



CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

Name(s) Sean S. Haas	Project Number J1114
Project Title Reverse Osmosis through Centrifugal Force	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The past two years I created several different solar powered apparatuses that purified and desalinated water through distillation. In continuing my interest in clean water, this year I created a centrifuge to purify water using reverse osmosis. This device could be utilized for contaminated water, salt water, or possibly even in space. Using a centrifuge instead of an electric pump may be a viable and more cost effective means of purifying water in emergency situations like the devastating earthquake in Haiti or when contaminated water is the only water available.</p> <p>Methods/Materials A centrifuge was created using a salad spinner. Inside the centrifuge was a basket covered in one of four variables, nylon fabric, tarp, finely woven plastic fabric and .22 Micron filter. These acted as semipermeable membranes. The centrifuge and the contaminated water were my controls; the membranes were my variables. Water was placed in the basket and the centrifuge was assembled and spun, forcing the water through the membrane to help purify it. To test for the water's purity, a sample of the water was taken before and after it was processed. Some samples were cultured on auger plates to test for bacteria CFUs (colony forming units), others were tested for turbidity against the McFarland turbidity standards. This was repeated three times for each variable. The .22 micron filter is a known sterilizing filter which I used to compare results from the other tests against.</p> <p>Results The contaminated water had a turbidity of 8 McFarlands, and average bacteria colonies of 103 CFUs. The .22 micron filter completely sterilized the water, and rendered it clear. The nylon membrane decreased the turbidity to 4.5 McFarlands. The plastic tarp decreased the water's turbidity to 6 McFarlands. The fine weave plastic fabric decreased its turbidity to 5.5 McFarlands. The nylon decreased the bacterial count of the water to 17.4 colonies. The tarp decreased the water's bacterial count to 29.6 colonies. The fine weave plastic fabric decreased the water's bacterial count to 19.6 colonies.</p> <p>Conclusions/Discussion The nylon performed the best; it removed more particulate matter and bacteria from the water than any other variables. These tests prove this device could be a viable means of water purification with low energy and high productivity. With the proper filter this device could be used for water purification, desalinization or possibly in low gravity for use in space.</p>	
Summary Statement I want to create a way to simply and inexpensively purify water for disaster situations with reverse osmosis.	
Help Received Mother helped with tests and moral support. Terry Jones help provide testing equipment.	