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A simple model for a complex system: kinetics of water oxidation with the  $[\text{Ru}(\text{bpy})_3]^{2+}/\text{S}_2\text{O}_8^{2-}$  photosystem as catalyzed by  $\text{Mn}_2\text{O}_3$  under different illumination conditions

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**A simple model for a complex system: kinetics of water oxidation with the  
[Ru(bpy)<sub>3</sub>]<sup>2+</sup> /S<sub>2</sub>O<sub>8</sub><sup>2-</sup> photosystem as catalyzed by Mn<sub>2</sub>O<sub>3</sub> under different  
illumination conditions**

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**Abstract**

The Ru(bpy)<sub>3</sub><sup>2+</sup>/persulfate photosystem is the most common dye/sacrificial reagent pair used to study the catalyzed water oxidation half-reaction. Recently, we developed a bubbling reactor along with its modelling, and we used it with the aforementioned photosystem to measure the actual rate of reaction ( $R_{O_2}$ ) over time. In the present work, the same method is employed to investigate the kinetics of the reaction occurring through several steps, *i.e.* not only water oxidation, but also parasitic reactions due to chemical instability of the intermediate [Ru(bpy)<sub>3</sub>]<sup>3+</sup> species, which degrade over time finally decreasing the

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