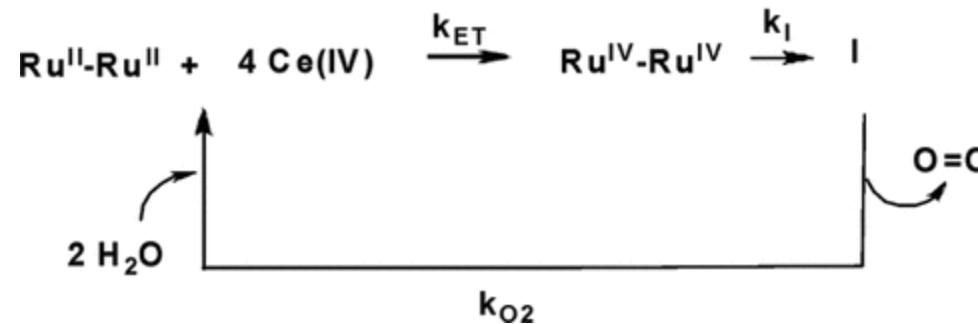
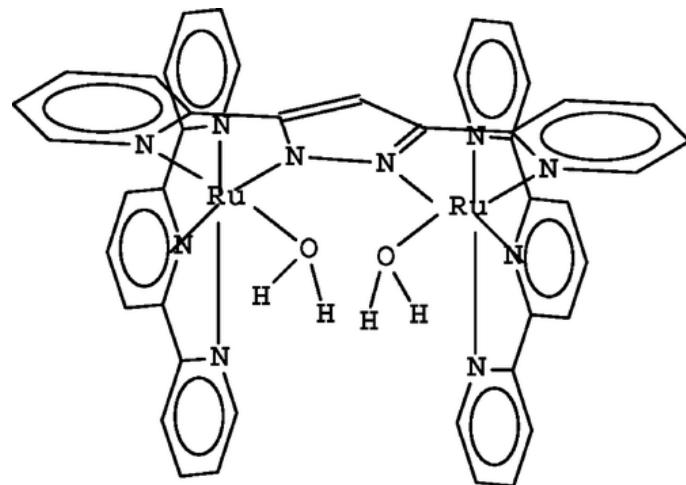


# EXERCISE 1

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The following Ru-based complex can catalyze the oxidation of water to form oxygen using cerium ammonium nitrate ( $\text{Ce}^{4+}$ ) as oxidant. The starting catalyst is  $\text{Ru}(\text{II})$ - $\text{Ru}(\text{II})$ . Experiments show the sequence in the right. Moreover, isotope experiments show that both oxygen atoms of the  $\text{O}_2$  are coming from the Ru-Ru complex. Based on this, propose a full catalytic cycle.



## EXERCISE 2

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The following scheme shows a Fe-based complex that can catalyze the oxidation of water to form oxygen using cerium ammonium nitrate ( $\text{Ce}^{4+}$ ) as oxidant. The starting catalyst is  $\text{Fe}(\text{II})$ . Propose two catalytic cycles. One based on one  $\text{Fe}$ -center. One based on two  $\text{Fe}$ -centers. You are allowed to represent the tetradentate macrocyclic ligand as  $\text{N}_4$ .

