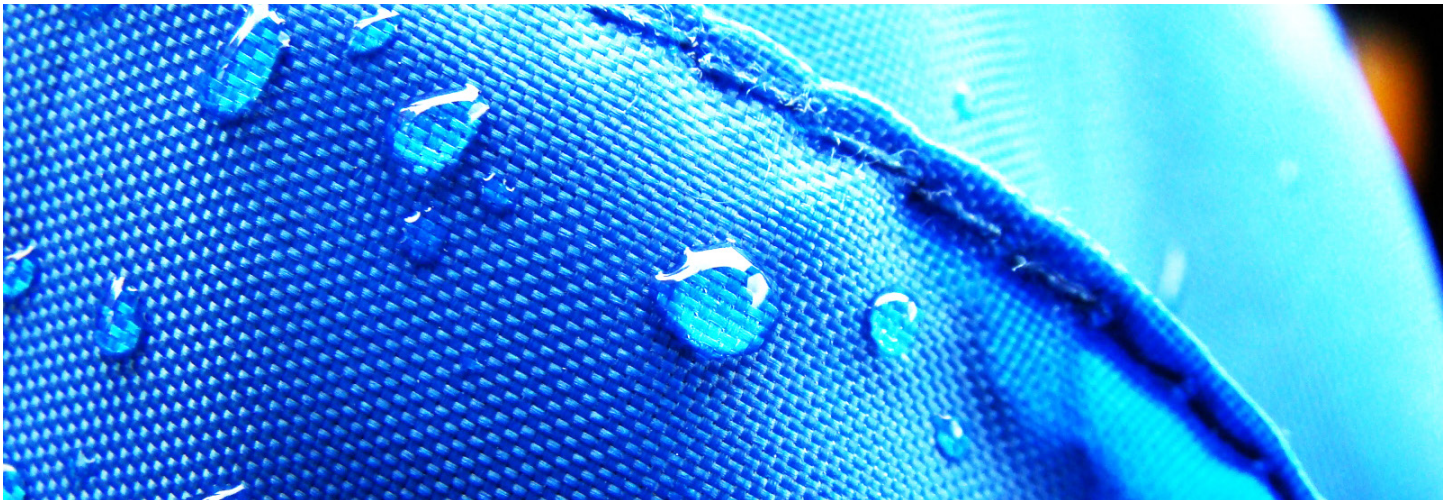

Fluorinated Alternatives: Myths versus Facts

Long-chain highly fluorinated chemicals — including PFOA, PFOS and other C8 compounds — were used for decades to give water-repellant, stain-resistant, and non-stick properties to furnishings, carpets, outdoor gear and other products. Exposure to PFOA has been linked to kidney and testicular cancer, elevated cholesterol, decreased fertility, thyroid problems and changes in hormone functioning in adults as well as adverse developmental effects and decreased immune response in children[1].

Due to such harmful effects, the long-chain chemicals were recently phased out and replaced by numerous similar compounds, including short-chain molecules called C6 and C4[2]. Industry says these alternatives are safe, sustainable, and well-tested[3]. A look at the facts shows those claims don't stick.

THE BOTTOM LINE

Highly fluorinated chemicals pose a potential risk to human health and the environment, and they should only be used with safeguards when their function is essential.

MYTH: "PFOA-free" means safe.

FACT: Products advertised as "PFOA-free" often contain replacement chemicals made with the same problematic chemical building blocks as PFOA.

Since PFOA has been phased out, numerous related chemicals that are equally persistent and may pose similar health risks have replaced it[4]. To prevent such "regrettable substitutions", the entire class of highly fluorinated chemicals should be avoided.

MYTH: Short-chain fluorinated alternatives like the 6 and 4 carbon-based compounds have been thoroughly tested and are safe.

FACT: Recent studies suggest these alternatives may cause similar health problems as the long chain compounds.

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As documented in 16 reports to the EPA filed by DuPont between 2006 and 2013[5], experimental animals exposed to a commonly used short-chain alternative had increases in several types of cancer and changes to the liver and immune system. These adverse health effects are similar to those from exposure to the old long-chain compounds. Another study found similarities in the way that short-chain and long-chain compounds adversely impact hormonal systems[6].

According to the California Department of Public Health[7], "other than PFOA and PFOS, the potential toxicity of [highly fluorinated chemicals] has not been well characterized." In 2015, more than 200 scientists from around the world signed the Madrid Statement, which called for limiting the production and use of highly fluorinated chemicals[8].

MYTH: Short-chain fluorinated alternatives (e.g., C6, C4) do not accumulate in human tissues like long-chain materials do.

FACT: Scientists are only beginning to understand what happens to short-chain fluorinated alternatives in the human body.

A recent study found that concentrations of short-chain fluorinated chemicals were higher than long-chain chemicals in human kidney, lung, liver, and brain[9]. According to the Danish Environmental Protection Agency[10], "the high presence of short-chain [fluorinated chemicals] in human tissue... is worrying."

MYTH: Short-chain fluorinated alternatives are sustainable.

FACT: Most fluorinated alternatives are extremely persistent and difficult to cleanup.

To be sustainable, chemicals should break down quickly after their intended use. Most short-chain alternatives do not break down in nature[9]. Like their long-chain cousins, they will be with us forever.

Short-chain fluorinated alternatives are even more difficult to clean up from the environment than the long-chains. Activated carbon filtration, commonly used for removing long-chain compounds from water, is much less effective at removing short-chains[11]. Studies show that highly fluorinated chemicals can move from contaminated water into food crops such as lettuce and strawberries. Surprisingly, short-chain alternatives are found in such crops at higher levels than long-chains[12].

MYTH: Highly fluorinated chemicals are necessary for modern life.

FACT: Many brands are removing all highly fluorinated chemicals from their products: IKEA, Crate & Barrel, Levi Strauss and more than 50 others.

REFERENCES

1. C8 Science Panel. "C8 Probable Link Reports." Accessed Feb. 22, 2017. http://www.c8sciencepanel.org/prob_link.html
2. Wang, Z., et al. *Environ. Int.* 75 (2015): 172-179, Wang, Z., et al. *Environ. Sci. Technol.* DOI 10.1021/acs.est.6b04806
3. "DuPont Capstone Surfactants and Repellants – an Overview." Accessed Oct. 27, 2016. http://www2.dupont.com/Capstone/en_US/assets/downloads/Capstone(R)_Overview_Document_rev28march2011.pdf
4. American Public Health Association. Policy Number 20163. (2016), Scheringer, M. et al. *Chemosphere* 114 (2014): 337-339
5. Lerner, S. "New Teflon Toxin Causes Cancer in Lab Animals." *The Intercept*, 2015.
6. Rosenmai, A. K., et al. *Andrology* 4.4 (2016): 662-672.
7. Biomonitoring California. "Potential Designated Chemicals: Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)". Accessed Sep. 9, 2016. http://www.biomonitoring.ca.gov/sites/default/files/downloads/PotenDesigPFASs_031315.pdf.
8. Blum, A., et al. *Environmental Health Perspectives* 123.5 (2015): A107-A111.
9. Perez, F., et al. *Environment International* 59 (2013): 354-362.
10. Danish Ministry of the Environment. "Short-chain Polyfluoroalkyl Substances (PFAS). A literature review of information on human health effects and environmental fate and effect aspects of short-chain PFAS." http://www2.mst.dk/Udgiv/publications/2015/05/978-87-93352-15-5.pdf. Accessed Oct. 17, 2016.
11. Appleman, T., et al. *Water Res.* 51 (2014): 246-255, Eschauzier, C. et al. *Environ. Sci. Technol.* 46.3 (2012) 1708-1715
12. Blaine, A. C., et al. *Environ. Sci. Technol.* 48.24 (2014): 14361-14368, Blaine, A. C. et al. *Environ. Sci. Technol.* 47.24 (2013): 14062-14069