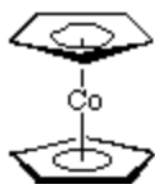


Problem: Find the valence electrons (EV) with both the ionic and covalent method



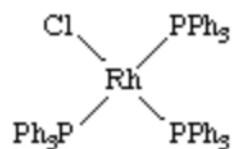
ionic	
Co ^{II}	7 e ⁻
2 Cp ⁻	12 e ⁻
Total	19 e⁻

covalent	
Co	9 e ⁻
2 Cp [•]	10 e ⁻
Total	19 e⁻



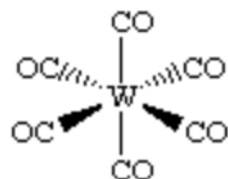
Ti ^{IV}	0 e ⁻
2 Cl ⁻	4 e ⁻
2 Cp ⁻	12 e ⁻
Total	16 e⁻

Ti	4 e ⁻
2 Cl [•]	2 e ⁻
2 Cp [•]	10 e ⁻
Total	16 e⁻



Rh ^I	8 e ⁻
Cl ⁻	2 e ⁻
3 PPh ₃	6 e ⁻
Total	16 e⁻

Rh	9 e ⁻
Cl [•]	1 e ⁻
3 PPh ₃	6 e ⁻
Total	16 e⁻

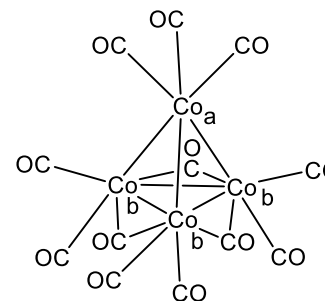
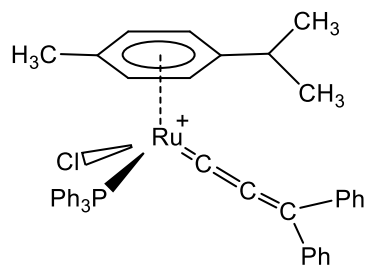
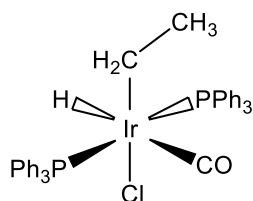
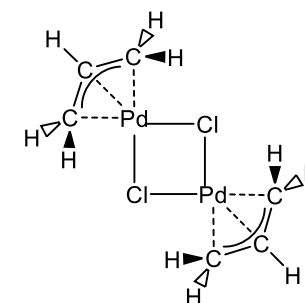
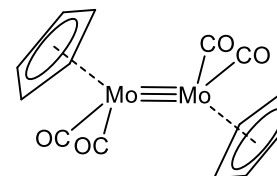
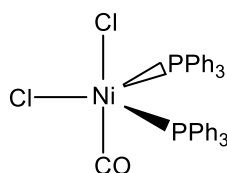
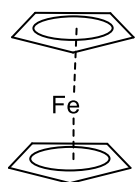


W ⁰	6 e ⁻
6 CO	12 e ⁻
Total	18 e⁻

W	6 e ⁻
6 CO	12 e ⁻
Total	18 e⁻

Exercises (I)

Give the formal oxidation state and electron count of the metal for the following compounds

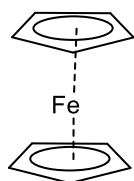


Exercises (I)

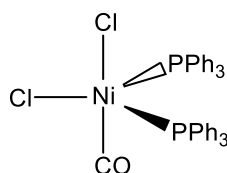
Give the formal oxidation state and electron count of the metal for the following compounds

+2 d6
2 η^5 Cp⁻ 12 e

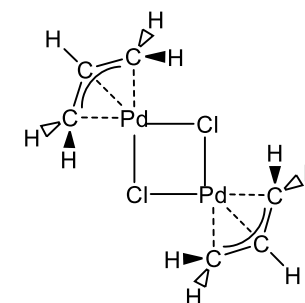
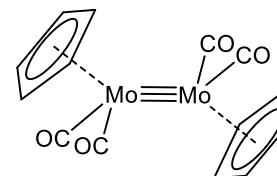
EV 18 e



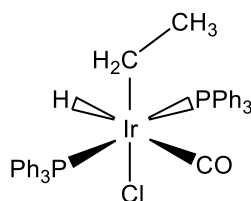
+2 d8
Each ligand 2e
EV 18



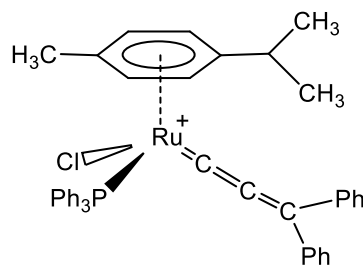
+1 d5 10 e-
4 CO 8e
3 M-M 6 e
2 η^5 Cp⁻ 12 e
EV per metal 18



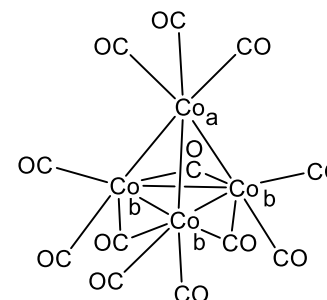
Pd +2 d8 16 e-
2 μ -Cl 8e
2 η^3 allyl⁻ 8 e
EV per metal 16



Ir (III) d6
6ligand 2e-
EV 18



Ru (II) d6
Carbene 2 e-
Cl 2 e- , PPh3 2e-
Arene 6 e-
EV 18



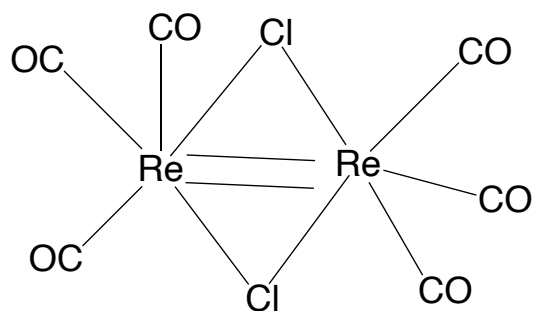
Co (0) d9 36 e-
12 CO 24 e-
6 M-M 12 e
EV per metal 18

Exercises (II)

Draw the structure of a complex of empirical formula $[\text{Re}(\text{CO})_3\text{Cl}]$ that obeys the 18 electron rule.

Exercises (II)

Draw the structure of a complex of empirical formula $[\text{Re}(\text{CO})_3\text{Cl}]$ that obeys the 18 electron rule.



Re (I) d^6

2 μ -Cl 8 e

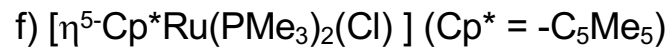
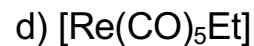
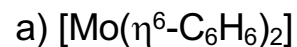
6 CO 12e

2 M-M 4 e

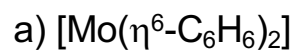
$$36/2 = 18$$

Exercises (III)

(1) Draw structures and give the formal oxidation state and valence electron count of the metal for the following compounds:

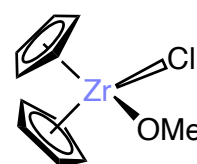
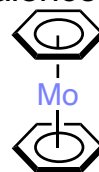


(1) Draw structures and give the formal oxidation state and valence electron count of the metal for the following compounds:

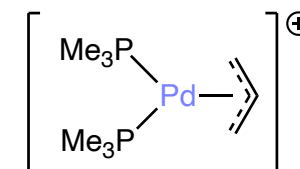


18EV

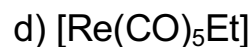
Mo(0)



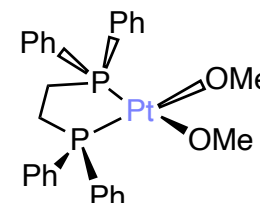
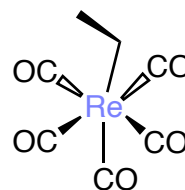
Zr(IV) 16EV



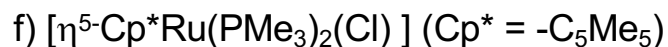
16EV
Pd(II)



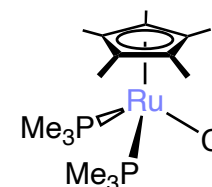
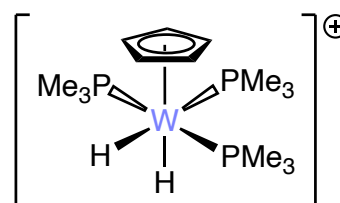
18EV
Re(0)



16EV
Pt(II)



18EV
W(IV)



18EV
Ru(II)