

## Introduction to Organometallic Chemistry

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#### VI) Metallocenes Questions dealing with cyclic polyenes.

25.  $\eta^5$  Cyclopentadienyl - complexes
26.  $\eta^6$  arene Metal complexes
27. Half sandwich complexes
28. Reactivity changes in coordinated ligands

1. Explain the following observations (If there are two possible explanations, give both)

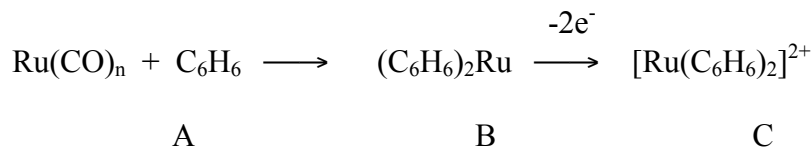
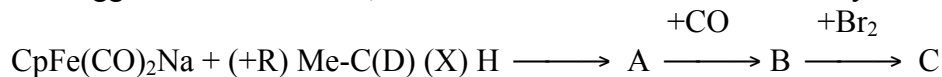
M-C distances in metallocenes formed by M(II) ions of Fe, Co and Ni are as follows:

Ni 2.196(4) Å Co 2.119(3) Å and Fe 2.064 (3) Å

2. Complete the following equations. Give the structure of the product and the electron count if it is a redox reaction.



3. Suggest structures for A, B and C indicate the stereo-chemistry clearly in each case.



- (a) Draw structures for A, B and C assuming they are  $18e^-$  species.
  - (b) Room temperature  $^1H$  NMR of B and C show only one peak. Explain
5. Identify the various reactive sites in the following molecules towards nucleophilic and electrophilic attack: (Hint Use NaOMe and  $HBF_4$  as reagents.)  
Which reactant would be more reactive towards the organometallic species given?

- (a) Ferrocene
- (b)  $[\eta^7(\text{cycloheptatrienyl}) Mn(CO)_3]^+$
- (c)  $(\eta^6C_6H_5CH_2Cl)Cr(CO)_3$
- (d)  $[(\eta^3C_3H_5)Ni(C_4H_6)]^+$