

PFAS polymers pose serious health and environmental threats

Per- and polyfluoroalkyl substances (PFAS) are toxic chemicals used in thousands of products ranging from cookware and clothing to paint and firefighting foam. Known as “forever chemicals” because they remain in the environment for such a long time, PFAS have contaminated more than 8,865 sites across all 50 states, the District of Columbia and four US territories¹, including drinking water of an estimated 200 million Americans.² The threat of these toxic and persistent chemicals is so great that many states, manufacturers and retailers are phasing out PFAS in products and processes. The states of Minnesota³ and Maine⁴ and the European Union⁵ are in the process of restricting all unnecessary uses of PFAS.

The backlash against PFAS has scared the chemical industry.

Manufacturers are now falsely claiming that many polymer versions of PFAS are safe, but this simply isn't true.

**As we have learned with Teflon[®],
PFAS polymers have a toxic lifecycle.**

PFAS polymers⁶ are a type of plastic used in a vast array of products such as smartwatch bands, nonstick pans, and waterproof clothing. The chemical industry, which previously claimed that the mostly phased-out first generation of PFAS chemicals were totally safe, now claims the same thing about many PFAS polymers. But the fact is that these compounds have a toxic lifecycle that threatens human and environmental health.

Water supplies for millions of people have been contaminated by the highly toxic and persistent PFAS chemicals DuPont and 3M used to make the PFAS polymer known as Teflon[®]. Many people have fallen ill after being exposed to the toxic byproducts of Teflon[®] manufacturing, and exposures continue today.^{7,8} With this history, the chemical industry's claims that PFAS polymers are safe must be recognized as highly suspect.

Why all PFAS polymers must be phased out:

- **PFAS polymer production and use creates toxic PFAS pollution** PFAS polymers are made using other harmful PFAS chemicals, which are subsequently released into the environment when waste byproducts enter air and waterways.⁹ In fact, when scientists studied the fate of a commonly used group of toxic PFAS, they estimated 80% of those chemicals made since the 1950's have been released to the environment from PFAS polymer “manufacture and use.”¹⁰ Certain PFAS polymers release toxic PFAS chemicals during their use, posing acute and chronic risk to human and ecological health.^{11,12} Workers in plants making or using PFAS polymers also may be exposed to serious hazards.¹³
- **PFAS polymers can leave PFAS in our environment forever** Many PFAS polymers are extremely persistent in the environment, which poses unique concerns. Other types of PFAS

polymers break down, only to form persistent PFAS chemicals. As a recent scientific paper noted: “if a chemical is highly persistent, its continuous release will lead to continuously increasing contamination” that will take “decades, centuries or even longer to reverse” and lead to “increasing probabilities of the occurrence of known and unknown effects.”¹⁴ With few exceptions, highly persistent organic chemicals should never be used.¹⁵

- **PFAS polymers can cause illness and injury**

Respiratory illnesses associated with normal consumer uses of PFAS polymer-containing products such as waterproofing agents and sealants remains an ongoing problem that has “occurred for many years in many different countries.”¹⁶ The Centers for Disease Control and Prevention have reported cases of “severe acute respiratory illness” linked to the use of a PFAS polymer-based shoe spray which was later recalled by the manufacturer.¹⁷ The Plastics Industry Association has noted in their own materials that PFAS polymer exposure can cause the flu-like condition known as “polymer fume fever.”¹⁸ It has also been known for decades that fumes from Teflon[®] pans can kill birds.¹⁹ The chemical industry simply can’t claim that PFAS polymers are safe when exposures during production and use have caused illness and injury.

- **PFAS polymer production emits “climate super-pollutants”** PFAS polymer production emits climate super-pollutants such as HCFC-22 and HFC-23, which are 5,280 and 10,800 times respectively more potent at warming the atmosphere than carbon dioxide, on a twenty year timescale.²⁰ The emissions of these two compounds from just a single PFAS polymer manufacturing plant are the equivalent of the annual carbon dioxide pollution from 750,000 passenger cars.²¹ HCFC-22 also destroys the health-protective stratospheric ozone layer.²²

- **Disposal of PFAS polymers poses serious threats**

Landfilling of PFAS polymers can lead to contamination of nearby soil and groundwater and can contribute to releases of microplastics and, in some cases, other PFAS chemicals.^{23,24} Deep well injection of manufacturing waste relocates the threat and creates the possibility of spills and leaching into drinking water.²⁵ Incineration of PFAS polymers creates toxic emissions that can harm frontline communities and spread far beyond their source. Most municipal incinerators are not designed to handle highly corrosive materials formed when PFAS polymers break down.²⁶ These same serious disposal issues are also present for the PFAS chemicals used to make the polymers.

- **Safer alternatives exist for many PFAS polymer uses**

In many cases, safer alternatives to PFAS polymers are readily available and being used in products. For some applications, they were never necessary in the first place: no one needs their watch band or dental floss to be made from a PFAS polymer. For other uses where alternatives are not yet available, immediate efforts should be made to develop replacements, or products should be redesigned to eliminate the use of PFAS polymers. In the meantime, all currently avoidable uses should be phased out as quickly as possible.

- **The PFAS crisis began with polymers – let’s not repeat history** PFAS

pollution first came to light from DuPont’s manufacture of the PFAS polymer Teflon[®] which led to massive contamination still causing harm today.^{27,28} We should learn from this disastrous history and take action to protect public health and the environment from these persistent toxic chemicals.

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- ² Andrews, D., Naidenko, O. (2020). Population-Wide Exposure to Per- and Polyfluoroalkyl Substances from Drinking Water in the United States. *Environmental Science & Technology Letters*. 7, 12, 931-936. <https://pubs.acs.org/doi/10.1021/acs.estlett.0c00713>
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- ⁶ Polymers are very large molecules with repeating individual units linked up to form chains or networks; some polymers are made up of hundreds or thousands of individual units. While there are a few different categories of PFAS polymers (including fluoropolymers and side-chain fluorinated polymers), all of them present serious health and environmental concerns.
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