

Organometallic Chemistry - 4571

HW # 2 Due: March 13, 2008 (by Noon)

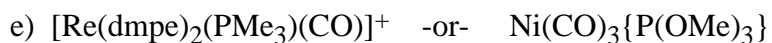
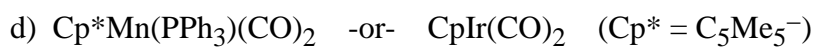
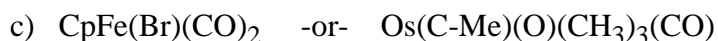
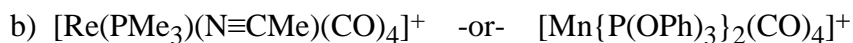
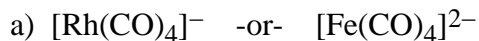
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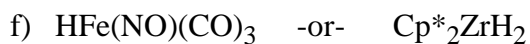
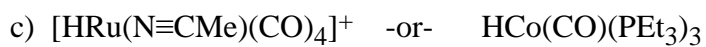
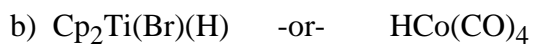
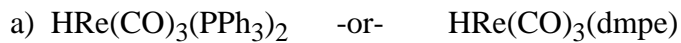
Group: _____

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. (18 pts) For each of the following pairs of metal complexes, circle the one that should have the highest average carbonyl IR stretching frequency. What does this tell you about the relative electron density on the metal center (electron-rich or deficient)? Briefly discuss your reasoning for each case.

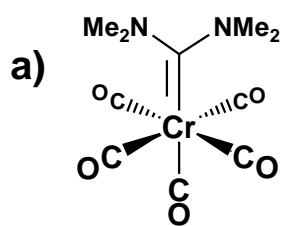


2. (18 pts) For each of the following pairs of metal hydride complexes, circle the one that should have the lowest pK_a value. Briefly discuss your reasoning for each case.

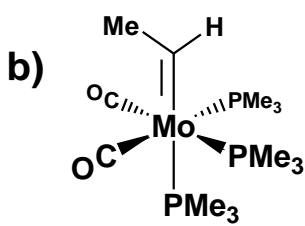


3. (8 points) The nitrosyl ligand usually coordinates as a cationic ligand, NO^+ . It can, however, occasionally act as an anionic NO^- ligand. When it is behaving as an anionic ligand it adopts a bent coordination geometry. Discuss (using Lewis dot-like figures) the distribution of electrons in both kinds of M-NO complexes and how these affect the structures (linear vs. bent). Assume in both cases that you are dealing with a $[\text{M-NO}]^+$ unit (positive charge on the overall complex) where the metal has 2 or more d electrons. Clearly show the relative oxidation states of the metal and the relative d electron count for each bonding case (linear vs. bent). I mentioned briefly in class that in some ways NO^- is the extreme case of NO^+ acting as a hyper π -backbonding ligand. Explain what I meant by that statement.

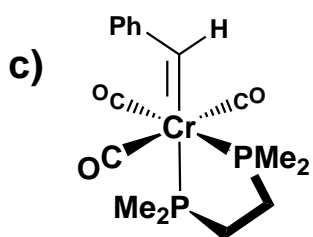
4. (6 points) Circle the correct ordering of the following group of Fischer carbenes from the strongest $\text{M}=\text{CR}_2$ bond to weakest. Explain your reasoning.



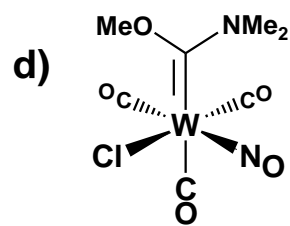
a > b > c > d



b > c > d > a



d > c > b > a



c > a > d > b