Water Purification Using Solar Energy

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The experiment’s purpose was to design a prototype in order to demonstrate that solar energy could be used to boil and distill water making it viable for human consumption. A prototype of the solar water distiller was built using two Fresnel lenses to capture and concentrate sunlight. Two concave mirrors further focused the light and redirected the focal point onto a piece of clay located inside a glass test tube, which heated up and boiled the water. Water from three different natural sources, rain, river, and sea, were distilled using the prototype and evaluated using qualitative and quantitative methods. Significant improvements in water color, turbidity, and odor were observed after distillation. Even when the original samples had some turbidity, color, and odor, the distillates were completely clear, colorless and odorless. In addition, all the water distillates obtained neutral pH values (6.9 - 7.0), while tap water and commercial purified bottled water obtained pH values of 7.7 and 5.5, respectively. Water conductivity measurements also demonstrated the efficacy of the distillation prototype in the removal of dissolved salts and minerals. The conductivity values of all distillates were much lower than that of tap water, indicating lower levels of dissolved salts and minerals. Furthermore, the distillates’ conductivities were comparable to that of commercial purified bottled water. The results obtained demonstrate that solar energy can be used for the purification of water by means of distillation in an eco-friendly, economical, and easy manner.

Awards Won:
King Abdulaziz &amp
his Companions Foundation for Giftedness and Creativity: First Award of $1,000