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PFOA and Related Compounds



In the early 2000s, the EPA began to investigate the synthetic compound Perfluorooctanoic Acid (PFOA or C8) and its salts, primarily Ammonium Perfluorooctanate (APFO) and other fluoropolymers that may metabolize or degrade into PFOA. These compounds are of interest because of their similarity to another compound known as Perfluorooctyl Sulfonate

(PFOS). PFOS was designated a persistent organic pollutant and the primary worldwide manufacturer ceased making it in 2001.

There is still controversy over PFOA's toxicity, though the compound is persistent (doesn't biodegrade, hydrolyse or photolyse), bioaccumulates in human and animal tissue (binds to proteins in the blood and liver), and biomagnifies up the food chain. In 2007, the Center for Disease Control and Prevention published the results of two studies on the levels of 11 different polyfluorochemicals in humans. In those studies PFOS, PFOA and Perfluorohexane Sulfonic Acid (PFHS) were found in 98% of those tested, confirming widespread exposure to these compounds. Exposure may occur through consumption of contaminated food or water or through the use of products containing these compounds, but not all sources are known or understood.

PFOA is a polymerization aid used in the manufacturing of fluoropolymers. The carbon fluorine part of the molecule is water resistant, which makes them valuable in producing fluoropolymer products that can repel water, grease and oil. These compounds are used in making non-stick surfaces for cookware, stain resistant clothing, carpets and other fabrics and in fire fighting foams. It is because of its unique polar anionic chemical properties that traditional models used to predict chemical behavior of non-polar organic chemicals, like PCBs or dioxins, in wildlife and humans, cannot be extrapolated from standard experimental data on mice and rats. In rodents PFOA has been shown to be carcinogen and immunotoxic, but whether this can be translated into information about its effect on humans is not clear. Studies continue. It should be noted, in February 2006, the EPA's Science Advisory Board voted to approve a recommendation that PFOA should be considered a likely carcinogen.

The principal fluoropolymer producers committed to a minimum 50-percent reduction in total global emissions by 2006 (using 2000 as the baseline year), 95% reduction in emissions and product content by 2010 and elimination of its use altogether by 2015. However, because of the persistence of these compounds in the environment and the bioaccumulation and biomagnification in the food chain these compounds will continue to be in the environment long after manufacturing ceases.

Perfluorinated compounds are large molecules and are not amenable to common analytical techniques such as Gas Chromatography/Mass Spectroscopy (GC/MS).

Columbia Analytical has developed analytical methods for these compounds using a high performance liquid chromatograph coupled with a triple quad mass spectrometer, commonly known as a LC/MS/MS. Our reporting limits for water matrices ranges from 0.5 to 1 ng/L.

For more information on testing for PFOA and PFOS contact Columbia Analytical at 360.577.7222.

References:

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