

The P-Sufficient Approach: A Strategy for Regulating PFAS as a Class

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Because of concerns about their persistence and potential toxicity, certain per- and polyfluoroalkyl substances (PFAS) have been targeted for regulation or removal from commerce.^{1,2} Yet experts worry that regulations aimed at specific PFAS will lead to problems with “regrettable substitutions” in which a regulated chemical is replaced with an unregulated one that may be equally or even more toxic.¹ In a commentary published in *Environmental Health Perspectives*, members of the Safer Consumer Products Program at the California Department of Toxic Substances Control (DTSC) elucidated the scientific rationale for a novel regulatory approach—regulating PFAS chemicals as a class.³

PFAS are a group of manmade chemicals that have been used widely over the past several decades in industrial applications, commercial household products, and food packaging.⁴ Numerous studies suggest that exposure to certain PFAS may be harmful to human health and the health of other organisms, although much remains to be learned.⁵ “There are six thousand or so PFAS chemicals,⁶ and the majority have not been thoroughly evaluated for ecological and human toxicity,” says André Algazi, senior study author and chief of the DTSC Chemical-Product Evaluation Section.

PFAS are an extremely diverse group of substances with a wide range of properties and applications, but they all have one thing in common: Somewhere in their chemical structure, each contains at least one carbon chain that is fully fluorinated, meaning it contains only carbon–fluorine bonds. A carbon–fluorine bond is one of the strongest chemical bonds known and thus one of the hardest to break. It is what makes PFAS so resistant to degradation in the environment, explains Ian Cousins, an environmental chemist at Stockholm University in Sweden, who was not involved in the new commentary.

Cousins and other environmental scientists have advocated for a persistence-sufficient, or “P-sufficient,” approach to regulating PFAS.⁷ The idea behind the P-sufficient approach is that the persistence of PFAS is a sufficient basis to warrant regulation regardless of, say, the chemicals’ bioaccumulation potential or toxicity.⁷ That is different from most chemical regulatory approaches, which tend to focus on hazard traits, such as whether a chemical is suspected or known to cause adverse health effects, Cousins explains. “We know that if we keep emitting PFAS, their concentrations in the environment will increase, because they do not degrade, and ultimately some known or unknown ‘effects threshold’ will be



Greaseproof paper food packaging can expose people to PFAS if the chemicals migrate into the packaged food. But discarded products present other exposure opportunities. For instance, depending on the disposal method, packaging can release PFAS into compost, landfill leachate, or (if incinerated) the air. In addition, recycled products made from PFAS-treated paper can be a source of PFAS exposure.¹⁰ Image: © onajourney/Shutterstock.

breached. But because there are thousands of PFAS chemicals and we have inadequate toxicity data on most of them, we do not know what the long-term effects will be,” he says.

Lead commentary author Simona Bălan, senior environmental scientist at the DTSC, says the California agency is the first in the world to adopt a P-sufficient approach to PFAS. The DTSC has proposed using this new approach to regulate PFAS specifically in food packaging, carpets and rugs, and stain-proofing treatments used on clothing, upholstery, and other consumer textiles.⁸ Bălan explains these product categories represent some of the biggest sources of documented PFAS exposure. The regulations are expected to be finalized by July 2021. Industry trade groups, including the American Chemistry Council (ACC), argue against a class approach to regulation. Although the total number of PFAS may be large, only a “small fraction” of these substances are actually used in a given application, such as textile treatment products, wrote ACC representative Renée M. Lani in comments to the DTSC on the proposed regulations.⁹

Under the new regulations, manufacturers selling those products on the California market will notify the DTSC of any PFAS used in the product. If a product contains PFAS, the manufacturer will perform an alternatives analysis to determine if a non-PFAS chemical could serve the same function in the product. If a suitable alternative does not exist, the product may continue to be sold, but it will carry a warning label for consumers. “The purpose of the new regulations is to [help] prevent regrettable substitutions, not to put an immediate ban on PFAS in those products,” Bălan says.

She and Algazi say these state regulations are just one small step to moving the consumer products market away from persistent chemicals. A P-sufficient approach to PFAS could also be feasible in regulations of drinking water and other environmental media, Algazi adds—for instance, by setting a limit for total allowable PFAS in drinking water. In addition, the authors wrote that other chemical classes may lend themselves to the P-sufficient approach, including nonylphenol ethoxylates in laundry detergents and microplastics.³

Although many environmental scientists believe a P-sufficient approach is a step in the right direction when it comes to PFAS,⁷ it does not completely solve the problem of regrettable substitutions. “Just because something is nonpersistent, doesn’t mean

that it is safe,” Cousins says. “A lot more research is needed to determine whether alternatives are better and safer, and what ‘better and safer’ means.”

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