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Emerging Contaminants: Per- and Polyfluoroalkyl Substances (PFASs)



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U.S. Environmental Protection Agency**

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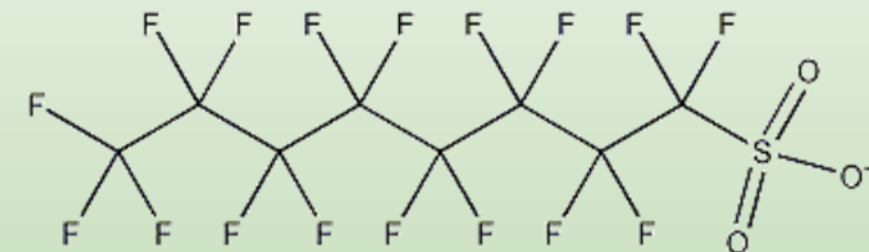
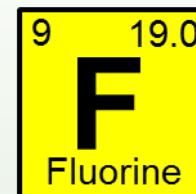


Topics in this Presentation

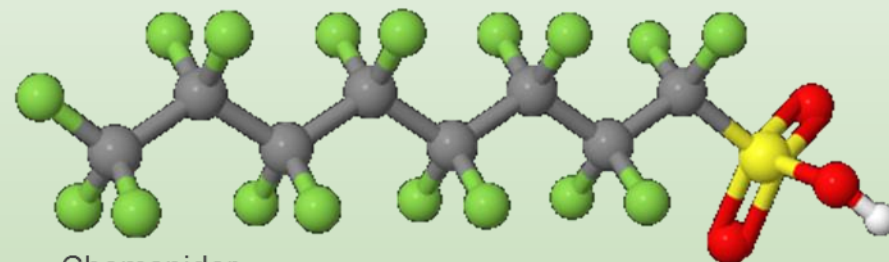
- Intro to PFASs (including PFCs)
- Uses & Sources of PFASs
- Chemical/Physical Properties
- Health Advisory
- Presenter Contact Information

Introduction to PFASs

- A family of synthetic organic compounds that contain multiple Fluorine (F) atoms.
- The 2 most studied PFASs are
 - Perfluorooctanoic Acid (PFOA)
 - Perfluorooctane Sulfonate (PFOS)



Conder et al. (2008)



Example molecular structures for perfluorooctane sulfonate (PFOS)

Why Can't we just call them PFCs?

- Per- and Polyfluoroalkyl Substances (PFASs)
 - Perfluorinated
 - All carbons in chain bonded only to F
 - (e.g., PFOS and PFOA)
 - Polyfluorinated
 - Not all carbons in chain bonded to F
 - (e.g. 6:2 FTSA (fluorotelomer sulfonate))
 - All PFCs are PFASs, but not all PFASs are PFCs



Uses & Sources of PFASs

PFASs are used in a wide variety of industries and commercial products for their valuable properties, including fire resistance, dust suppression, and oil, stain, grease, and water repellence. (Some examples of uses are on the following slides)

- Fire fighting foams (AFFF)



Uses & Sources of PFASs

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- Food surfaces (Teflon pans*, pizza boxes, popcorn bags)



Uses & Sources of PFASs

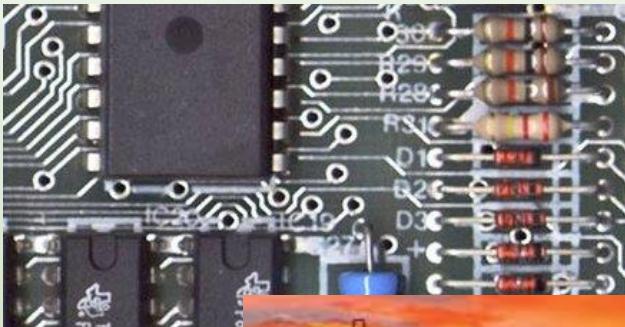
PFASs are used in a wide variety of industries and commercial products for their valuable properties, including fire resistance, dust suppression, and oil, stain, grease, and water repellence. (Some examples of uses are on the following slides)

- Polishes, waxes, paints
- Stain repellants (carpets, clothing and upholstered furniture)
- Cleaning products



Uses & Sources of PFASs

PFASs are used in a wide variety of industries and commercial products for their valuable properties, including fire resistance, dust suppression, and oil, stain, grease, and water repellence. (Some examples of uses are on the following slides)



- Dust suppression for chrome plating
- Electronics manufacturing
- Oil and mining for enhanced recovery
- Performance chemicals (hydraulic fluid, fuel)

Chemical and Physical Properties

- PFAS are commercially useful because they repel both oil and water.
- The fluorinated carbon tail is both lipophobic (repelled by lipid or oily phase) and hydrophobic (repelled by water).
- The functional group head is hydrophilic (attracted to water).
- Because of these properties, they are often used as surfactants.

Chem and Phys Properties (cont'd)

- PFAS are extremely persistent in the environment.
- They do not biodegrade, hydrolyze, oxidize, or photolyze with exception to some polyfluoroalkyls degrading to perfluoroalkyls.

Lifetime Health Advisory (HA) replaces Provisional Health Advisory (PHA)

- New Lifetime HA was released May 2016 and replaces the PHA
 - Much lower value of 0.07 ug/L (70 ppt)
 - Provides peer reviewed reference dose and cancer slope factor
- Until May 2016, EPA's Office of Water's 2009 provisional health advisory (PHA) levels were in effect with much higher values:
 - PFOA 0.4 ug/L
 - PFOS 0.2 ug/L

Lifetime Health Advisory (HA) replaces Provisional Health Advisory (PHA) (cont.)

- The health advisories are not regulations and EPA does not have national drinking water regulations for PFOA and PFOS.
- Fall 2016 update to RSL/RML tables should include PFOA and PFOS

Contact Information

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