

# Organometallic Chemistry - 4571

HW # 2 Due: March 15 (by Noon!), 2007

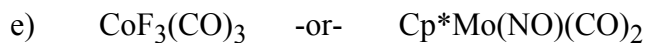
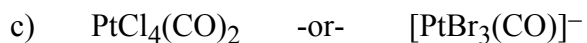
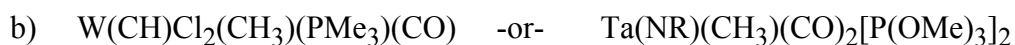
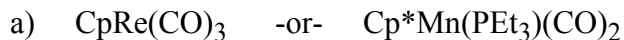
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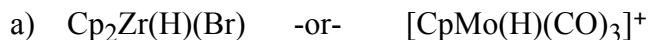
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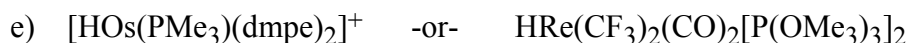
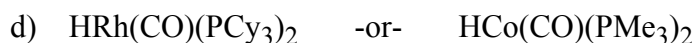
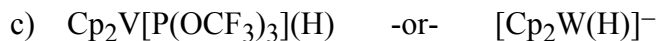
Check the box to the right if you want your graded homework to be placed out in the public rack outside Prof. Stanley's office. Otherwise you will have to pick up your homework from Prof. Stanley in person:

1. (20 pts) For each of the following pairs of metal complexes, circle the one that will have the highest CO stretching frequency. Briefly discuss your reasoning for each case.



2. (20 pts) For each of the following pairs of metal hydride complexes, circle the one that should have the lowest  $\text{pK}_a$  value. Briefly discuss your reasoning for each case.





4. (10 pts) Consider  $\text{Cp}_2\text{Rh}_2[\mu-(\text{CF}_3\text{CCCF}_3)](\text{CO})(\text{CNR})$  shown on page 7 of the Alkene/Alkyne chapter. The Rh-Rh bond distance is 2.67 Å strongly indicating the presence of a covalent bond between the two rhodium atoms. (a) (5 pts) show the electron-counting for this complex including Rh oxidation state, ligand charges, # of e- donated, etc. Only one Rh center needs to be counted since both the CO and  $\text{C}\equiv\text{NR}$  ligands are neutral 2e- donors making the complex electronically symmetrical from an electron counting viewpoint. (b) (5 pts) Why does the alkyne ligand orient parallel to the Rh-Rh bond? From an organic hybridization and bonding viewpoint how should the “alkyne” be considered? Draw a simple orbital picture showing how the filled “alkyne” orbitals are overlapping with the empty Rh orbitals (use the diagram below as a starting point, ignore all other ligands).

