



## Drinking Water Treatment Technologies for Household Use

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POU/POE* Technologies that may remove some/all contaminants		Household Water Contaminants***				
		Protozoa (e.g., <i>Cryptosporidium</i> , <i>Giardia</i> )	Bacteria (e.g., <i>Campylobacter</i> , <i>Salmonella</i> , <i>Shigella</i> , <i>E. coli</i> )	Viruses (e.g., Enteric, Hepatitis A, Norovirus, Rotavirus)	Chemicals	
<b>Filtration **</b> (physical process that occurs when liquids, gases, dissolved or suspended matter adhere to the surface of, or in the pores of, an adsorbent medium)		Microfiltration	++++	++	-	-
		Ultrafiltration	++++	++++	++	+
		Nanofiltration	++++	++++	++++	++
<b>Reverse Osmosis Systems **</b> (process that reverses the flow of water in a natural process of osmosis so that water passes from a more concentrated solution to a more dilute solution through a semi-permeable membrane. Pre- and post-filters are often incorporated along with the RO membrane itself)		++++	++++	++++		Will remove common chemical contaminants (metal ions, aqueous salts), including sodium, chloride, copper, chromium, and lead; may reduce arsenic, fluoride, radium, sulfate, calcium, magnesium, potassium, nitrate, fluoride, and phosphorous.
<b>Distillation Systems</b> (process of heating water to the boiling point and then collecting the water vapor as it condenses, leaving many of the contaminants behind)		++++	++++	++++		Will reduce most common chemical contaminants, including arsenic, barium, cadmium, chromium, lead, nitrate, sodium, sulfate, and many organic chemicals.
<b>Ultraviolet Treatment Systems (with pre-filtration)</b> (treatment process that uses ultraviolet light to disinfect water or reduce the amount of bacteria present)		++++	++++	+++		-
<b>Water Softeners</b>		ion exchange technology for chemical or ion removal to reduce the amount of hardness (calcium, magnesium) in the water; can also be designed to remove iron and manganese, heavy metals, some radioactivity, nitrates, arsenic, chromium, selenium, and sulfate; does not protect against protozoa, bacteria, and viruses.				
<p><b>* Point of Use (POU)-</b> point of use water treatment systems typically treat water in batches and deliver water to a single tap, such as a kitchen sink faucet or an auxiliary faucet.</p> <p><b>* Point of Entry (POE)-</b> point of entry water treatment systems typically treat most of the water entering a residence. Point-of-entry systems, or whole-house systems, are usually installed after the water meter.</p>						
<p><b>** Filtration:</b></p> <ul style="list-style-type: none"> <li>- A <b>microfiltration filter</b> has a pore size of approximately 0.1 micron (pore size ranges vary by filter- 0.05 micron - 5 micron)</li> <li>- An <b>ultrafiltration filter</b> has a pore size of approximately 0.01 micron (pore size ranges vary by filter- 0.001 micron - .05 micron; Molecular Weight Cut Off (MWCO) of 13,000 to 200,000 Daltons); Ultrafiltration filters remove particles based on size, weight, and charge.</li> <li>- A <b>nanofiltration filter</b> has a pore size of approximately 0.001 micron (pore size ranges vary by filter- 0.008 micron - 0.01 micron; Molecular Weight Cut Off (MWCO) of 200-2000 Daltons); Nanofiltration filters remove particles based on size, weight, and charge.</li> <li>- A <b>reverse osmosis filter</b> has a pore size of approximately 0.0001 micron</li> </ul> <p>Filtration of contaminants depends highly on the amount of contaminant, size of the contaminant particle, and the charge of the contaminant particle. Depending on the household's water needs, pretreatment before filtration may include the addition of coagulants and powdered activated carbon, adjustments in pH or chlorine concentration levels, and other pretreatment processes in order to protect the filter's membrane surface.</p>						
<p><b>*** The treatment technologies described can be used in conjunction with each other for greater pathogen reduction. The addition of coagulants, carbon, alum, and iron salts to filtration systems may aid in chemical removal from water.</b></p>						
<p><b>**** In addition to providing safe drinking water to your household, you can also prevent illness by practicing good personal hygiene. Wash hands before preparing and eating food, after going to the bathroom, after changing diapers, and before and after tending to someone who is sick.</b></p>						