



INDEPENDENT LABORATORY TESTING OF PURALYTICS' SOLARBAG - (Jan 13, 2012)

The SolarBag is a photocatalytic water purification device that uses solar energy to initiate a series of chemical reactions that break down, remove and inactivate contaminants. Particulates are filtered in a 100 micron pre-filter; chemical contaminants are mineralized by photo-redox reactions; metals are removed through photo-adsorption onto the photocatalyst; and microbes are inactivated due to advanced oxidation and solar disinfection.

Several independent laboratories have tested the SolarBag and its components to date to validate and measure the performance mechanisms stated above. These laboratories have tested numerous water types in the SolarBag all over the world and their conclusions are summarized below.

EPA Purifier Tests - University of Arizona - Tucson, Arizona

The independent laboratory at the University of Arizona has run several tests to evaluate the ability of the SolarBag to inactivate microbial contaminants in the method outlined in the EPA *Guide Standard and Protocol for Testing Microbiological Water Purifiers*. The co-author of the document, Dr. Charles Gerba, has overseen all the experiments and ensured that the testing of the SolarBag has been consistent with the EPA guidelines.

Three SolarBags were tested in parallel to evaluate the product's ability to kill bacteria (*Raoultella terrigena*), virus (poliovirus/rotavirus) and protozoan cysts (*cryptosporidium*) to the respective levels specified in the EPA guidelines of 6-log (99.9999%), 4-log (99.99%), and 3-log (99.9%). Each contaminant was tested in two different types of water. EPA Test Water #1 represents general test water that is similar to U.S. tap water. EPA Test Water #4 is the EPA standard for worst case water for UV light dependent purification products. Each bag was filled with test water and exposed to direct sunlight for 4 hrs before being sampled.

The results of this testing have demonstrated that the SolarBag exceeded the requirements the EPA guidelines for water purifiers, achieving 6-log reductions on both bacteria and virus and a 4-log reduction on protozoan cysts.

Additional testing demonstrated that the SolarBag removed all arsenic in the challenge water to non-detectable levels below 5 ppb from the EPA limit of 10 ppb.

Cascade Designs Inc. – Seattle, Washington

Cascade Designs Inc (CDI) is a company in Seattle, Washington that makes several water treatment and storage products for outdoor recreational and military use. Their microbiological laboratory tests various water purification products against EPA and military guidelines for performance.

Over a six month period, CDI performed a series of tests measuring chemical contaminant reduction and microbial inactivation on the SolarBag. The tests were performed outdoors in both the morning and afternoon sun, under both clear and overcast skies; ambient temperatures ranged from 15 - 30 °C. CDI also used specially formulated challenge water designed to represent developing world water supplies, as well as challenge water defined in EPA and NSF P248 protocols.

The tests showed that the SolarBag was able to reduce 99.9999% of all bacteria, 99.99% of all virus, and over 90% of the chemical contaminants in just 2 hours on warm sunny days while taking 4 hours in rainy overcast conditions.

Ministry of Water and Irrigation – Kisumu, Kenya

The government of Kenya requires an in house performance test to approve product distribution within their borders. Puralytics provided the Ministry of Water and Irrigation with the necessary SolarBags and they tested bacterial reduction in water from Lake Victoria through the water quality laboratory in Kisumu.

Water was pulled from a commonly used drinking water source in Lake Victoria where the Nzoia river discharges at the lake. The sample was poured into the SolarBags through two layers of standard cloth to reduce the turbidity. The SolarBag was left under direct sunlight for 2 hours. After exposure there was no reproducing coliform detected in the product water, indicating a total kill of any bacteria initially present in the water source.

The ministry concluded that the SolarBag is a recommended treatment method for household drinking water.

Kanagawa Academy of Science and Technology – Kawasaki City, Japan

The SolarBag was investigated as a means to address water accessibility challenges in the wake of the April earthquake and tsunami. The Kanagawa Academy of Science and Technology (KAST) used its facilities to test the SolarBag in a controlled environment under a UV lamp to measure bacterial coliform inactivation and organic contaminant reduction.

A SolarBag was filled with water from an outdoor canal that had been filtered through a simple cloth material. The bag was left under the lamp for 4 hours and sampled for coliform and total organic carbon (TOC).

The results, while not demonstrating real-world sunlight conditions, demonstrated significant reductions in both bacteria and organic chemicals.

Chemoptix Microanalysis, Llc. – West Linn, Oregon

The custom sock filter that comes attached to every SolarBag was analyzed at Chemoptix for pore size. Pores on the filter material were measured for size based on a sensitive measurement of light transmission. The study found more than 97% of the pores on the sock filter were smaller than 100 μm in diameter, making it an effective filter for particles exceeding that size.