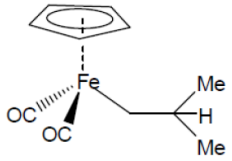
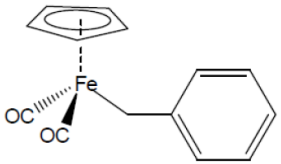
Exercises (I)

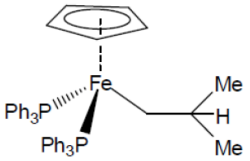
Draw the β-elimination product for A – D following loss of one CO or PPh_3 ligand.



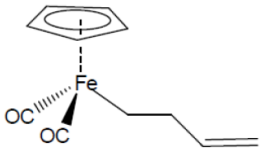
A



B



C



D

Exercises (II)

Which of the following can undergo oxidative addition?

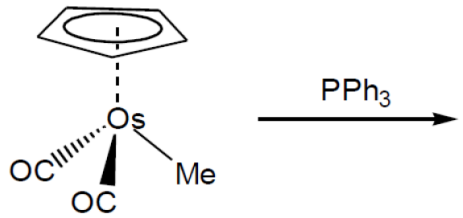
cis-$[RhI_2(CO)_2]^-$ *cis*-$[Zr(Cp^*)_2(Me)(Cl)]$

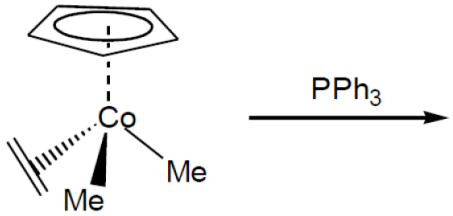
($Cp^* = \eta^5\text{-}C_5Me_5$)

Which of the following will be **more** reactive towards oxidative addition?

$[Rh(PPh_3)_3Cl]$ *trans*-$[Rh(PPh_3)_2(PF_3)Cl]$

Predict the product of the reaction:





Predict the product from the following reaction:

$Fe(\eta^5\text{-}C5H5)(CO)_2CH_3 + PPh_3$

Exercises (VI)

Which of the following is **least** likely to undergo reductive elimination?

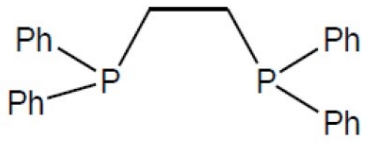
cis- [$Rh(CO_{)2}(I)3(COMe)]^-$

cis-$[Pt(P^iPr_3)_2(H)_2]$

cis-$[Nb(\eta\text{-}C_5H_5)_2(H)(\eta\text{-}C_2H_4)]$

Draw the products of the following oxidative addition reaction.

$(dppe)Ir(CO)Br + Et_3Si\text{-}H \rightarrow$

dppe = 

Exercises (VIII)

Draw the product of the following oxidative addition reaction.

$$[CpRh(CO)_2] \quad + \quad CF_3CF_2I \rightarrow$$

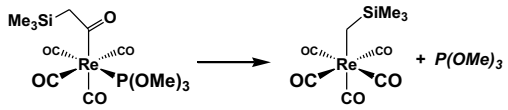
Exercises (IX)

1. Classify the following reactions as oxidative addition, reductive elimination, migratory insertion, elimination, β-hydride elimination, ligand substitution, ligand dissociation, ligand addition, oxidative coupling, hydrogenolysis (i.e., 4-center concerted H_2 activation & transfer), etc. There may be more than one step and that the equations are not necessarily balanced or completely list all possible products. If there is more than one step to label, make sure you list the steps in the correct order ***if*** the order is important. NO discussion or justification is necessary.

a) $[Rh(CH_2CH_2CH_2CH_3)(dmpe)(PMe_3)] \longrightarrow [Rh(H)(dmpe)(PMe_3)] + CH_2{=}CH\text{-}CH_2CH_3$

b) $[Cp_2Zr(PMe_3)_2] + H_2 \longrightarrow [Cp_2ZrH_2(PMe_3)] + PMe_3$

c)



d) $[Mn(SiMe_3)(dppe)(N{\equiv}CCH_3)_3] + H_2 \longrightarrow [MnH(dppe)(N{\equiv}CCH_3)_3] + SiHMe_3$

e) $[Re(=CH_2)(Ph)(CO)_4] + PMe_3 \longrightarrow [Re(CH_2Ph)(CO)_4(PMe_3)]$ (CH_2 = neutral carbene)

f) $[CpRh(CO)(PMe_3)] + C_6H_6 \xrightarrow{h\nu} [CpRh(C_6H_5)(H)(PMe_3)] + CO$

2. For each of the following pairs of metal complexes, circle the one that will ***most readily*** do an **oxidative addition** to the substrate shown. No discussion is necessary.

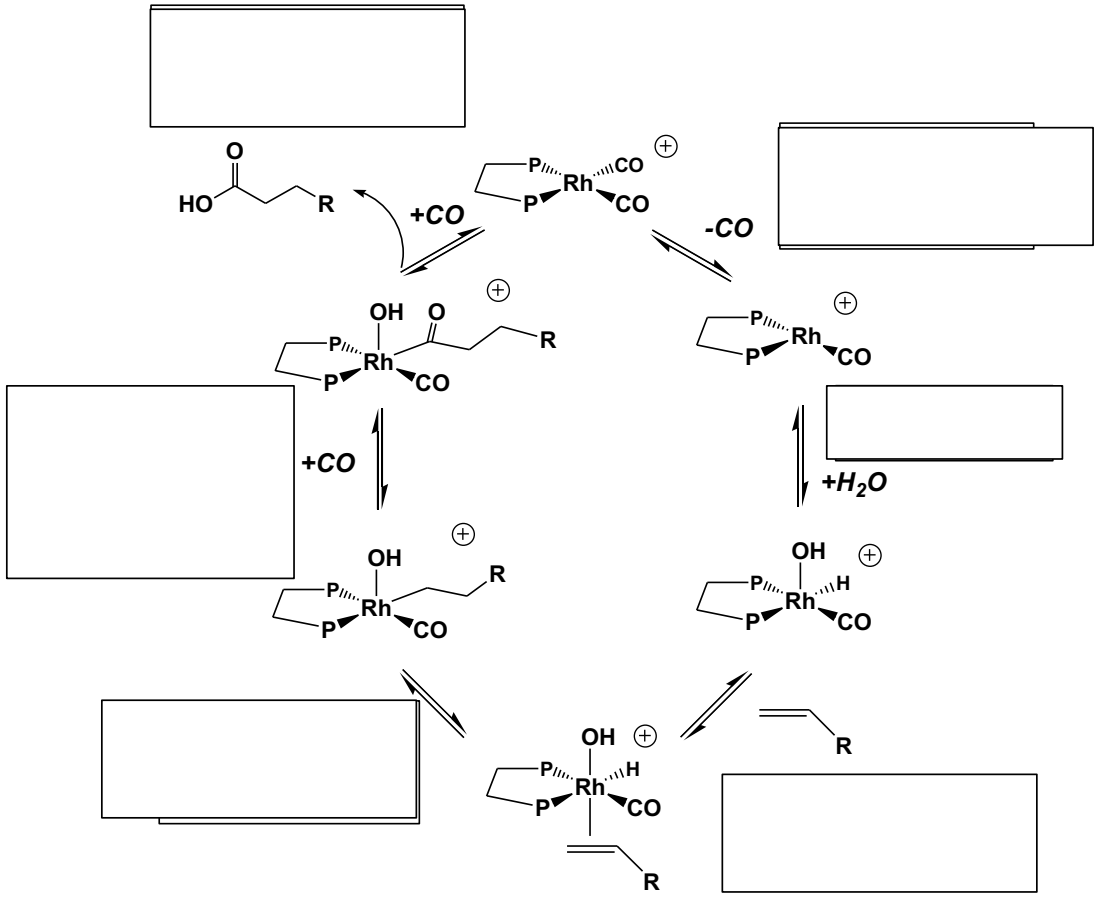
a) H_2: $[Cp_2Nb(NMe)(CH_3)]$ - or - $[Rh(CO)_2I_2]^-$

b) Cl_2: $[Mo(CO)_3(PMe_3)_3]$ - or - $[Mo(CO)_3\{P(OMe)_3\}_3]$

c) CH_3I: $[IrH(CO)(PMe_3)_2]$ - or - $[RhCl(CO)_3]$

d) CH_3I: $[Rh(I)(CO)\{P(tert\text{-}butyl)_3\}_2]$ - or - $[Re(CO)_3(dmpe)]^-$

Use the boxes to label the following steps to identify what is going on in the following catalytic cycle



4. Explain how the methyl and bromide ligands in the following reaction end up in the indicated positions. Use diagrams to clearly illustrate your vivid description of this process.