Solar Powered Water Purification System

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Project Description

The overarching goal of this project is to build a water purification system based on the principles of distillation that is cheap to manufacture, easy to maintain, and can provide two gallons of drinking water per day to provide clean water in certain impoverished countries. This provides enough water for a family of 4 to be able to sustain off of.
The reason this product is important is the potential impact this project has on developing countries and those in disaster relief situations.

Functional Requirements

Easy to maintain and set up	Product takes less than 15 minutes to set up
Affordable	Unit cost under $15
Durable	Enclosure can withstand drastic temperature changes (40 F) and high pressure (1.07 atm)
Collection method	No heat dissipation from enclosure
Output meets water standards	0% turbidity, <50 bbp, and BPA free (Clean Water Act)
Produces adequate water	Produces 2 gallons of water per day

Engineering Standards

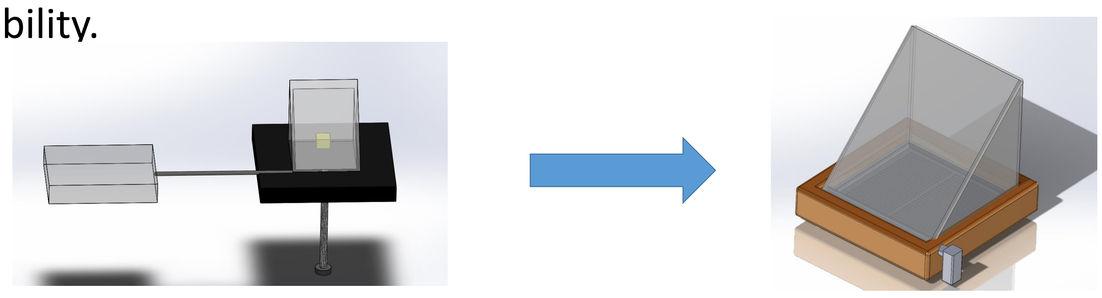
ASTM C147-86 Standard Test Methods for Internal Pressure Strength of Glass Containers: Material quality was evaluated to ensures glass will not shatter from high heat/pressure difference. Simulations along with field tests were run to ensure materials met the standards in similar environmental settings
ASTM E2247-15 standard for water resistance of coatings: Ensured that water resistant aspects of the project remained water resistant in 100% relative humidity through field test.
Water Quality Standards set by the Safe Drinking Water Act : Output water was tested to ensure the water quality met 0% turbidity, <50 bbp, and BPA free.

Design Process

Stage 1 (Conceptualization and Market Research): Researched competitive products, conceptualized design through hand sketched and cardboard models.
S*tage 2 (Design and 3D Model):* Using SolidWorks finalized initial design and ran heat flow simulations for simulated proof of concept.
Stage 3 (Alpha Prototyping Phase): Assembled the basic components of device including the base and the enclosure, established proof of concept.
Stage 4 (Beta Prototyping Phase): Finalized the design and finished the assembly of collection tray, clean water storage, and anchoring system.

Design Specifications

Collection: Highly absorbent bamboo fiber cloth is woven together & hangs down into the water through a wire rack to wick water into the chamber.
Glass Enclosure: Heat from sunlight causes evaporation, leaving behind contaminants. Condensation occurs & falls down front panel into a collection tray.
Water Storage: Collection tray is angled downward & connected to a stainless steel growler to store the purified water.
Base: 8” x 10” metal frame holds life jacket foam, where the buoyancy can be adjusted by adding or taking away layers.
Anchor: Connected to wires from each corner for weight distribution & stability.



Testing & Data Collection

Collection test: Place device in a dirty tank of water and let sit for 24 hours. Data collected is amount of water collected, pH level, turbidity, and particulate count of the water.
Set up: Time average device setup. Data collected will be the average time of setup
Field Test: After completing modifications on device, place device in body of water such as a pond or lake. Data collected is output water.

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