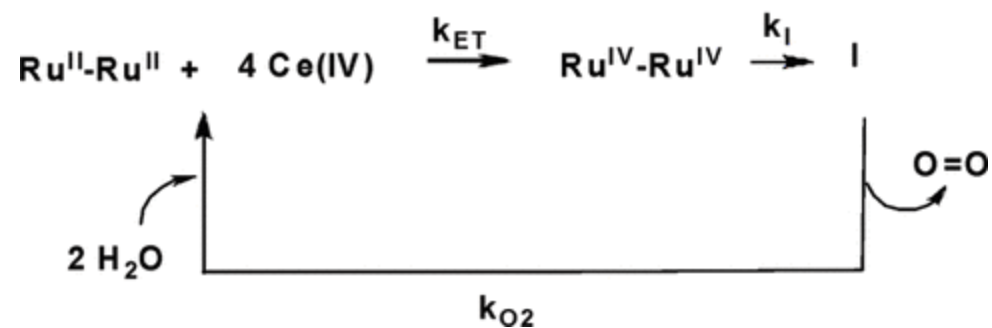
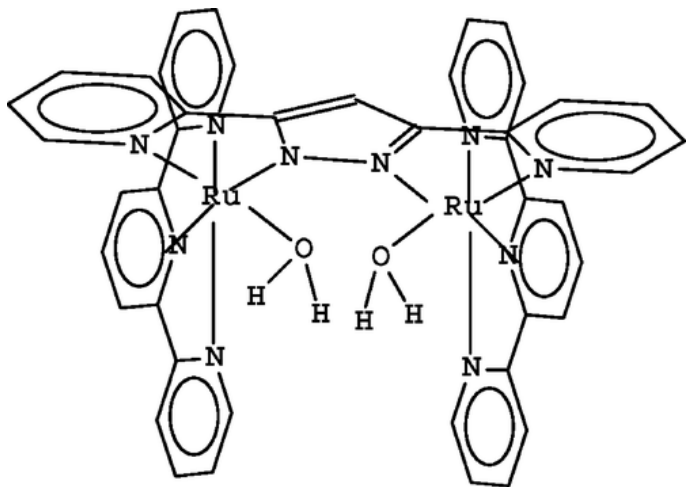
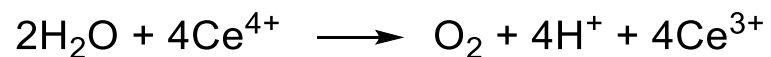


EXERCISE 1

The following Ru-based complex can catalyze the oxidation of water to form oxygen using cerium ammonium nitrate (Ce^{4+}) as oxidant. The starting catalyst is Ru(II)-Ru(II). Experiments show the sequence in the right. Moreover, isotope experiments show that both oxygen atoms of the O_2 are coming from the Ru-Ru complex. Based on this, propose a full catalytic cycle.



EXERCISE 2

The following scheme shows a Fe-based complex that can catalyze the oxidation of water to form oxygen using cerium ammonium nitrate (Ce^{4+}) as oxidant. The starting catalyst is Fe(II). Propose two catalytic cycles. One based on one Fe-center. One based on two Fe-centers. You are allowed to represent the tetradentate macrocyclic ligand as N_4 .

