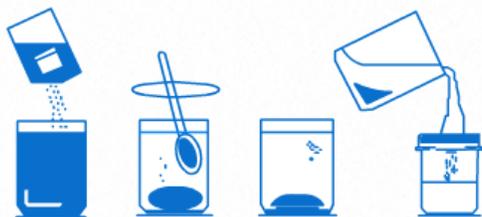


Household Water Treatment Flocculant/Disinfectant Powder

Household Water Treatment and Safe Storage in Developing Countries

Studies have shown that household water treatment and safe storage interventions improve water quality and reduce diarrheal disease incidence in developing countries. Five of these proven options – chlorination, solar disinfection, ceramic filtration, slow sand filtration, and flocculation/disinfection – are widely implemented in developing countries. The decision of selecting which options are most appropriate for a community is often difficult, depending on existing water and sanitation conditions, cultural acceptability, implementation feasibility, availability of technology, and other local conditions. This series of technical bulletins is designed to assist organizations in comparing and selecting the most appropriate options.



Process for PUR Purifier of Water system
Procter & Gamble

Flocculant/Disinfectant Powder

The Procter & Gamble Company developed PUR Purifier of Water™ in conjunction with the Centers for Disease Control and Prevention. PUR sachets are now centrally produced in Pakistan, and sold to non-governmental organizations (NGOs) worldwide at a cost of 3.5 US cents per sachet. The PUR product is a small sachet containing powdered ferric sulfate (a flocculant) and calcium hypochlorite (a disinfectant). PUR was designed to reverse-engineer a water treatment plant, incorporating the multiple barrier processes of removal of particles and disinfection. To treat water with PUR, users open the sachet, add the contents to an open bucket containing 10 liters of water, stir for 5 minutes, let the solids settle to the bottom of the bucket, strain the water through a cotton cloth into a second container, and wait 20 minutes for the hypochlorite to inactivate the microorganisms.

Lab Effectiveness, Field Effectiveness, and Health Impact

The flocculant/disinfectant powder PUR has been proven to remove the vast majority of bacteria, viruses, and protozoa, even in highly turbid waters. PUR has also been documented to reduce diarrheal disease from 90% to less than 16% incidence in five randomized, controlled health intervention studies. PUR also removes heavy metals—such as arsenic—and chemical contaminants—such as pesticides—from water. Studies showing the efficacy of PUR have been conducted for highly turbid water in the laboratory, in developing countries, in rural and urban areas, refugee camps, and include all age groups.

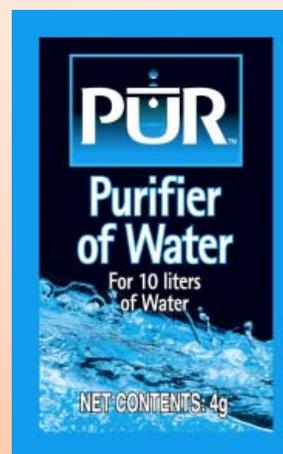
Benefits, Drawbacks, and Appropriateness

The benefits of flocculant/disinfectant powders are:

- Proven reduction of bacteria, viruses, and protozoa in water
- Removal of heavy metals and chemicals
- Residual protection against contamination
- Proven reduction of diarrheal disease
- Visual improvement of water and acceptability
- Sachets are easily transported and have a long shelf life

The drawbacks of flocculant/disinfectant powders are:

- Multiple steps are necessary—requires training or demonstration
- Requires a lot of equipment (2 buckets, cloth, and a stirrer)
- The higher relative cost per liter of water treated



A PUR sachet
Procter & Gamble

PUR is most appropriate in areas with a consistent supply chain for sachet resupply and in urban, rural, and emergency situations when educational messages can reach users to encourage correct and consistent use.



Woman with PUR sachets in Haiti
D. Lantagne, CDC

Implementation Examples

From 2003 to 2007, 85 million sachets of PUR were distributed to 23 countries. That equates to 850 million liters of water.

Social marketing organizations, such as the NGO Population Services International, sell PUR sachets in 9 countries.

Local organizations use the socially marketed PUR sachets in their own programming to provide safe drinking water. In western Kenya students in schools are taught how and why to use PUR, and safe water clubs treat drinking water for all the students. Also in Kenya, HIV self-help groups sell PUR sachets and storage containers as an income generating activity.

PUR sachets have been widely used to respond to emergencies – from the 2004 tsunami in Indonesia to flooding in Haiti to cholera epidemics in Africa.

The Procter & Gamble Children's Safe Drinking Water program has been given numerous awards, including the Ron Brown Presidential Award for Corporate Leadership in 2007, the EPA Children's Health Excellence Award in 2007, the Grainger Challenge Bronze Award in 2007, and the Stockholm Industry Water Award in 2005.

Economics and Scalability

Each sachet of PUR is provided to global emergency relief organizations or non-governmental organizations at a cost of 3.5 US cents, not including shipping from Pakistan by ocean container. Transport, distribution, education, and community motivation can add significantly to program costs. Sachets are generally sold at product cost recovery for 10 US cents each, for a cost of 1 US cent per liter treated. Currently, PUR projects operate either on partial cost recovery (charging the user only for the product, and subsidizing program costs with donor funds), or fully subsidized free distribution such as in emergency situations. Procter & Gamble sells the PUR sachets at cost, makes no profits on PUR sales, and donates programmatic funding to some projects.

For more information about household water treatment systems visit:

<http://www.cdc.gov/safewater>

or

http://www.who.int/household_water/

For more information about flocculant/disinfectant powder systems for developing countries visit:

<http://www.csdw.org>

<http://www.pghsi.com/safewater>



Turbid water in Kenya treated with PUR
G. Allgood, Procter & Gamble