

TITLE: Application of Solar Energy and Nanotechnology to the Purification of Contaminated Water

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There are approximately one billion people in the world who do not have a safe water supply available. It is therefore the main objective of this project to find an affordable method to purify contaminated water and make it easily accessible to rural regions. The main components utilized in this method were: the sun (since it is a renewable source and readily accessed), in the form of UV (A+B), UV C and infrared radiation, and, Titanium Dioxide (TiO_2) in the nanoparticle range, used as the catalyst to make the method a more efficient one. After observing the electron microscopy of various test surfaces, the specially prepared plastic surface with the ballotini glass beads, coated with TiO_2 was chosen for use. Ten (10) liters of distilled water was contaminated with 50ml of an E Coli bacteria culture. This concentration was chosen for use to ensure a good bacterial count, after various concentrations were previously tested. The contaminated water was then pumped into the reactor and allowed to flow at a steady rate over the plastic film. The temperatures (inside the reactor, of the air and inside the reservoir), the insolation, the UV (A+B) and the UV C were monitored and recorded as functions of time. The Colilert-18 system was used and the counts were obtained 18 hours after. It was found that 10L of water was completely purified in 20 - 25 minutes on a cool to cloudy day, and in 10 - 15 minutes on a very hot day.