

Effect of Photocatalysis on SODIS: The Implementation of Titanium Dioxide, Zinc Oxide, and Chitosan in Solar Water Disinfection

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Solar Water Disinfection (SODIS) is an inexpensive and effective method for disinfecting water that uses readily available materials such as Polyethylene Terephthalate plastic (PET plastic) bottles and sunlight, thus making it very appealing to developing countries that cannot afford expensive machinery to clean water. The objective of this research is to investigate photo-catalysts as a mechanism to enhance the performance of SODIS. In this research the addition of photo-catalysts Titanium Dioxide, Zinc Oxide, Chitosan, and a Titanium Dioxide/Chitosan mixture were tested. Concentrations of each photocatalyst were put into PET plastic bottles and exposed to light in a broad spectrum sunlight simulator. Results showed that Titanium Dioxide has significant antibacterial properties; Chitosan has little to no reaction to light; and the Titanium Dioxide/Chitosan mixture has few antibacterial effects since Chitosan was not activated. Further studies showed that Titanium Dioxide can also kill algae and, therefore, can be assumed to kill Ultraviolet resistant micro-organisms; however, it can only be activated under wavelengths shorter than 365 nanometers. Titanium Dioxide is overall a very promising candidate for the improvement of SODIS.