

## **LOW-COST WATER PURIFICATION SYSTEM USING CONDENSATION**

**K.H. Ellepola and P.W.S.K. Bandaranayake\***

*Department of Physics, Faculty of Science, University of Peradeniya, Sri Lanka*  
*\*kumarab@pdn.ac.lk*

Access to pure drinking water is a major problem for underprivileged people in the dry zone of Sri Lanka, and as a result, most of them suffer from kidney diseases. Therefore, this research project was focused on designing and testing a low-cost and easily maintainable water purification system for obtaining pure drinking water. The principle is based on evaporation of water using solar energy to obtain saturated vapour at high temperature and to condense at lower temperature. Using an El Toro insulating sheet and a thin galvanized sheet, a thin wide channel was designed, which was connected to the water inlets. The other end of the galvanized iron envelope folds onto the El Toro sheet to wet the surface. Solar energy entering through the glass window heats the wet surface and produces hot saturated water vapour. The inner surface of the glass window was used for condensation. The purification ability was tested using dilute NaCl solution. To increase the yield, the El Toro wetting surface was modified by incorporating pot clay, coconut charcoal and manganese dioxide incorporated clay or coconut charcoal to increase its wettability and heat absorption. The maximum temperature difference of 14 °C between the wetting chamber and the condensation chamber was observed with MnO<sub>2</sub> incorporated coconut charcoal when the double glazing was used. The yield obtained was 249 mL m<sup>-2</sup> h<sup>-1</sup>, and it was given by the surfaces made of coconut charcoal and modified coconut charcoal. The yield increased to 416 mL m<sup>-2</sup> h<sup>-1</sup> when the double-glazed glass unit was used to separate the condensation surface and the wetting surface. The quality of the water samples collected from different locations was tested using the facility at National Water Supply and Drainage Board, and the results agreed well with the drinking water standards of Sri Lanka and World Health Organization.

**Keywords:** Manganese dioxide, Modified charcoal, Pot clay, Solar distillation, Water purification