Supporting Information

The derivation of the equation describing the binding of pyridine to **Ru(CO)3**

$$K = \frac{[HL'][L]}{[HL][L']} \text{ but since } [L] = \text{constant}$$

$$K' = \frac{[HL']}{[HL][L']} \text{ and } K = K'[L]$$

Let $[HL]_o$ be the initial concentration of HL, and $[L']_o$ be the initial concentration of L'

$$K' = \frac{[HL']}{([HL]_o - [HL'])([L']_o - [HL'])}$$

$$\Rightarrow K'([HL]_o - [HL'])([L']_o - [HL']) = [HL']$$

$$\Rightarrow K'([HL'])^2 - (K'[HL]_o + K'[L']_o + 1)[HL'] + K'[HL]_o[L']_o = 0$$

Divide by K'

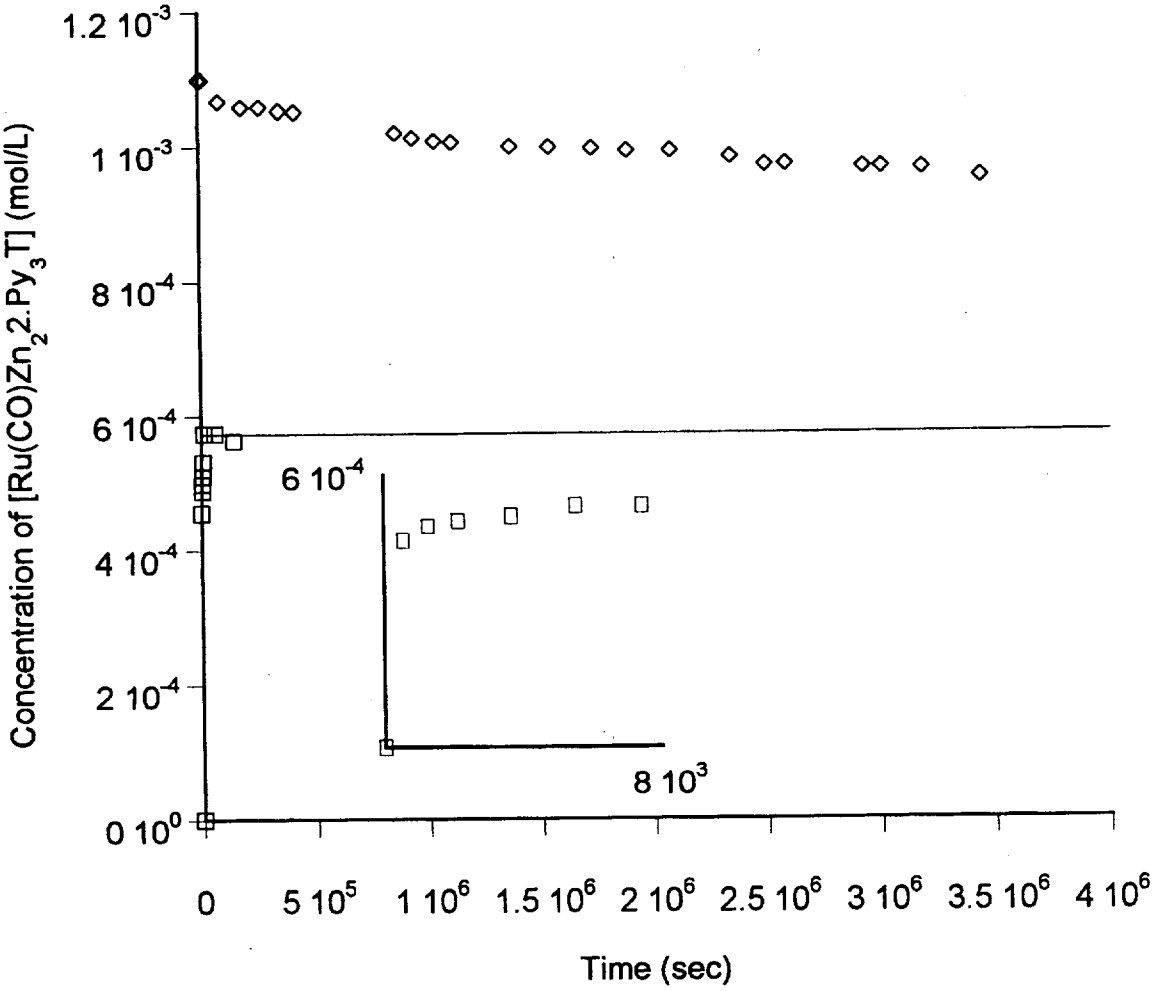
$$\Rightarrow ([HL'])^2 + (-[HL]_o - [L']_o - \frac{1}{K'})[HL'] + ([HL]_o)[L']_o = 0$$

Solve using the Quadratic Equation

$$HL' = \frac{([HL]_o + [L']_o + \frac{1}{K'}) \pm \sqrt{(-[HL]_o - [L']_o - \frac{1}{K'})^2 - 4([HL]_o)[L']_o}}{2}$$

Since we know the initial concentration of host $[HL]_o$, then the concentration of the complex $[HL']$ can be calculated for each initial concentration of ligand $[L']_o$, for an arbitrary value of K'. The error in the calculated curve can then be calculated in each calculated value of $[HL']$ by averaging $|$ $[HL']$(found) – $[HL']$(calculated)$|$ for each $[L']_o$.

Figure S1. Graph showing the rate of displacement of **Py_3T** from **$Zn_31(NO_2)_6.Py_3T$** into **$Ru(CO)Zn_22$** (Reaction A, □) and from **$Ru(CO)Zn_22.Py_3T$** into **$Zn_31(NO_2)_6$** (Reaction B, ◊). The solid line represents the equilibrium value. The inset shows the initial stages of Reaction A.



The 250 MHz proton NMR spectrum of **Ru(CO)Zn$_2$2.Py$_3$T**.