Modeling Realistic Factors for the Improvement of SODIS-AOP

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Solar Water Disinfection(SODIS) is an inexpensive and effective method for disinfecting water using cost-effective materials like PET bottles and sunlight. Advanced Oxidation Process (AOP) is widely implemented with the addition of photo-catalyst TiO2 in SODIS. However, real-world factors and practicality, such as turbid water sources and visual indicators for disinfection, have not been considered in past research. To model turbid water sources, kaolinite clay was added to the water models, and samples were exposed to light in a sunlight simulator for the control's half-life time. The results showed that clay had a significant negative effect on microbial disinfection for TiO2-suspension SODIS-AOP test cases using a mechanism other than the blocking of light by turbidity. This suggests that clay and other minerals in natural water sources may have a complex interaction with the SODIS-AOP methods. In addition, microbial experiments were replaced with dye, which served as an indicator for an oxidization environment. These results did not show the same significant effect that clay had on the SODIS-AOP cases in microbial experiments. This discovery of unexpected interactions between TiO2 and clay suggests new investigative directions for future research to understand the mechanisms that are introduced when clays are present in AOP methods.

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