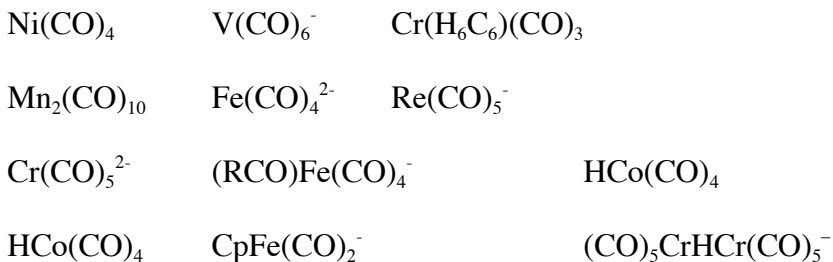
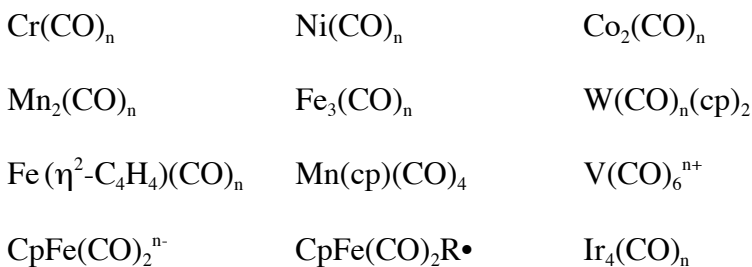


RPS 9 Eighteen electrons

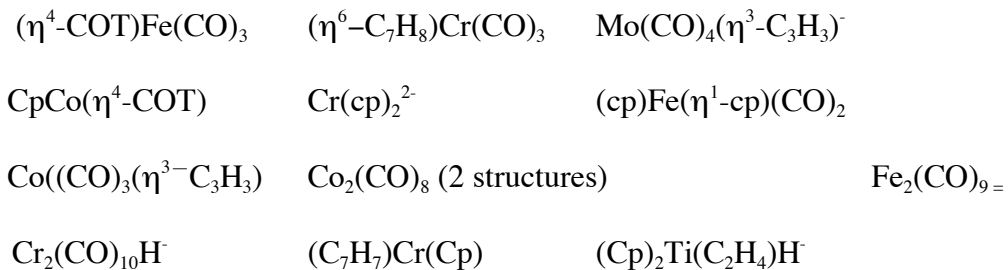
Do the following compounds follow the 18 electron rule



For the following compounds determine n by using the 18 electron rule:



Draw the following compounds:



Do the following compounds follow the 18 electron rule

$\text{Ni}(\text{CO})_4$  Ni has 10  $e^-$  and 2 for each CO  $\Rightarrow 10+8=18$

$\text{V}(\text{CO})_6^-$  V has 5 and 2 for each CO and one more for the charge  $\Rightarrow 5+12+1=18$

$\text{Cr}(\text{H}_6\text{C}_6)(\text{CO})_3$  Cr has 6 and 6 for  $\text{H}_6\text{C}_6$  (2 from each double bond) and 6 from

$\text{COs} \Rightarrow 6+6+6=18$

$\text{Mn}_2(\text{CO})_{10}$   $(\text{CO})_5\text{Mn}-\text{Mn}(\text{CO})_5$  Mn has 7 one from other Mn and 10 from COs  $\Rightarrow 18$

$\text{Fe}(\text{CO})_4^{2-}$  Fe has 8 + 8 from COs and 2 more for neg charge  $\Rightarrow 18$

$\text{Re}(\text{CO})_5^-$  Re has 7 + 10 from COs and one for neg charge  $\Rightarrow 18$

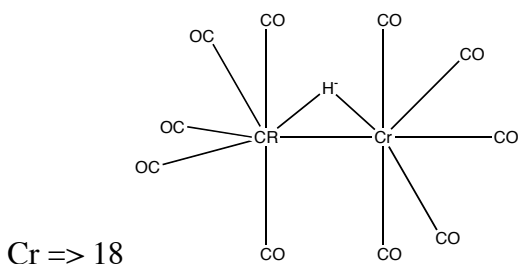
$\text{Cr}(\text{CO})_5^{2-}$  Cr has 6 + 10 from COs and 2 for neg charge  $\Rightarrow 18$

$(\text{RCO})\text{Fe}(\text{CO})_4^-$  Fe has 8 + 8 from COs + 1 for neg charge + 2 from RCO's double bond  $\Rightarrow 19$

$\text{HCo}(\text{CO})_4$  Co has 9 one from H and 8 from COs  $\Rightarrow 18$

$\text{CpFe}(\text{CO})_2^-$  Fe has 8 + 4 from COs + 1 neg charge + 5 from Cp  $\Rightarrow 18$

$(\text{CO})_5\text{CrHCr}(\text{CO})_5^-$  Cr has 6 + 10 from COs and 1 from other Cr and H donates 1 to each

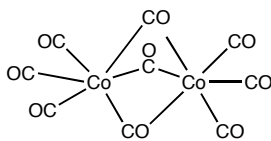


For the following compounds determine n by using the 18 electron rule:

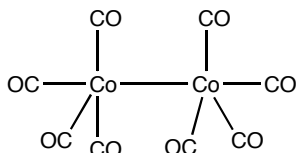
$\text{Cr}(\text{CO})_n$   $18=6+n*2 \Rightarrow n=6$

$$\text{Ni}(\text{CO})_n \quad 10 + 2 * n = 18 \Rightarrow n = 4$$

$\text{Co}_2(\text{CO})_n \quad 9 + 2 * (n/2) = 18 \Rightarrow n = 9$ ; There must be one (or 3 bridging COs) such as

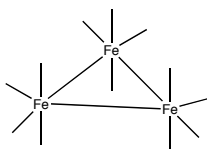


However it could have a Co–Co bond such as;



$\text{Mn}_2(\text{CO})_n$  If you have an Mn–Mn bond then you need 5 COs on each Mn (or some could bridge)

$\text{Fe}_3(\text{CO})_n$  Put the Fe in a triangle so it has  $8 + 2(1 \text{ from each of the other Fe})$  and then it will



need 4 more COs on each Fe thus  $n = 12$ .

$\text{W}(\text{CO})_n(\text{cp})_2$  W has 6 Cp has 5 each so  $n = 1$

$\text{Fe}(\eta^2\text{-C}_4\text{H}_4)(\text{CO})_n$  Fe has 8 and  $\eta^2\text{-C}_4\text{H}_4$  contributes 2 thus need 10 more and  $n = 5$

$\text{Mn}(\text{Cp})(\text{CO})_4$  Mn has 7 CO has 8 thus Cp must contribute 3 so it is  $\eta^3$

$\text{V}(\text{CO})_6^n$  V has 5 and 12 from COs so  $n = 1$ ;

$\text{CpFe}(\text{CO})_2^n$  Fe has 8 COs 4 Cp 5  $n = 1$ ;

$\text{CpFe}(\text{CO})_2\text{R} \cdot \text{Fe}^*$ , COs 4 Cp 5 then R must contribute one

$\text{Ir}_4(\text{CO})_n$  If Ir is pyramidal and so each Ir has an electron contributed by the other Ir then Ir has  $9 + 3(\text{from other Irs})$  and need 6 from COs for each Ir. Thus  $n = 3 * 4 = 12$

Draw the following compounds:

