

Organometallic Chemistry - 4571

Name: _____

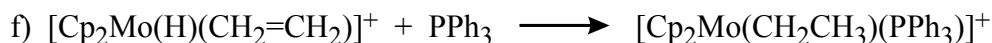
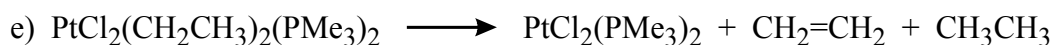
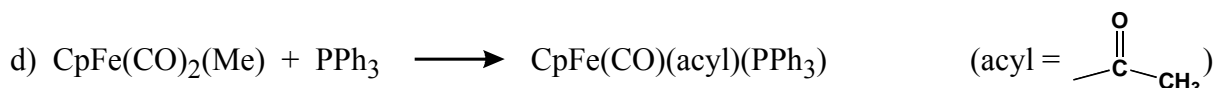
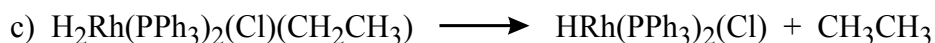
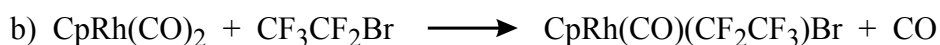
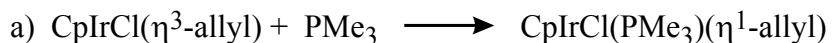
HW # 3 Due: April 19 (by Noon), 2007

Signature: _____

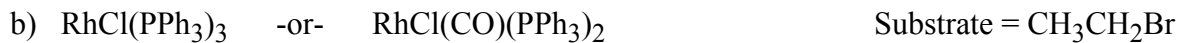
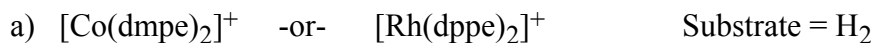
Group: _____

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. (30 pts) Identify the following reactions by their type (migratory insertion, elimination, β -hydride elimination, oxidative addition, reductive elimination, ligand addition, ligand dissociation, ligand coordination change, etc.). Note that in some cases you will have to use more than one description for a reaction that has several steps. Note also that the order may be important! No discussion is needed.



2. (20 pts) For each pair of complexes shown below, circle the one that should be the most reactive towards the oxidative addition the substrate shown. Give a brief but clear explanation for your choice.

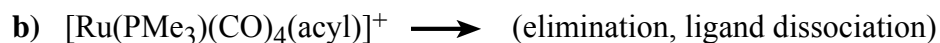


3. (10 pts) $(\eta^3\text{-allyl})\text{Co}[\text{P}(\text{OMe})_3]_3$ is an arene hydrogenation catalyst that can cleanly hydrogenate benzene to cyclohexane.

a) (5 pts) It is known that the first reaction step in the hydrogenation mechanism is H_2 oxidative addition to the complex. It is also known that there is **no** phosphine dissociation for this step. How does H_2 add to the complex? Discuss.

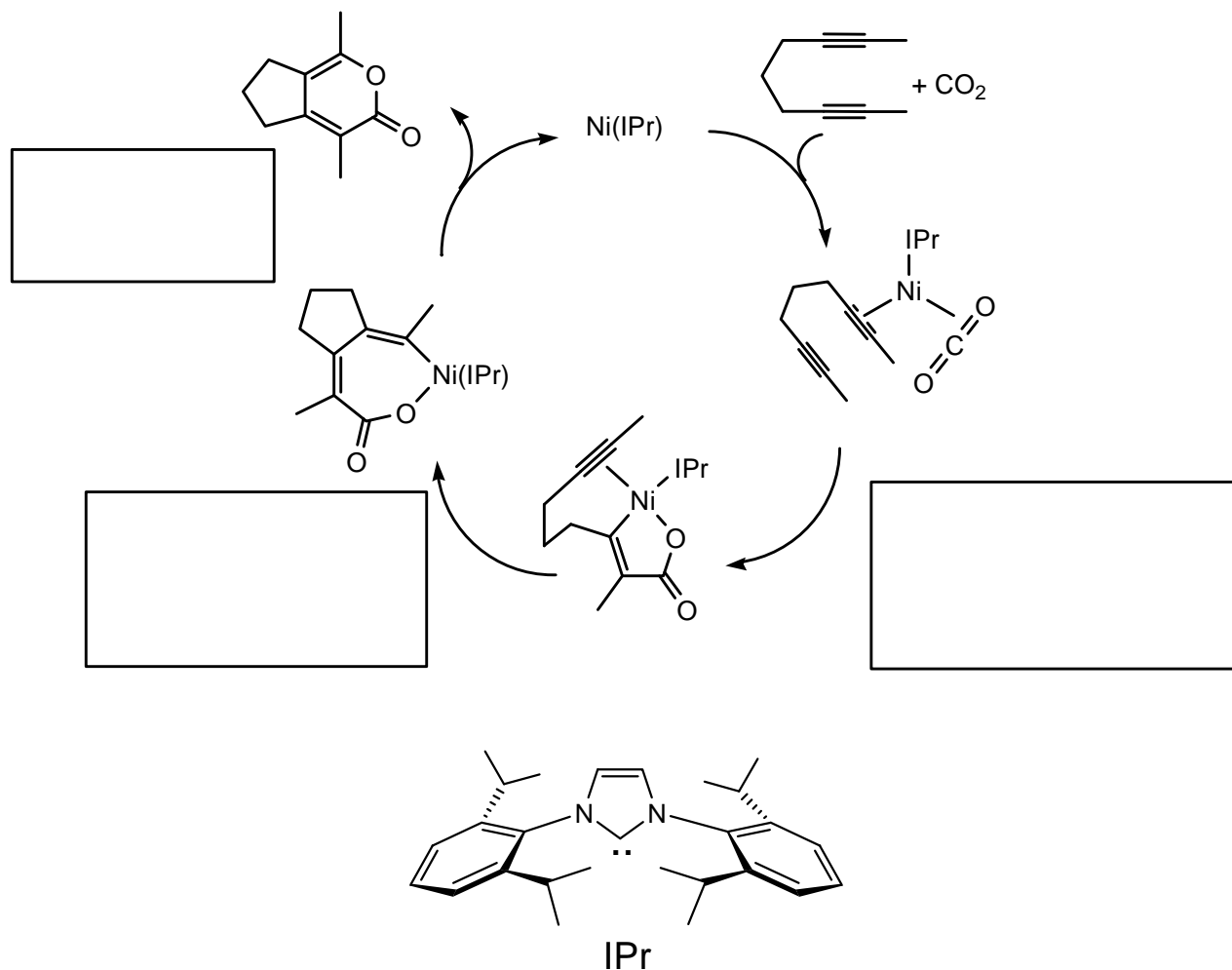
b) (5 pts) The use of bulkier phosphite ligands such as $\text{P}(\text{OEt})_3$ or $\text{P}(\text{O}^i\text{Pr})_3$ speeds up the rate of arene hydrogenation. Discuss the reason(s) for this observation. The statement in part a) does not necessarily apply.

4. (20 pts) Consider the following reactions. Sketch out the final product clearly showing the structure and geometry. The rxn steps listed may not be in the correct order. If they are NOT in the correct order please include a brief and clear explanation of the correct order of steps and why they go in that order.



5. (20 pts) Shown below is a catalytic cycle for the cyclocoupling of CO_2 and diynes developed by Prof. Janis Louie at the University of Utah (*JACS*, 2002, 124, 15188).

a) (15 pts) Label the steps with boxes next to them. There may be more than one step shown in each transformation. IPr ligand shown below.



b) (5 pts) The ligand is shown as a neutral ligand and Prof. Louie draws the bond from the IPr to the Ni as a single bond. Is this correct? Clearly discuss.