Introduction to Organometallic Chemistry
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Questions on Module II C1 ligands and simple reactions

02. Metal carbonyl complexes
03. Metal carbonyls –Part II
04. Ligand substitution reactions
05. Substitutes for carbonyl ligands
06. Carbene complexes
07. Carbene complexes continued
08. Non-Carbon Ancillary ligands
09. Non-Carbon Ancillary ligands continued
10. Metal alkyl complexes
11. Ligand Insertion Reactions

1. Explain the following observations (If there are several possible explanations, give all of them)

(a) The CO stretching frequency of the following compounds are as follows.
BH_3CO 2164 cm^{-1}, $[Cu(CO)_4]^+$ 2200 cm^{-1}, $[Fe(CO)_4]^{2-}$ 1790 cm^{-1}

(b) PF_3 is a good π acceptor and is better π acceptor than $P(Bu)_3$

(c) Homoleptic nitrosyl complexes are possible for Co but not for Ni.

(d) Fischer carbene complexes such as M=C(OMe)Ph have rotational barriers around M-C and C-O bonds.

(e) A sample of $Fe(CO)_5$ (yellow liquid) left in bright sunlight becomes a golden yellow flaky solid.

2. Complete the following equations giving the structure and electron count of the organometallic products

a. $Fe(CO)_5$ + Na/Hg ⟶ [X] + CH_2I_2 ⟶

b. $CS_2 + RhCl(PPh_3)_3$ ⟶

c. $NaNO_2$ + $Co_2(CO)_8$ + Acetic acid ⟶

d. $NOCl + Na[Co(CO)_4]$ →

e. $W(CO)_6 + 2CH_3CN$ →

3. Suggest suitable methods for the preparation of C_6H_5MgF