

ABSTRACT NO.: 531

TITLE: Purification of Water Containing Organic Chemicals Using Solar Energy and Nanotechnology

AUTHORS: Shastri Laloo
Stephanie Mohammed

SUPERVISOR: Professor Ramsey Saunders

Pure water is absolutely vital for human survival and it is essential for many industrial processes. But due to contamination it is increasingly difficult to get pure water, and therefore many water purification methods have been established. Water purification is the process of removing undesirable chemicals, materials, and biological contaminants from raw water. According to the WHO and UNICEF, dirty drinking water kills 2.2 million people per year, over 1.5 million of whom are children under the age of five (WHO, 2000). Unfortunately, this means that contaminated drinking water is a major problem along with diseases like AIDS and cancer to be the biggest killer of human beings on Earth. In this project the objective was to purify water containing organic chemicals using Solar Energy and Nanotechnology. The organic chemical used was dichloroacetic acid. This purification was done by using sunlight and a solar reactor. The solar reactor contained a specially designed surface. This surface membrane of the reactor was coated with titanium dioxide nanoparticles. Water contaminated with dichloroacetic acid was allowed to flow over the titanium dioxide membrane surface. This was exposed to sunlight through a transparent glass surface. The contaminated water was then tested by a chloride electrode device for chloride ions. It was seen from the results that the acid was being broken down to form chloride ions. There was an exponential increase in the amount of chloride ions, which showed that the acid was continuously being broken down in the presence of sunlight and the titanium dioxide membrane. The concentration of the chloride ions changed on an average of $7.180 \times 10^{-4} \text{ molL}^{-1}$ to $5.850 \times 10^{-3} \text{ molL}^{-1}$ within a three hour period. This occurred under sunny conditions (1112 Wm^{-2}) but decontamination was slowed by cloudy conditions (101 Wm^{-2}).