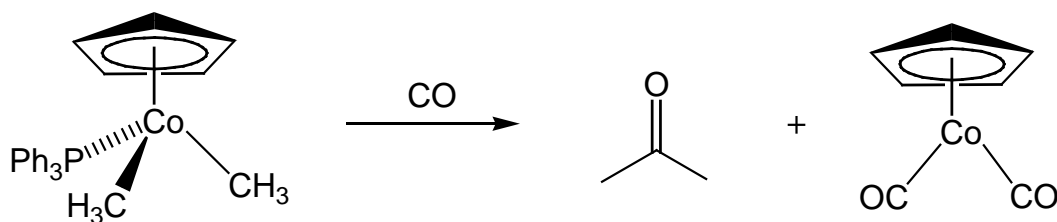


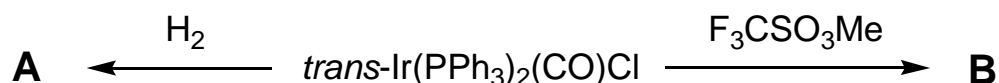
1. Suggest a plausible mechanism for the following reaction:



2. Why are electrophilic additions involving  $H^+$  often mechanistically complex?

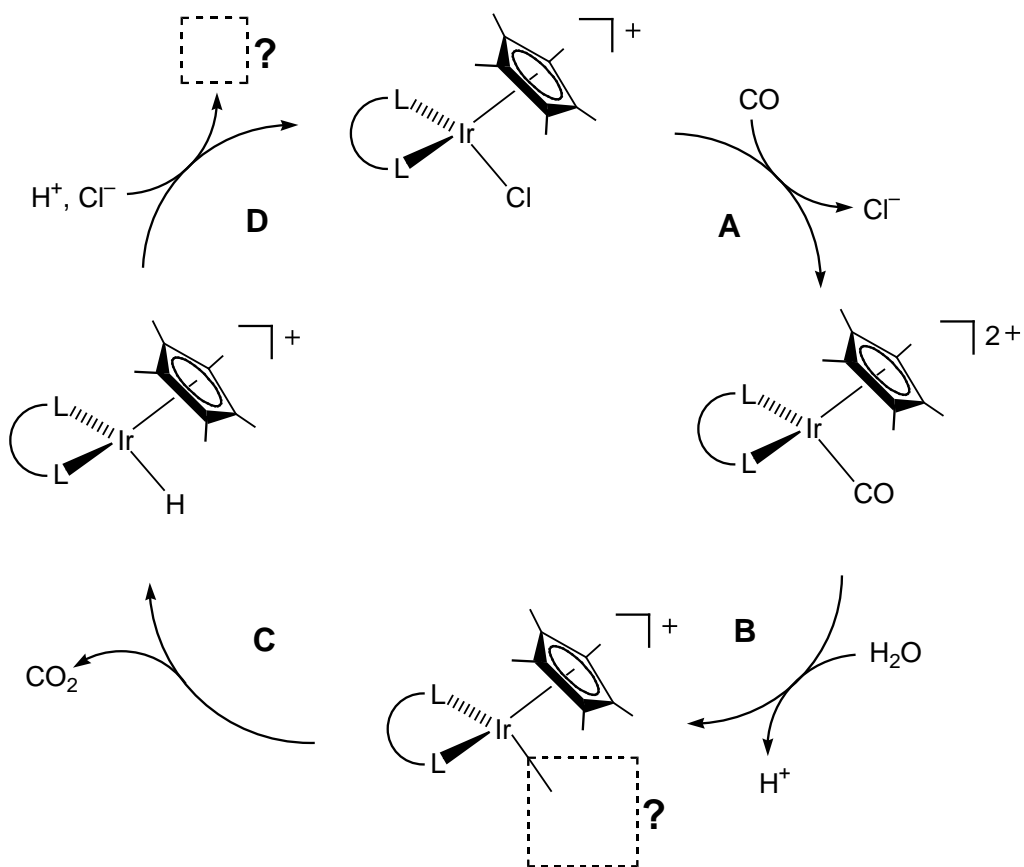
3. Addition of  $H_2$  to  $Cp_2Sc-Me$  generates  $Cp_2Sc-H$  and  $CH_4$ . What is the probable mechanism?

4. The following reactions have been shown to proceed via different mechanisms:

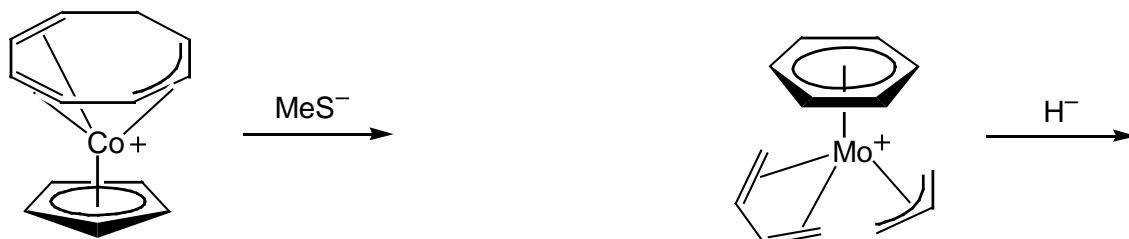


Predict products **A** and **B**, including stereochemistry, and present a reasonable mechanism for each reaction.

5. Inspect the catalytic cycle below. Fill in the two boxes (marked with “?”). What reaction is being catalysed? Describe each of the steps **A** – **D** in as much detail as possible.



6. Predict the outcome of the following reactions.



7. For the pairs of complexes given below, predict which one will be more reactive towards oxidative addition of  $\text{H}_2$ .

- (a)  $\text{RhCl}(\text{PPh}_3)_3$  or  $\text{RhCl}(\text{CO})(\text{PPh}_3)_2$   
 (b)  $\text{IrCl}(\text{CO})(\text{PPh}_3)_2$  or  $[\text{PtCl}(\text{CO})(\text{PPh}_3)_2]^+$