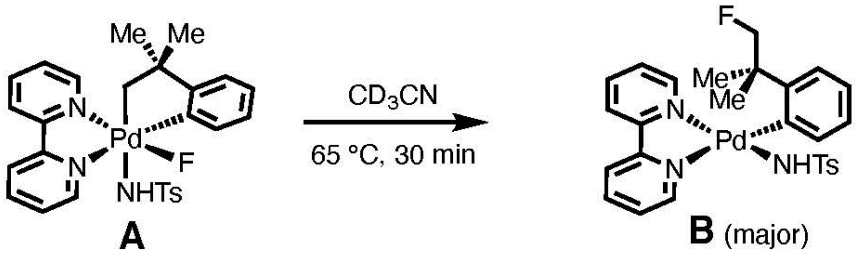






5.

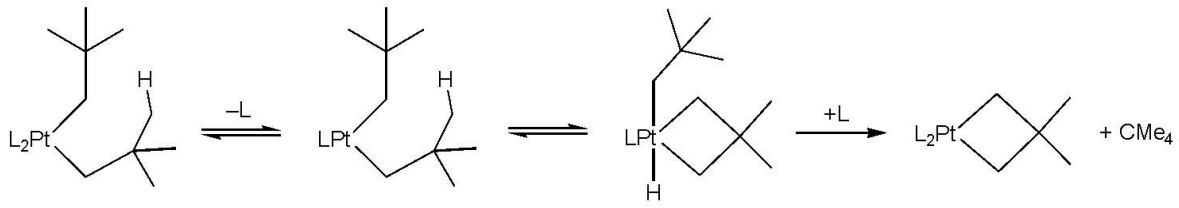
Cyclometallated palladium species **A** rapidly undergoes reductive elimination to give **B**.



A. For both complexes, **provide the (a) coordination number, (b) d-electron count, (c) geometry, (d) metal oxidation state, and (e) total electron count.**

6. Metal alkoxides, like metal alkyls, can also β-eliminate. With this in mind:
(a) explain why –O$_t$Bu is a common ligand in metal alkoxide chemistry.
(b) what are the products of decomposition of primary and secondary alkoxide ligands?
(c) why are alcohols, in the presence of a base, used as reducing agents **in combination with** metal complexes?

7. In the following reaction scheme, name the reaction(s) occurring at each step.



8.

Complex **A** underdoes 1,2-migratory insertion with a rate that is ~40x faster than that of complex **B.** **explain this observation.**