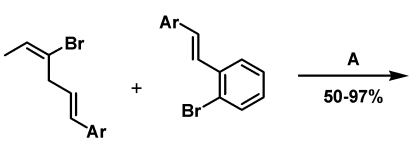
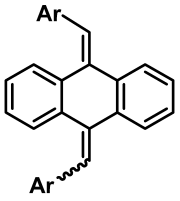
Q4. Predict the product in the following reaction. What is this type of reaction called and also what is the special name for this protocol? (3 marks)

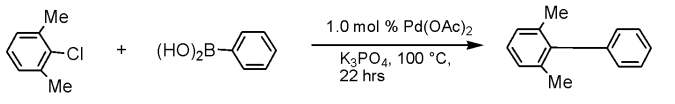


A: $Pd(OAc)_2$ (10 mol%), K_2CO_3, LiCl, Bu_4NBr, DMF, 110 °C

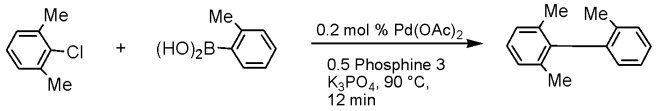


Answer key. Heck reaction,

Q5. Predict the reagent in the two following reactions and justify your answer. (2 marks)



Phosphine 1 85 % yield
Phosphine 2 91 % yield



98% yield

Ans. First reaction with base K_3PO_4/Na_2CO_3 is acceptable

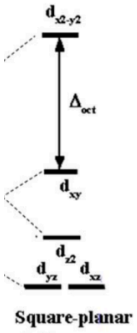
For second reaction PPh_3 is must.

Q6. Classify the above given octahedral complexes, $[Co(en)_3]^{2+}$, $[Fe(CN)_6]^{4-}$, $[Fe(CN)_6]^{3-}$, and $[CrF_6]^{4-}$ and write in the boxes below as those (3 marks)

Having no tetragonal distortion	$[Fe(CN)_6]^{4-}$,
Having slight tetragonal distortion which is seen from UV Visible spectral studies	$[Fe(CN)_6]^{3-}$
Having significant tetragonal distortion indicated as varying bond distances in their structure	$[Co(en)_3]^{2+}$,$[CrF_6]^{4-}$

Q7. The energy of d_{z2} will be lower than d_{xy} but higher than d_{xz} and d_{yz} in which complex(es) shown below. Justify your answer with orbital presentation (2 marks)

a. Anhydrous $CuCl_2$,
b. $CuCl_2.2H_2O$
c. $NiCl_2(PPh_3)_2$
d. $Rh(PPh_3)_3Cl$

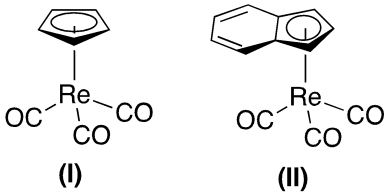


Ans. $Rh(PPh_3)_3Cl$, square planar,

Q8. Explain the effect of Cr-C and C-O bond distance, when one CO group is replaced by $P(C_6F_5)_3$ in $[Cr(CO)_6]$ (2 marks)

Ans. Cr-C bond distance **increase**
C-O bond distance **decrease**

Q9. Which of the compounds (I) or (II) will undergo substitution of a CO ligand for a phosphine more readily? Explanations required. (2 marks)



Ans. **II, Exaplanation….**