EPA Researchers Investigate The Effectiveness Of Point-Of-Use/Point-Of-Entry Systems To Remove Per- And Polyfluoroalkyl Substances From Drinking Water

By U.S. EPA

PFAS are a group of synthetic chemicals that have been in use since the 1940s. PFAS manufacturing and processing facilities, facilities using PFAS in production of other products, airports, and military installations are some of the contributors of PFAS releases into the air, soil, and water. Due to the widespread use of PFAS and their persistence in the environment, most people in the United States have been exposed to PFAS. For homeowners, there is strong interest in finding a household water treatment system that can be easily installed, if necessary, to reduce the levels of PFAS in their drinking water.

Currently, NSF International has standards PFOA and PFOS, two PFAS compounds. To help homeowners make an informed decision when trying to reduce PFAS in their drinking water, EPA researchers conducted studies on several off-the-shelf, commercially available technologies, including granular activated carbon (GAC), reverse osmosis (RO), and ion exchange treatment systems to determine if they were capable of decreasing PFAS levels in drinking water. Studies for GAC and RO have been completed to date.

In these studies, EPA researchers analyzed water samples for PFAS, pH, temperature, turbidity, total organic carbon, total dissolved solids, hardness, and free available chlorine. The PFAS included in this research were perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS), perfluoroheptanoic acid (PFHpA), perfluorobutane sulfonate (PFBS), perfluorohexane sulfonic acid (PFHxS), and perfluorononanoic acid (PFNA).

EPA found that both the GAC and RO systems studied were able to reduce PFAS to below laboratory detection limits when used as point-of-entry (where the water enters the whole house) or point-of-use (where water is used in the house, for example a kitchen sink or a bathroom sink) systems. However, water quality conditions, concentrations of PFAS in the water, and operational conditions were shown to affect each of the systems and their effectiveness.

For example, for RO systems, homeowners would be required to replace membranes and filters on a regular schedule to maintain effectiveness. While RO systems were very effective as point-of-use systems, for use as a point-of-entry system to treat water for the entire home, they would require additional components—such as a 200-500-gallon water storage tank, a 20-gallon bladder tank, and a pump with a shutoff switch.

In addition, because RO systems demineralize water, homeowners may have to add mineralization cartridges to point-of-entry RO systems to prevent potential lead and copper corrosion issues within household plumbing.

The RO systems tested included the iSpring RCS5T, the Hydrologic Evolution RO1000 and the Flexeon LP-700. All effluent PFAS results for the iSpring and Flexeon RO systems were non-detect (less than three parts per trillion) during the one-week studies.

However, the Hydrologic RO systems were shown to have PFAS concentrations higher than non-detect during intermittent operation. Even in these cases, the membrane removed greater than 75% of the individual PFAS.

GAC systems were also studied on two types of GAC media. Both GAC media (Evoqua 1230CX and Calgon Filtrasorb 600 AR+) were shown to have the potential to remove PFAS to below detection under the specific water quality conditions, PFAS concentrations, and operational conditions used in this study. However, point-of-entry applications, large quantities of GAC would be required to provide enough contact time for removal of PFAS in residents homes.

In conclusion, if a household water system is correctly designed based on the source water's characteristics and the PFAS type and concentrations found within the water, then point-of-use and point-of-entry water systems can provide relatively inexpensive treatment barriers for PFAS removal in the home. It is important to keep in mind that any in-home treatment device should be certified by an independent party, currently available for PFAS (NSF P473), and should be properly maintained to ensure that the treatment system remains effective over time.

For homeowners considering testing to evaluate PFAS in their drinking water, EPA recommends contacting your state to learn if they have state accredited laboratories to test for PFAS. For drinking water, EPA recommends using an EPA testing method.

EPA researchers continue to work with states, tribes, and local communities to develop treatment options to decrease PFAS exposures.

Read the journal article: *Effectiveness of point - of - use/point - of - entry systems to remove per - and polyfluoroalkyl substances from drinking water*.