423/523 Organometallic Chemistry
Problem set 6

1. Sketch the transition state for the first step in the oxidative addition of a benzyl halide and a square planar complex ML_4.

2. Explain the following. The *cis* isomer of $L_2Pd(Et)_2$ decomposes immediately to give butane, but the *trans* isomer produces a 1:1 mixture of ethene and ethane.

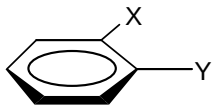
3. The reaction of $L_2Pd(Me)_2$ with PhC*HDBr produced PhC*HDMe. What is the other product, and do you expect retention or inversion at the chiral carbon?

4. SO_2 can insert into an L_nM-CR_3 bond. The reaction is thought to proceed by an S_E2 pathway to form an ion pair, $[L_nM]^+[OS(O)R]^-$. Collapse of the ion pair generates the O-sulfinate (formally a 1,2-insertion of SO_2), which can rearrange to the *S*-sulfinate (formally a 1,1-insertion of SO_2). Draw the transition state, the ion pair, and the *O*- and *S*-sulfinates.

5. Provide a mechanism for the reaction:

$$L_nZr–H \;+\; \textit{E}\text{–2-butene} \;\rightarrow\; L_nZr–CH_2CH_2CH_2CH_3$$

6. Binding of $Cr(CO)_3$ to an achiral arene:



gives a chiral complex. Illustrate this. What about for *meta*- and *para*- substituted arenes? How might this be useful?