

Per- and Polyfluoroalkyl Substances (PFAS)

Basic Facts

- The class of chemical compounds known as per- and polyfluoroalkyl substances (PFAS) are ubiquitous environmental contaminants commonly known as “forever chemicals.”
- PFAS are manmade chemicals composed of a chain of linked carbon and fluorine atoms. The U.S. EPA has identified over 12,000 individual PFAS chemicals. Common examples include fluorotelomer alcohol (FTOH), perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS).
- The carbon-fluorine bond of a PFAS chemical is one of the strongest chemical bonds known, making it attractive in many product uses due to their thermal stability, resistance to degradation, and surfactant ability, allowing products to repel water, grease, and stains.
- Because of the strength of the carbon-fluorine bond, PFAS chemicals do not degrade easily in the environment or the human body — that is why they are called “forever chemicals.”
- PFAS chemicals have been used since the 1940’s and can be found in many consumer and commercial products including paints, fast food packaging, firefighting foams, pesticides, personal care products, non-stick cookware, and performance clothing and design fabrics.
- According to the Centers for Disease Control and Prevention (CDC), approximately 97% of Americans have detectable levels of PFAS in their blood.
- People can be exposed to PFAS by using products containing them. This can occur by ingestion of contaminated food and water, breathing contaminated air and touching products or dust containing PFAS chemicals.
- PFAS exposure to children may result in developmental effects such as low birth rates and behavioral changes. Children with high levels of PFAS have also shown reduced response to routine vaccinations such as diphtheria and tetanus.
- Some studies indicate PFAS exposure may be related to increased risks of prostate, kidney, and testicular cancers and immune system disorders.
- Additional health concerns include adverse reproductive effects such as decreased fertility and high blood pressure among pregnant women.
- On June 15, 2022, the U.S. EPA issued updated health advisories for the level of PFOS and PFOA in drinking water at 0.02 parts per trillion (ppt) and 0.004 ppt, respectively. The updated levels are significantly lower than 70 ppt previously issued in 2016.
- State level guidelines and regulations for PFAS are variable, but some do include enforceable standards for drinking, ground and/or surface water. For example, the state of Vermont regulates the sum (combination) of five specific PFAS as 20 ppt in drinking water.
- Maine and California have included the term “intentionally-added” PFAS to regulations banning the production and use of PFAS in consumer products like food packaging, textiles, and cosmetics.
- California has listed PFOA and PFOS as carcinogens under Proposition 65, requiring notification of PFAS content in goods by manufacturers.

RELATED CHEMICAL INSIGHTS RESEARCH INSTITUTE DOCUMENTS

Science Insights - [Exposure and Health Implications of Per- and Polyfluoroalkyl Substances \(PFAS\)](#)

Technical Brief - [A Strategic Research Initiative on the Impact of Perfluoroalkyl and Polyfluoroalkyl Substances \(PFAS\) on Human Health](#)



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