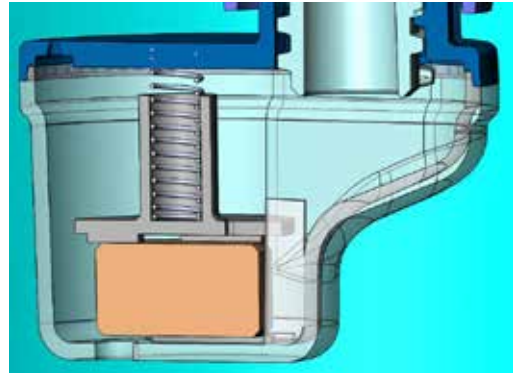


SLOW DISSOLVE CHLORINE TABLET HWTS PURIFIER

MSR Global Health is developing a new water filter element to improve access to safe water in low-income households.

THIS SYSTEM is a low-cost single-pass household water treatment device incorporating a hardy, fast-flowing, cleanable ceramic filter and large capacity treatment media to achieve reduction of turbidity, protozoa, bacteria and viruses while also providing residual protection against recontamination.



Many of the available water treatment options are problematic at best and often prone to dangerous malfunction or misuse when used alone.

HOLLOW FIBER MEMBRANE BASED OPTIONS are expensive, can be critically damaged without user knowledge, and suffer from low recovery from cleaning attempts, making them unsustainable in long-term response situations.

TRADITIONAL CERAMIC FILTERS overcome some of these issues as they are lower cost, less prone to damage that is not visible to the user, and are readily field cleanable for long periods of time. However, they suffer from lower water production rates and are not capable of treating water of viral pathogens.

OXIDANT BASED OPTIONS (e.g., chlorine) eliminate bacteria and viruses and are low cost but require correct dosing, do not inactivate some protozoa or remove turbidity, and often suffer from smell and taste issues.

THE PROPOSED HWTS OVERCOMES THESE CHALLENGES USING INNOVATIVE TECHNOLOGY AND DESIGN.

Source water is added to the upper container where a low-cost, high-flow (16L/hr maximum) ceramic is used as a pre-filter to remove turbidity, some bacteria, helminths, and protozoa. Water then flows through a disinfection device where it is automatically dosed with sufficient chlorine to inactivate any remaining bacteria and viruses as well as provide a residual to reduce recontamination risks. This controlled chlorine addition is accomplished through the use of a slow dissolving chlorine tablet as well as through the design of the housing which limits the amount of water that is allowed to make contact with the tablet's surface.

Feasibility testing has shown advantages over resin based halogen systems in that dosing is minimally affected by pH or dissolved solids, making achieving consistent dosing much

simpler. The selected chlorine source is capable of treating up to 10,000L, has a shelf life of >5 years, and can be replaced for less than \$0.10 USD. It is also designed to stop the flow of water when the chlorine is used up and to allow for easy replacement while recycling the plastic parts.

The basic design is very similar to the ImerPure™, developed with technical support from MSR, but replaces the brominated treatment with a new device. Because development and commercialization are not yet complete, it is not possible to provide hard price estimates. However, based on materials and previous work, the total cost of the full system (water containers, tap, ceramic and chlorine doser) is expected to be <20\$ USD with the chlorine doser alone costing <8\$ USD.

The initial studies to validate the technology have found this approach to be capable of exceeding the **WHO Guidelines for a highly protective Household Water Treatment System (HWTS)**.

Current performance results indicate that this HWTS will possess advantages over those currently available in the areas of water production rate (4 L/hr for full run), treatment capacity (up to 10,000L), shelf life (> 5 years), and microbiological efficacy (> 6 log bacteria, > 5 log viruses, > 4 log protozoa reductions).

FLOW RATE	3-4 L/hr full volume average 16 L/hr maximum
CAPACITY	Up to 10,000 L
BACTERIAL EFFICACY	> 6.00 LRV
VIRAL EFFICACY	> 5.00 LRV
PROTOZOA EFFICACY	> 4.00 LRV
SHELF LIFE	> 5 years
COST	< 20\$ USD (<8\$ Chlorine Doser)

This HWTS purifier is a traditional countertop or floor-mounted two chamber design.

Source water is added to the upper chamber by the customer and clean water is collected and stored in the lower chamber.

A tap can then be used to dispense the treated water as desired.

No user adjustments or monitoring is required to ensure safe use or setup due to the novel design.

Utilization of the C1 Interface in the design will prevent users from inadvertently installing the filter technology incorrectly, significantly simplifying initial setup. In terms of daily use and maintenance of the system, the user will simply add source water to the device and allow it to feed through using gravity as the driving force. There will be no required measurement or adjustments to the system. If flow slows because suspended solids have collected on the surface of the ceramic, it can be rinsed or scrubbed as needed to remove the debris.

Once the chlorine source is exhausted, the flow through the device will stop. This will happen automatically and flow will not be restored until the disinfection device is recharged. This will prevent accidental or intentional use of the system when no chlorine is available. This is important because without chlorine, it will remove only minimal viruses and 99.9-99.99% bacteria; although it will continue to reduce helminth and protozoa to acceptable levels.

