Problem set 4 –KW

1. The mechanism of the water addition step in the Wacker oxidation is still much under debate. Here below is an experiment to elucidate this mechanism in which the intermediate Pd-η1-alkyl complex is trapped by carbon monoxide before it can make hydrogen–β-elimination. Based on the stereochemical outcome of the reaction, does this experiment support SYN- (insertion) or ANTI-addition of water?

2. How could the 2-quinolone below be synthesized using a Heck reaction?

3. What is the product of the following transformations?

   1) n-BuLi
   2) ZnBr₂
   3) CH₂CH₂CH₂I
   4) Pd(dba)₂/PPh₃ (catalytic amount)

   \[ \text{dba} = \text{dibenzylideneacetone} \]

4. The Heck arylation of cyclohexene by phenyl bromide is slower than the corresponding Heck arylation of hexene. Explain why! Which regioisomer of the double bond in the product would you expect to result in the first case?

5. Give the structure of the products A and B of the following transformations?