



The Chinese Foundation Secondary School

Photo-induced Activation of Water Molecules as a Strong Oxidizing Agent

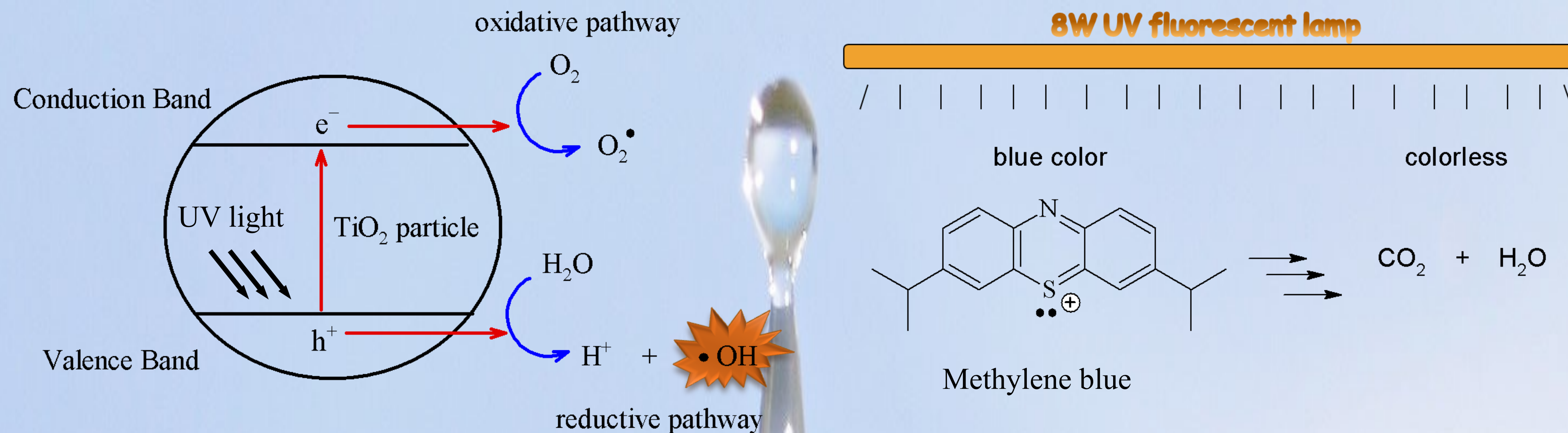
Aims

1. To activate water molecules serving as a strong oxidizing agent
2. To produce a more green oxidizing agent to replace the traditional ones
3. To produce an oxidizing agent with lower cost

Objective of the experiments

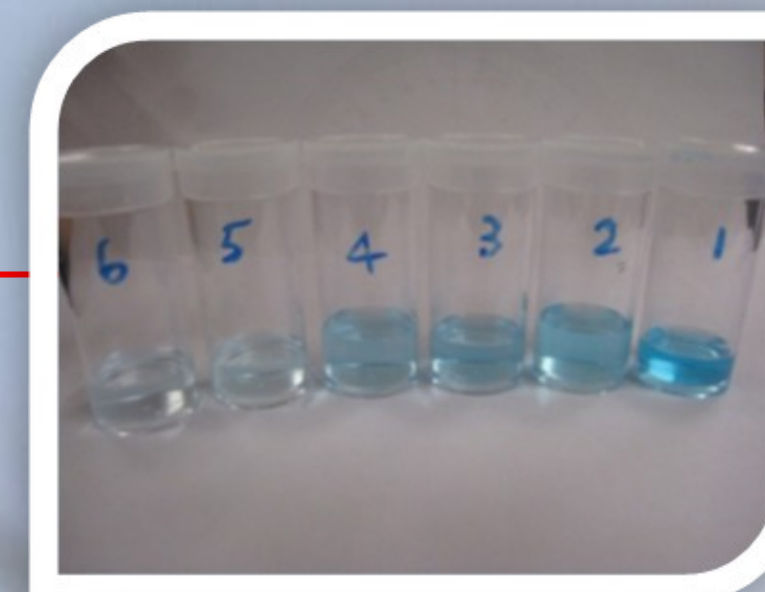
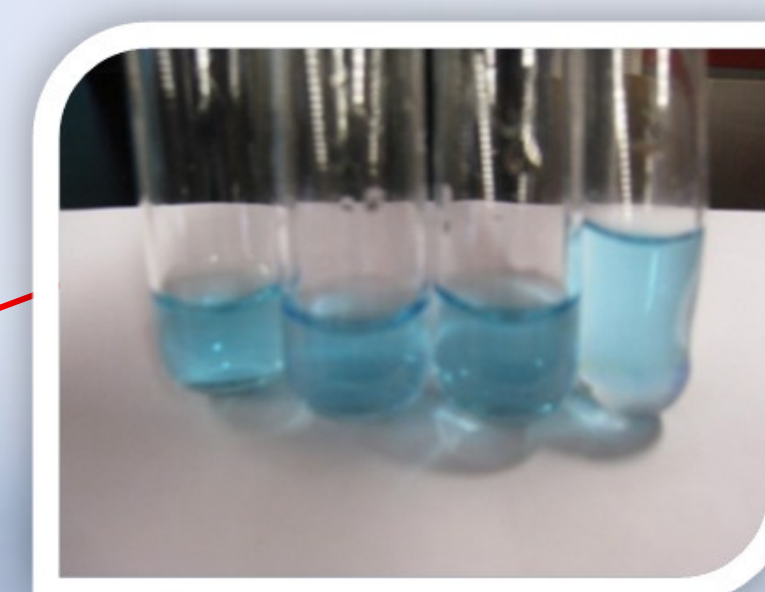
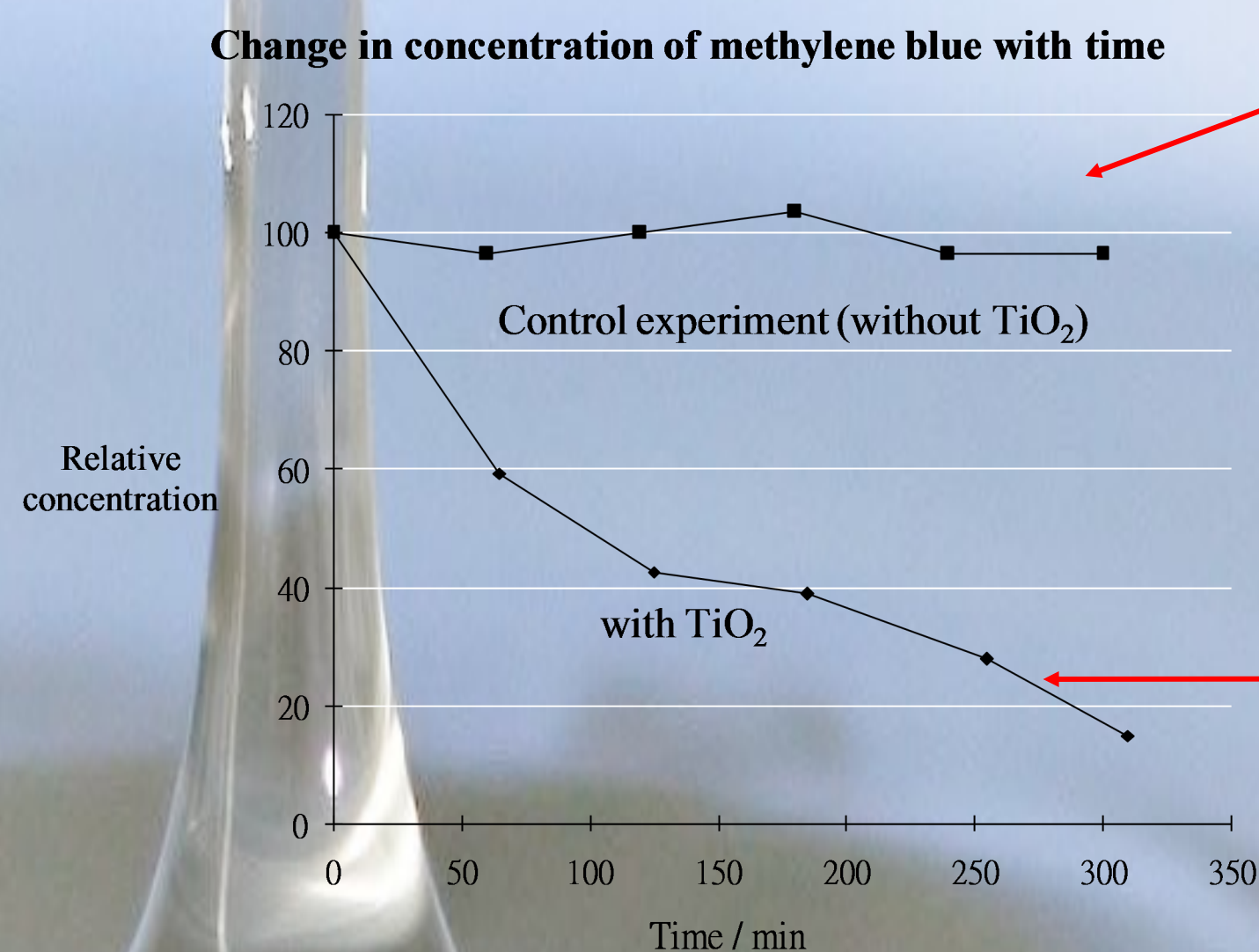
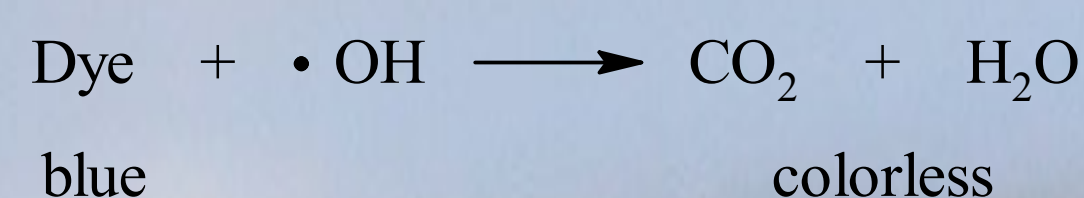
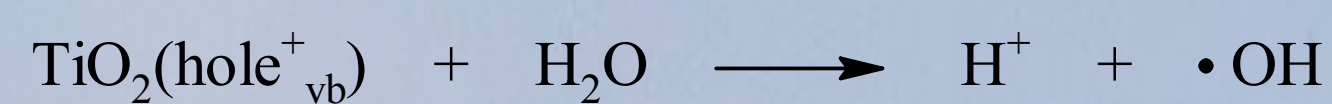
To investigate the oxidizing power of the activated water molecules through the following experiments

Principle of Method



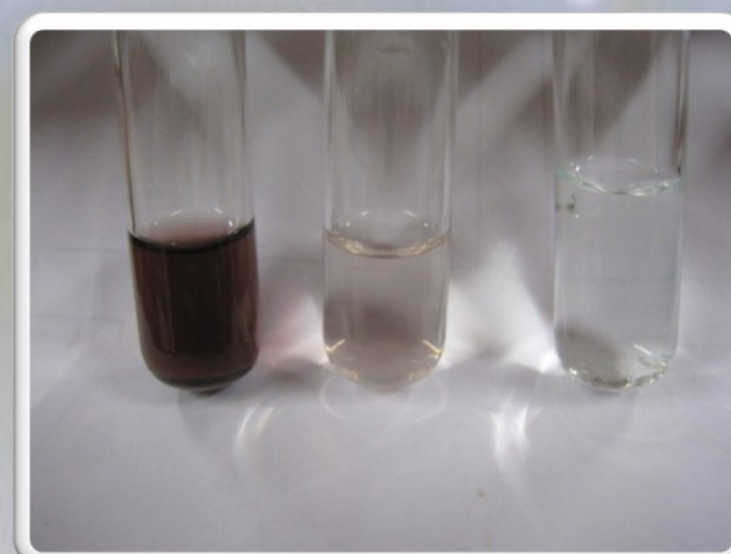
Experiment I Photodegradation of methylene blue by activated water molecules

Part A: Stability test of methylene blue
Part B: Photocatalytic degradation of methylene blue by activated water molecules



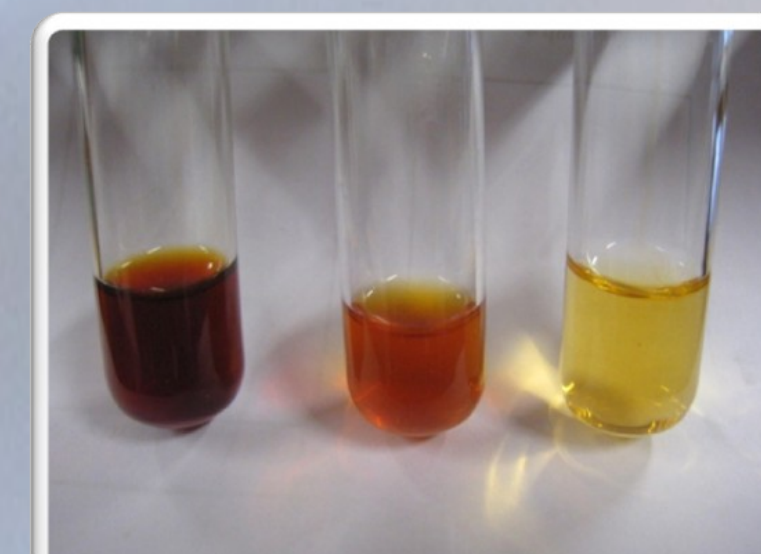
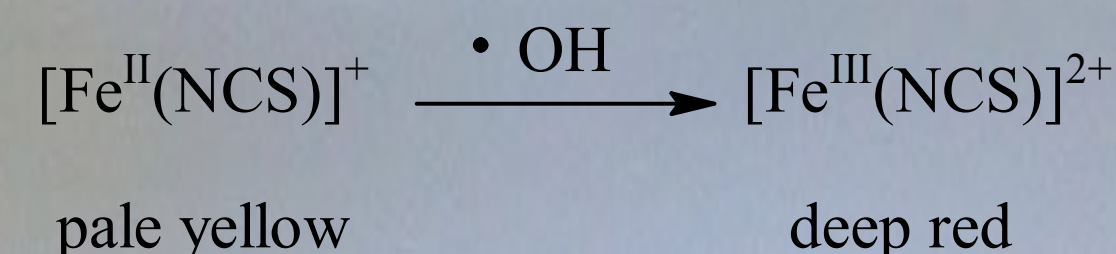
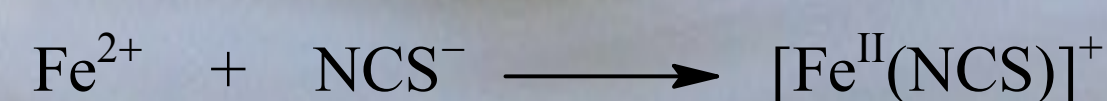
Experiment II Study of the oxidizing power of Activated water molecules from the oxidation of iodide

Part A: Stability test of iodide in the exposure of UV and air
Part B: Photocatalytic oxidation of iodide solution



Experiment III Study of the oxidizing power of activated water molecules from the oxidation of iron(II) ion

Part A: Stability test of iron(II) in the exposure of UV and air
Part B: Photocatalytic oxidation of iron (II) solution



Conclusion

In this study, water, an unreactive substance, was activated and converted into a strong oxidizing agent by a photocatalyst titanium dioxide under UV irradiation. The result of the experiment shows that activated water molecules are reactive even towards stable organic compounds like methylene blue. This method is applicable to many industrial processes and waste treatments. It is beneficial to our daily life and the products formed after the reaction are water and other stable compounds, which are harmless and environmentally friendly.