Calculation of M-M bond:

1. Determine the total valence electron (TVE) = A
   TVE = No. of valence electrons of the metal + No. of electrons from each ligand and the charge.
2. Substract this number from nX18, where n = no. of metals in the complex i.e (nX18) − A = B
3. (i) $\frac{B}{2}$ = Total number of M-M bonds in the complex.

(ii) A/n = no. of ēns per metal.

- n → 18 → no. M-M bond
- n → 17 → One M-M bond
- n → 16 → Two M-M bonds
- n → 15 → Three M-M bonds

eg. $Fe_3(CO)_{12}$

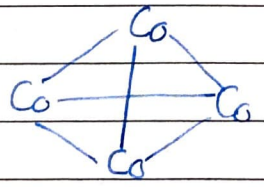
TVE = 8X3 + 2X12 = 48 (A)

nX18 = 3X18 = 54

B = 54 − 48 = 6

No. of M-M bond = $\frac{6}{2}$ = 3

No. of ēns per metal = $\frac{48}{3}$ = 16, Two M-M by each metal

Molecule	TVE (A)	18Xn − A = B	Total M-M bonds B/2	Bonds per metal	Basic Geometry of metal atoms
$Fe_2(CO)_{12}$	48	54 − 48 = 6	6/2 = 3	$\frac{48}{3}$ = 16, 2	Fe—Fe, Fe
$Co_4(CO)_{12}$	60	72 − 60 = 12	12/2 = 6	$\frac{60}{4}$ = 15, 3	
$Fe_2(CO)_9$	34	36 − 34 = 2	2/2 = 1	$\frac{34}{2}$ = 17, 1	Fe—Fe

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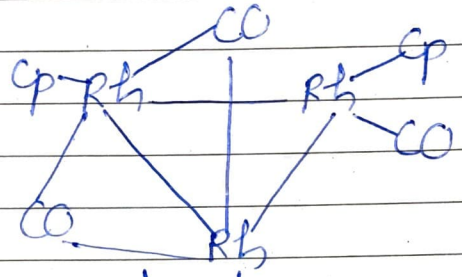
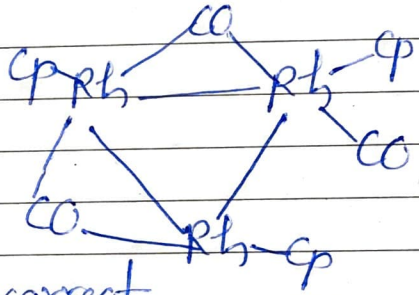
Molecule	TVE(A)	18XD−A=B	Total M-M bonds B/2	Bonds per metal	Basic Geometry of metal atoms.
$[\eta^5\text{-}C_5H_5Mo(CO)_2]_2$	30	36−30=6	6/2=3	30/2=15,3	Mo≡Mo
$(\eta^4C_4H_4)_2Fe_2(CO)_3$	30	36−30=6	6/2=3	30/2=15,3	Fe≡Fe

$[(Cp)_3(Rh)_3(CO)_3]$: TVE =

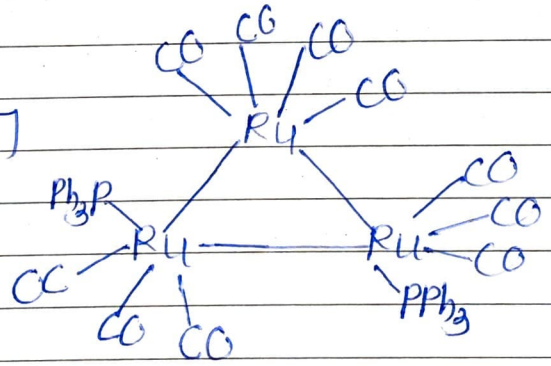


A - Correct

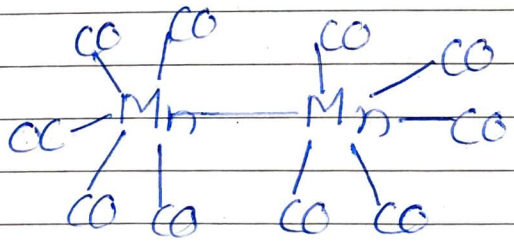


B. Incorrect

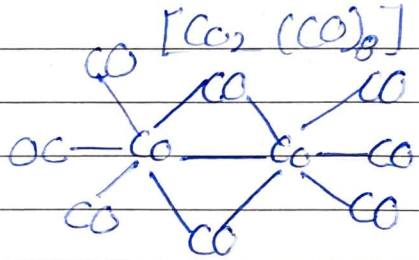
$[Ru_3(CO)_{10}(PPh_3)_2]$



$[Mn_2(CO)_{10}]$



$[Co_2(CO)_8]$



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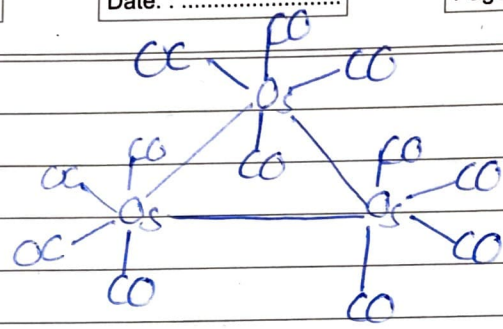
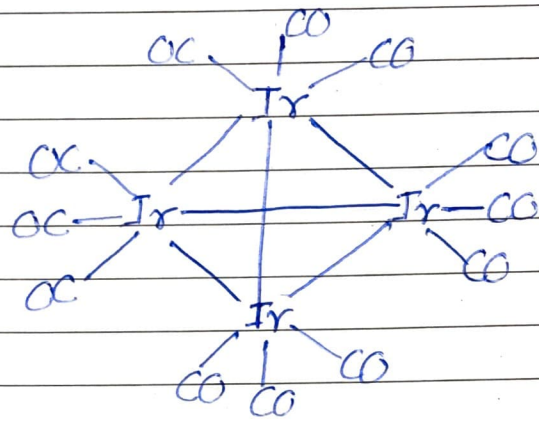
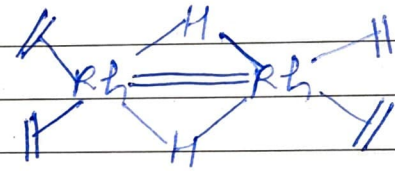
$[Os_3(CO)_{12}]$



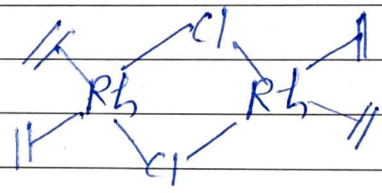
$[Ir_4(CO)_{12}]$:



$[(\eta^2\text{-ethylene})_2Rh(\mu\text{-}H)_2]_2$



$[(\eta^2\text{-ethylene})_2Rh(\mu\text{-}Cl)]_2$



$[(\eta^2\text{-alkene})Co(PMe_3)_3Ph]$

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