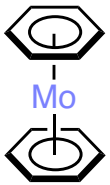
Exercises (III)

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

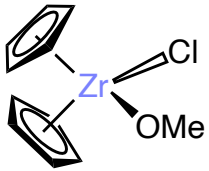
a) $[Mo(\eta^6\text{-}C_6H_6)_2]$

Mo(0) d6:
NE 18



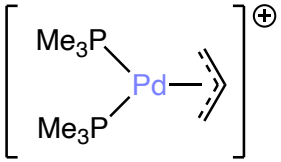
b) $[Cp_2ZrCl(OMe)]$

Zr(IV) d0:
NE 16



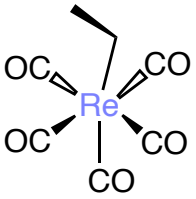
c) $[(PMe_3)_2Pd(\eta^3\text{-}C_3H_5)]Cl$

Pd(II) d8:
NE 16

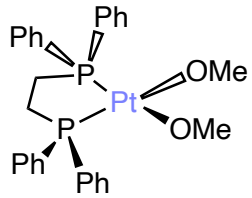


d) $[Re(CO)_5Et]$

Re(I) d6:
NE 18



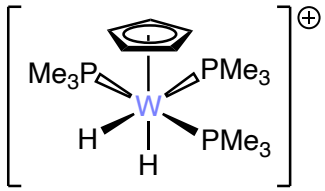
e) $[(dppe)Pt(OMe)_2]$ (dppe = $Ph_2PCH_2CH_2PPh_2$)



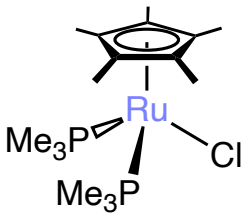
Pt(II) d8:
NE 16

f) $[\eta^5\text{-}Cp^*Ru(PMe_3)_2(Cl)]$ ($Cp^* = -C_5Me_5$)

g) $[CpW(PMe_3)_3(H)_2]^+$



W(IV) d2:
NE 18



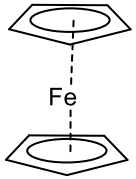
Ru(II) d6:
NE 18

Exercises (II)

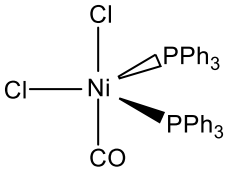
Give the formal oxidation state and electron count of the metal for the following compounds

+2 d6
2 η^5 Cp^- 12 6

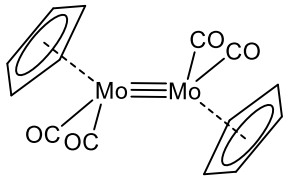
EV 18 e

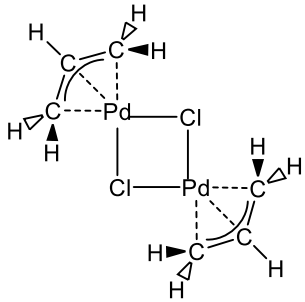


+2 d8
Each ligand 2e
EV 18

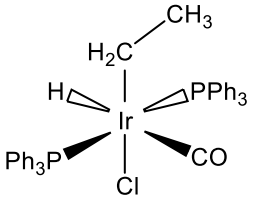


+1 d5 10 e-
4 CO 8e
3 M-M 6 e
2 η^5 Cp^- 12 e
EV per metal 18

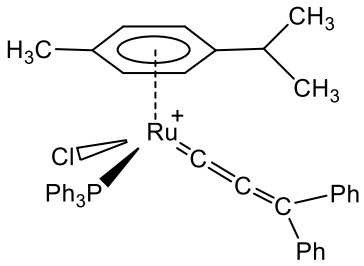




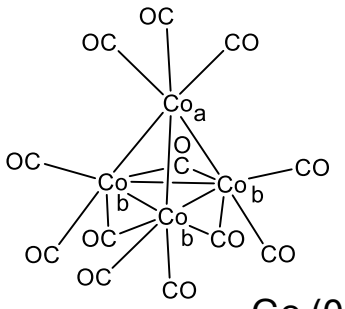
Pd +2 d8 16 e-
2 μ-Cl 8e
2 η^3 $allyl^-$ 8 e
EV per metal 16



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



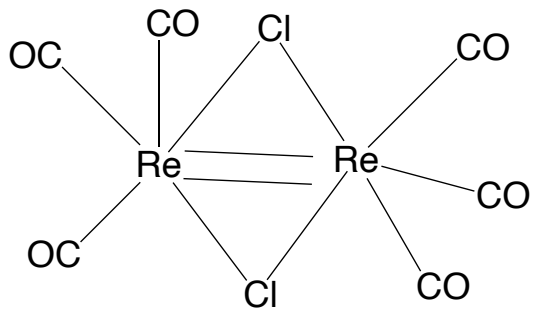
Ru (II) d6
Carbene 2 e-
Cl 2 e- , PPh3 2e-
Arene 6 e-
EV 18



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

Exercises (III)

Draw the structure of a complex of empirical formula $[Re(CO)_3Cl]$ that obeys the 18 electron rule.



Re (I) d6

2 μ- Cl 8 e

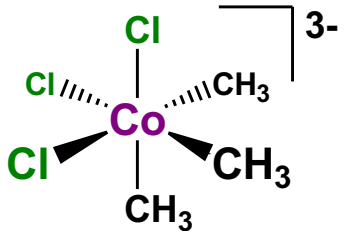
6 CO 12e

2 M-M 4 e

36/2 =18

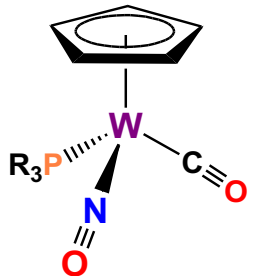
1. Sketch out the structure of the following transition metal complexes as accurately as possible and clearly show the electron counting (including the oxidation state of the metal center and ligand charges if present). You don't have to draw out phenyl rings on ligands (e.g., for PPh_3).

a) $[Co(CH_3)_3Cl_3]^{3-}$



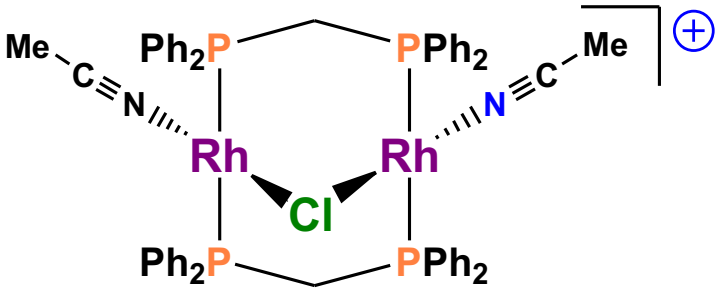
Co(+3)	d6
$3CH_3^-$	6e-
$3Cl^-$	6e-
Total	18 e-

b) $[CpW(NO)(CO)(PR_3)]$



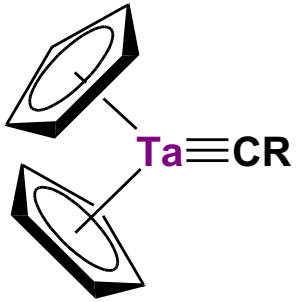
W(0)	d6
Cp^-	6e-
NO^+	2e-
PR_3	2e-
CO	2e-
Total	18 e-

c) $[Rh_2(\mu\text{-dppm})_2(\mu\text{-Cl})(N{\equiv}CMe)_2]^+$ (dppm = $Ph_2PCH_2PPh_2$)



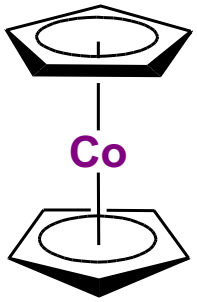
Rh(+1)	d8
μ-Cl^-	2e-
$2PR_3$	4e-
N≡CR	2e-
Total	16 e-

d) $[Cp_2Ta(CCH_3)]$



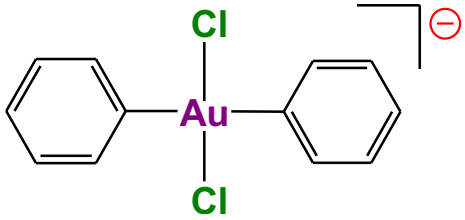
Ta(+5)	d0
$2Cp^-$	12e-
$\equiv CR^{3-}$	6e-
Total	18 e-

e) $[Cp_2Co]$



Co(+2)	d7
2Cp⁻	12e-
Total	19 e-

f) $[AuCl_2Ph_2]^-$ (Ph = C_6H_5)



Au(+3)	d8
2Ph⁻	4e-
2Cl⁻	4e-
Total	16 e-