RPS 9 Eighteen electrons

rules:

<table>
<thead>
<tr>
<th>Donate 1 electron</th>
<th>H, Cl, Br, I, bridging CO, CH₃, R’,</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donate 2 electrons</td>
<td>CO, NO⁺, Cl⁻, Br⁻, H₃PX₃, Pyridine, CN⁻, NH₃</td>
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<tr>
<td>Donate 3 electrons</td>
<td>NO, C₃H₅,</td>
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<tr>
<td>Variable</td>
<td>Cp(1,3,5), H₆C₅ (2,4), C₈H₈ (2,4,6,8)</td>
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</table>

Ni(CO)₄ Ni has 10 electrons and CO contributes 2 each => 8 thus 10+8=18

V(CO)₆⁻ V has 5, CO contributes 2 each and one for charge thus 5+12+1=18

Cr(H₆C₆)(CO)₃ Cr has 6 CO contributes 2 each and H₆C₆ can contribute 2, 4 or 6 +6+6=18

Mn₂(CO)₁₀ Mn 7, CO (5*2) and one from the other Mn 7+10+1 =18=18

HCo(CO)₄ Co has 9, CO contributes 4*2 and H contributes 1 or 9+8+1=18

CpFe(CO)₂⁻ Fe has 8, CO 2*2, charge 1, Cp 5 or 3 or 1 8+4+1+5=18 So Cp gives 5

Fe(SCN)₆⁴⁻ Two ways if all neutral then Fe has 8, SCN has 1 and 4 for charge =>

8+6+4=18
if SCN\textsuperscript{−} (i.e. use charge on SCN) Then the SCN\textsuperscript{−} gives a total of 6 negative charges of which 4 are on the complex therefore Fe must be Fe\textsuperscript{2+} thus we have 6 for Fe 12 for SCN or 6+12=18. You don’t use the charge here since you have assigned the total charge to the individual atoms.

Co(NH\textsubscript{3})\textsubscript{6}\textsuperscript{3+} Co has 9 each NH\textsubscript{3} has 2 and total charge takes away three electrons so 9+12-3=18

(CO)\textsubscript{5}CrHCr(CO)\textsubscript{5} Cr 6, CO 5\#, H has \(\frac{1}{2}\) for each Cr, charge has \(\frac{1}{2}\) for each Cr, and each Cr donates one to the other Cr.

Examples of Hapticity:

<table>
<thead>
<tr>
<th>(\eta^1)</th>
<th>(\eta^3)</th>
<th>(\eta^5)</th>
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</thead>
<tbody>
<tr>
<td><img src="image1" alt="Hapticity 1" /></td>
<td><img src="image2" alt="Hapticity 3" /></td>
<td><img src="image3" alt="Hapticity 5" /></td>
</tr>
<tr>
<td><img src="image4" alt="Hapticity 2" /></td>
<td><img src="image5" alt="Hapticity 4" /></td>
<td><img src="image6" alt="Hapticity 6" /></td>
</tr>
</tbody>
</table>
CpFe(CO)$_2^n$  
Fe 9, if Cp is 5, CO 2*2 and charge has n then 8+5+4+1=18 
therefore charge is n=1.

CpFe(CO)$_2$R • Cp has 1, 3, or 5, Fe has 8, CO has 2*2 R has one 5+8+4+1 =18

Ir$_4$(CO)$_n$ Assume it is symmetric and Ir it is tetrahedral so each Ir has bonds to another Ir. Thus Ir has 9, gets 1 from each of the other for 3 more, and thus need 6 from CO so each Ir has 3 CO  Looks

Draw the following compounds:

$(\eta^4$-COT)Fe(CO)$_3$  
4+8+6=18

$(\eta^6$-C$_2$H$_6$)Cr(CO)$_3$  
6+6+7=18

Mo(CO)$_4$(\eta$^3$-C$_3$H$_3$)  
6+8+3+1=18

CpCo(\eta$^4$-COT) 5+9+4=18

(cp)Fe(\eta$^1$-cp)(CO)$_2$ 5+8+1+4=18
$\text{Co}((\text{CO})_5(\eta^3-\text{C}_3\text{H}_3)) 9+6+3=18$

$\text{Co}_2(\text{CO})_8 9+8+1=18$

$\text{Cr}_2(\text{CO})_{10}\text{H}^+ 8+1+1+6+1+1=18 \quad \text{and} \quad 1+1+6+10=18$