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English

Exam in KJ3005/KJ8105
Organometallic compounds in organic synthesis

Monday 30. November 2009
kl. 0900 – 1300

Permitted tools: D – No printed or written text is permitted.
Molecular models are permitted.

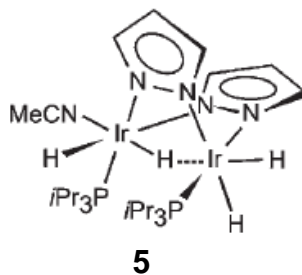
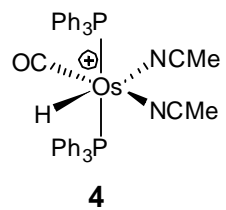
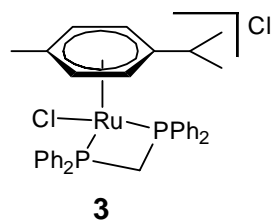
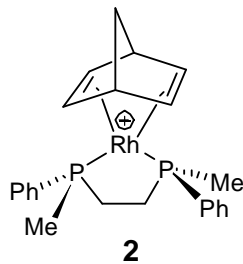
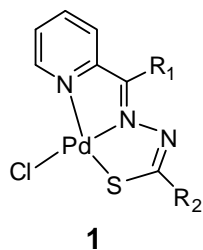
The examination results will be open to the public by 21. December 2009

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Problem I (25 points)

For each of the following complexes:

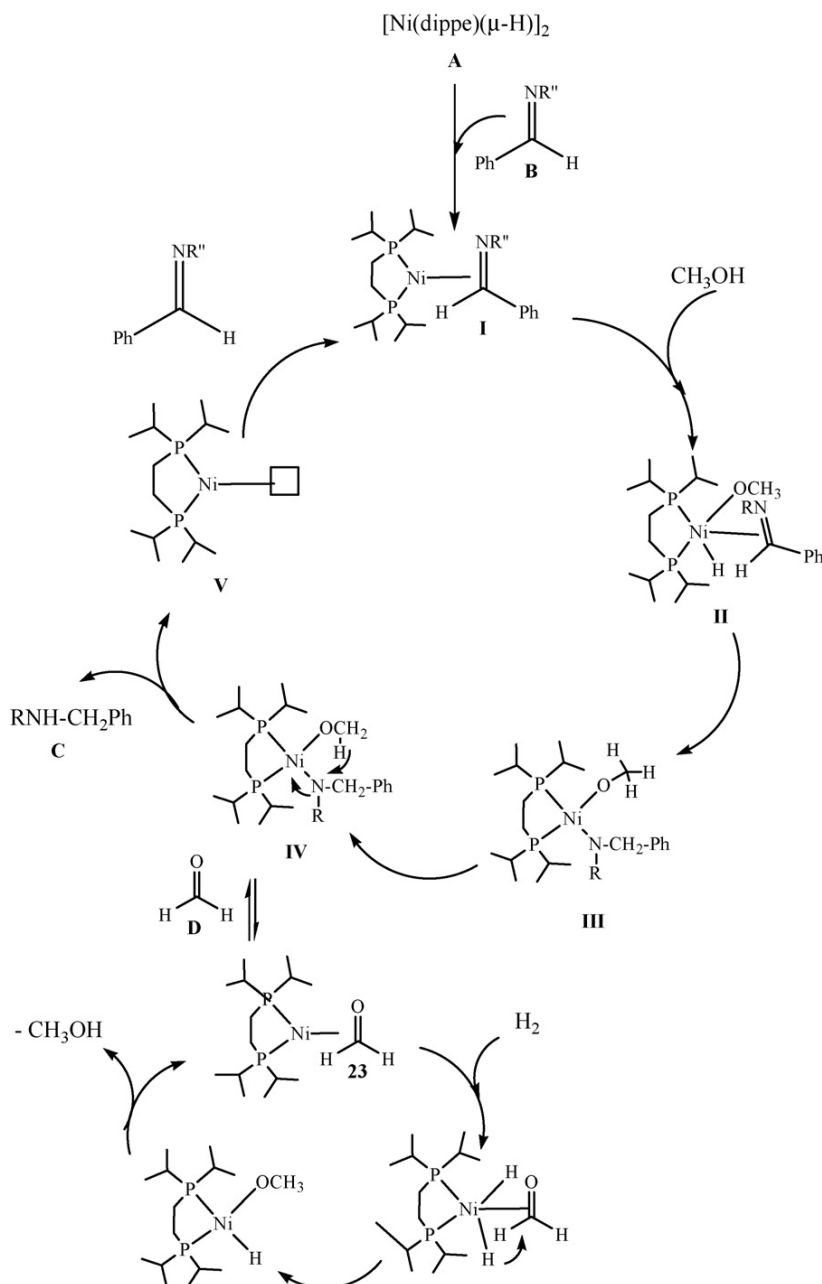
- (a) What is the number of valence electrons around the metal?
- (b) What is the oxidation state of the metal?



Problem II (25 points)

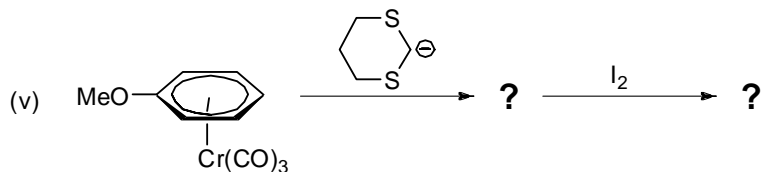
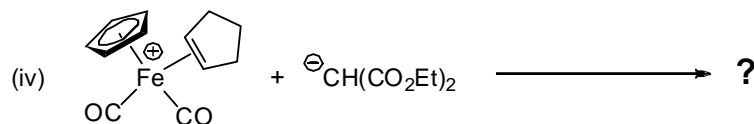
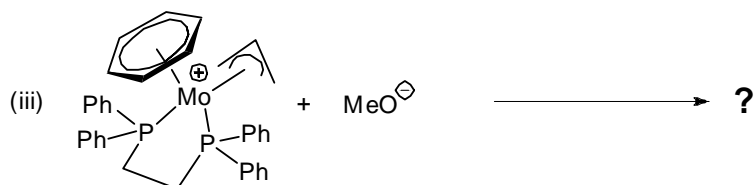
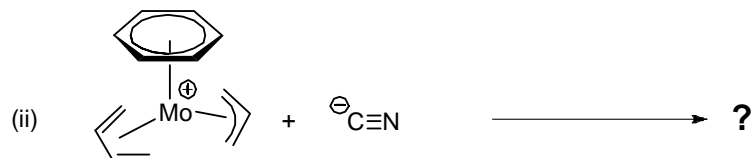
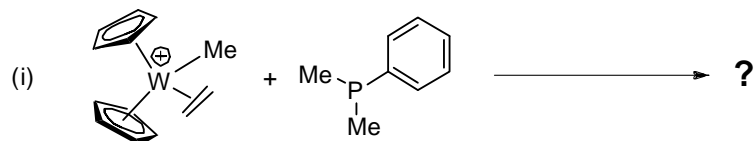
A catalytic cycle is described below.

- What is the structure of $[\text{Ni}(\text{dippe})(\mu\text{-H})_2]$? (dippe is the diphosphine ligand shown in complex **I**).
- Name the elementary reaction for each of the steps (starting from complex **I**).
- What is the oxidation state for the metal in the different complexes?

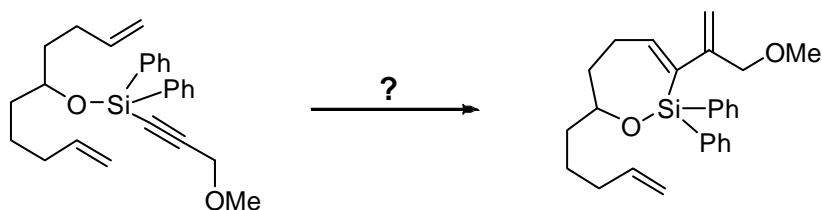


Problem III (25 points)

(a) Show the products missing in the reaction schemes shown below.

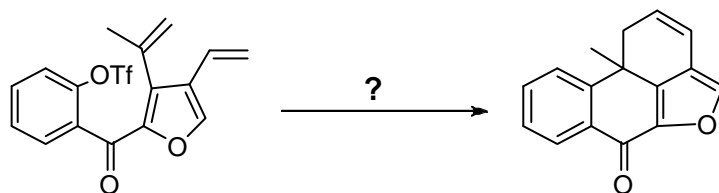


(b) Give the reagents necessary for promoting the transformation shown below. Write also the mechanism for the reaction.

Maifeld et al. *J. Am. Chem. Soc.* **2004**, 126, 12228

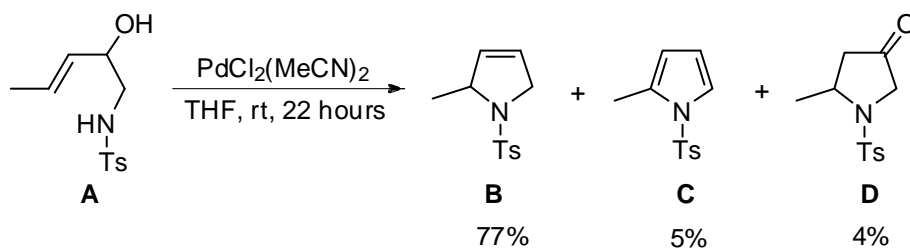
Problem IV (25 points)

- (a) Give reagents and the mechanism for the reaction shown below.



Gorobets *et al.* *Tetrahedron Lett.* **2004**, 45, 3597

- (b) Show the mechanisms involved for formation of products **B**, **C** and **D** from substrate **A**. Stereochemical points of importance should also be shown. Are the reactions producing **B**, **C** and **D** catalytic regarding palladium?



Kimura *et al.* *J. Chem. Soc., Chem. Commun.* **1994**, 2531

Good Luck!

ORG