423／523 Organometallic Chemistry
Mid－term，8：30 am Friday $16{ }^{\text {th }}$ November 2012
50 minutes， 50 marks．
NAME： $\qquad$

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1. Examine the scheme below ( $\mathrm{L}=$ phosphine). Fill in the boxes with the appropriate structures and give electron counts and oxidation states for all palladium complexes. Write down the overall reaction, and name reactions $\mathbf{A}, \mathbf{B}, \mathbf{C}$ and $\mathbf{D}$.
[10 marks]

2. Draw the product(s) of the reaction between Grubbs' second generation catalyst and one equivalent of norbornene. Your scheme should indicate the mechanism and include an intermediate. What happens if you then add one equivalent of 1-hexene? Draw the product(s).

3. Predict the products of the addition of $\mathrm{PMe}_{3}$ to the complex shown below, showing the structure of each and the expected relative distributions. Note: the products include all the atoms of the original complex and of the $\mathrm{PMe}_{3}$. Choose ONE of the products, and describe in as much detail as you can its $v(\mathrm{CO})$ IR spectrum and its ${ }^{31} \mathrm{P}$ NMR spectrum (proton decoupled).

4. Explain the difference between homogeneous and heterogeneous catalysts and detail the advantages/disadvantages of both.
5. Use the Davies-Green-Mingos rules to predict the products of the reactions between the following complexes and $\mathrm{RS}^{-}$. Briefly explain why the nucleophile chooses that particular site of attack.
[8 marks]

