

# Per- and poly-fluoroalkyl substances (PFAS)

Per- and polyfluoroalkyl substances (PFAS) are a family of >4,730 compounds – produced since the 1940s – that are of anthropogenic origin.<sup>1</sup> Although PFAS are remarkably useful in many industries, they are an emerging concern to environmental health for all living beings, including humans. This has driven the search for analytical technologies to monitor these chemicals and, more importantly, calls for global regulations to restrict or eliminate PFAS.<sup>2</sup>



# What are PFAS?

PFAS are compounds that have a chain of strong carbon-fluorine (C-F) bonds. They can be gases, liquids or solid short- and long-chain polymers, with a wide range of different physical, chemical and biological properties. PFAS is often used as a broad term, therefore it is important to classify and group these compounds, based on their structure.<sup>3</sup>

Non-polymers	Polymers*
<p><b>Perfluoroalkyl</b></p> <p>All C-H replaced with C-F (except on functional groups)</p> <p>(Aliphatic) perfluorocarbons Perfluoroalkyl acids Perfluoroalkane sulfonyl fluorides Perfluoroalkane sulfonamides Perfluoroalkyl iodides Perfluoroalkyl aldehydes</p>	<p><b>Fluoropolymers</b></p> <p>Carbon-only backbone with C-F</p>
<p><b>Polyfluoroalkyl</b></p> <p>At least one (but not all) C-H replaced with C-F</p> <p>Perfluoroalkane sulfonamido derivatives Fluorotelomer-based compounds Semifluorinated hydrocarbons</p>	<p><b>Perfluoropolyethers</b></p> <p>Carbon and oxygen backbone with C-F</p>
	<p><b>Side-chain fluorinated polymers</b></p> <p>Fluorinated side chain on non-fluorinated backbone; polymers of:</p> <p>(Meth)acrylate Urethane Oxetane</p>

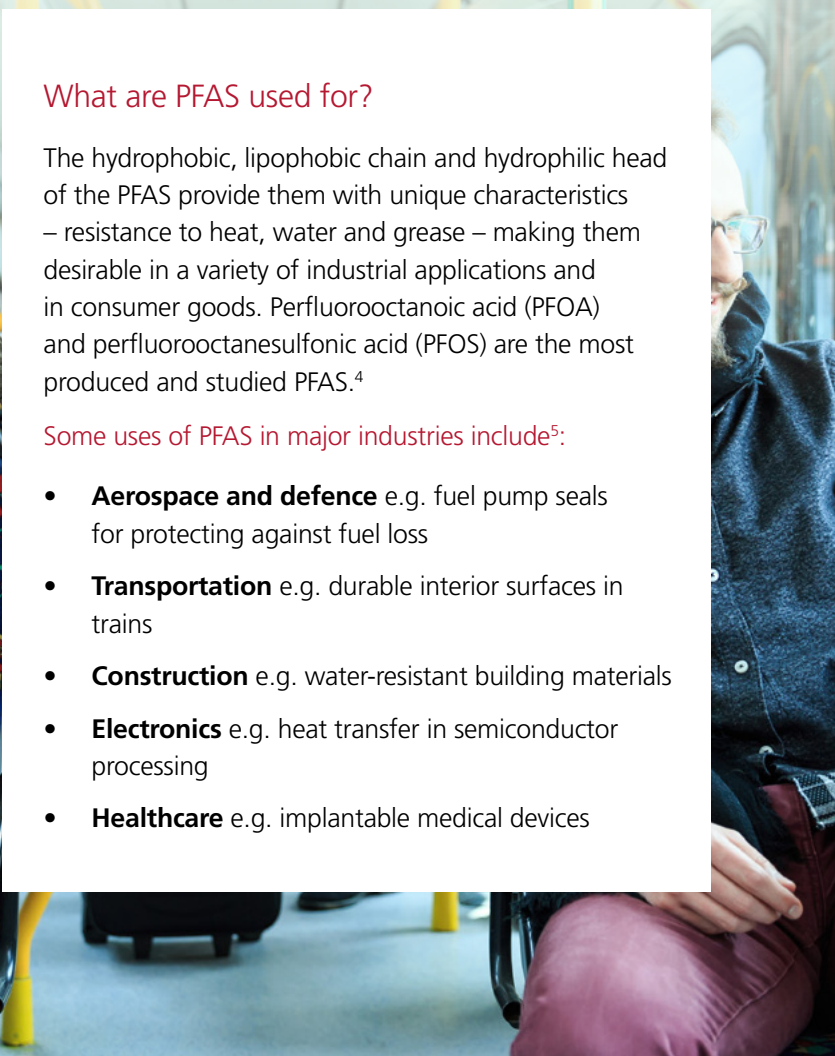
\*Polymers are currently not available from Chiron.

## What are PFAS used for?

The hydrophobic, lipophobic chain and hydrophilic head of the PFAS provide them with unique characteristics – resistance to heat, water and grease – making them desirable in a variety of industrial applications and in consumer goods. Perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) are the most produced and studied PFAS.<sup>4</sup>

Some uses of PFAS in major industries include<sup>5</sup>:

- **Aerospace and defence** e.g. fuel pump seals for protecting against fuel loss
- **Transportation** e.g. durable interior surfaces in trains
- **Construction** e.g. water-resistant building materials
- **Electronics** e.g. heat transfer in semiconductor processing
- **Healthcare** e.g. implantable medical devices







WATER  
RESISTANT  
CLOTHING

NON  
STICK  
COOKWARE

PERSONAL  
CARE PRODUCTS

# PFAS

can be found in these products:

FAST FOOD  
PACKAGING

STAIN  
RESISTANT  
FURNITURE

COSMETICS

## How do PFAS get into the environment and human body?

There are many routes through which PFAS can enter the environment to contaminate groundwater, surface water and soil before being transported long distances away from the source of their release, ultimately entering the human body via food, water or air.

The pathway may begin with:

- **Exhaust air from industrial sources** that is dispersed into nearby ground and water
- **Rain and snow** carrying PFAS from the air into the soil and water
- **Evaporation** from items like carpets, treated with waterproofing sprays
- **Direct contamination of soil** with products such as firefighting foam
- **Leaching of household sources** into surface waters from wastewater treatment facilities, sewage or landfill

## What are the concerns?

The detrimental health effects of PFAS have been neglected for a long time. Humans are exposed to ever greater concentrations every day at home, in their workplace, even in the food they eat and drinking water. PFAS have been widely recognised as contaminants of emerging global concern due to their high persistence compared to other man-made substances, in combination with their high environmental mobility, high toxicity, and poor removability from drinking water.<sup>6</sup>





# Regulations

## Globally regulated PFAS

Since 2009, the Stockholm Convention has regulated the global elimination of PFOS, PFOA and their related compounds. PFOS have already been restricted in the EU for >10 years under the EU's Persistent Organic Pollutants (POPs) Regulation,<sup>7,8</sup> whereas PFOA have been banned since July 2020.<sup>9</sup>

## REACH

The manufacture and use of some PFAS is restricted under REACH. The European Chemicals Agency (ECHA) supports the proposals submitted by Germany, Norway and Sweden for the restriction of the following compounds and their derivatives<sup>10</sup>:

- Perfluorinated carboxylic acids
- Undecafluorohexanoic acid (PFUndA)
- Perfluorohexane-1-sulfonic acid (PFHxS)

These substances have also been recommended for inclusion in the Stockholm Convention. PFAS in various industries are currently being studied by the ECHA and the European Commission (EC), to clarify initial concerns and for ongoing or future restrictions.<sup>11</sup> For example, the use of PFAS in firefighting foams is expected to be restricted by October 2021.<sup>12</sup>

## Substances of very high concern (SVHC) under REACH

SVHC identifies chemicals equivalent to carcinogens, mutagens and reprotoxicants, which are very persistent, bioaccumulative and toxic. To date, two PFAS and their derivatives are classed as SVHC<sup>10</sup>:

- Perfluorobutane sulfonic acid (PFBS)
- 2,3,3,3-Tetrafluoro-2-(heptafluoropropoxy) propionic acid (HFPO-DA)





## Classification, labelling and packaging (CLP), and grouping approach

Classification and labelling of some PFAS is already harmonised under CLP, with others being proposed.<sup>10</sup>

ECHA's database contains information on >2,000 PFAS on the EU market. In December 2019, ECHA submitted a proposal to the EC from several Member States for a holistic group approach to the regulatory assessment and risk management for PFAS.<sup>13</sup>

## PFAS in drinking water and food

As of January 2021, the Drinking Water Directive limit is 0.5 µg/l for all PFAS, which is aligned with the grouping approach.<sup>14</sup>

In September 2020, the European Food Safety Authority set a new safety threshold – a tolerable weekly intake of 4.4 ng/kg of body weight/week – for PFOA, PFOS, PFHxS and perfluorononanoic acid, which commonly accumulate in the body.<sup>15</sup>

## What does Chiron offer?





To address the escalating concerns regarding environmental and health impacts, and to comply with evolving regulatory requirements for risk assessment and management, Chiron offers an expanding portfolio of reference materials for PFAS.



## References:

1. Organisation for Economic Co-operation and Development. (2018) Toward a new comprehensive global database of per- and polyfluoroalkyl substances (PFASs): summary report on updating the OECD 2007 list of per- and polyfluoroalkyl substances (PFASs). [https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV-JM-MONO\(2018\)7&doclanguage=en](https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV-JM-MONO(2018)7&doclanguage=en)
2. United Nations Environment Programme. (2015) PFAS analysis in water for the Global Monitoring Plan of the Stockholm Convention: set-up and guidelines for monitoring. [https://stg-wedocs.unep.org/bitstream/handle/20.500.11822/29682/Analysis\\_PFAS\\_En.pdf?sequence=1&isAllowed=y](https://stg-wedocs.unep.org/bitstream/handle/20.500.11822/29682/Analysis_PFAS_En.pdf?sequence=1&isAllowed=y)
3. Buck, R. C., Franklin, J., Berger, U., Conder, J. M., Cousins, I. T., de Voigt, P., Jensen, A. A., Kannan, K., Mabury, S. A., van Leeuwen, S. P. J. (2011) Perfluoroalkyl and polyfluoroalkyl substances in the environment: terminology, classification, and origins. *Integrated Environmental Assessment and Management*, 7(4), 513–541. <https://setac.onlinelibrary.wiley.com/doi/full/10.1002/ieam.258>
4. United States Environmental Protection Agency. (2021) Basic Information on PFAS. <https://www.epa.gov/pfas/basic-information-pfas>
5. 3M. (2021) 3M's Commitment to PFAS Stewardship. [https://www.3m.com/3M/en\\_US/pfas-stewardship-us/](https://www.3m.com/3M/en_US/pfas-stewardship-us/)
6. Johnson, M. S., Buck, R. C., Cousins, I. T., Weis, C. P., Fenton, S. E. (2021) Special issue: understanding environmental risk from exposure to per- and polyfluoroalkyl substances (PFASs). *Environmental Toxicology and Chemistry*, 40(3), C1, 539–957. <https://setac.onlinelibrary.wiley.com/toc/15528618/2021/40/3>
7. European Parliament and European Union. (2019) Regulation (EU) 2019/1021 on persistent organic pollutants (recast). <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019R1021&from=EN>
8. European Commission. (2019) Commission delegated regulation (EU) 2020/1203 amending Annex I to Regulation (EU) 2019/1021 of the European Parliament and of the Council as regards the entry for perfluorooctane sulfonic acid and its derivatives (PFOS). <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020R1203>
9. European Commission. (2019) Commission delegated regulation (EU) 2020/784 amending Annex I to Regulation (EU) 2019/1021 of the European Parliament and of the Council as regards the listing of perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020R0784&from=EN>
10. European Chemicals Agency. (2021) Information on chemicals. <https://echa.europa.eu/information-on-chemicals>
11. European Chemicals Agency. (2020) Restriction of per- and polyfluoroalkyl substances (PFAS) under REACH. <https://echa.europa.eu/-/restriction-of-per-and-polyfluoroalkyl-substances-pfas-under-reach>
12. European Chemicals Agency. (2020) Registry of restriction intentions until outcome. <https://echa.europa.eu/registry-of-restriction-intentions/-/dislist/details/0b0236e1856e8ce6>
13. European Chemicals Agency. (2019) Elements for an EU-strategy for PFASs. <https://www.regjeringen.no/contentassets/1439a5cc9e82467385ea9f090f3c7bd7/fluor---eu-strategy-for-pfass---december-19.pdf>
14. European Commission. (2021) Review of the drinking water directive. [https://ec.europa.eu/environment/water/water-drink/review\\_en.html](https://ec.europa.eu/environment/water/water-drink/review_en.html)
15. European Food Safety Authority. (2020) PFAS in food: EFSA assesses risks and sets tolerable intake. <https://www.efsa.europa.eu/en/news/pfas-food-efsa-assesses-risks-and-sets-tolerable-intake>

# PFAS product listing

Chiron No.	Name	Synonym / Example Structure	CAS
<b>PFA Sulfonic acids</b>			
			<i>PFHpS</i>
2041.4	Perfluorobutanesulfonic acid	PFBS	375-73-5
2719.4	Perfluorobutanesulfonic acid, potassium salt	PFBS-K	29420-49-3
15263.5	Perfluoropentanesulfonic acid	PFPeS	2706-91-4
14797.5	Perfluoropentanesulfonic acid, sodium salt	PFPeS-Na	630402-22-1
2186.6	Perfluorohexanesulfonyl fluoride	PFHSF; PHxSF	423-50-7
8579.6	Perfluorohexanesulfonic acid	PFHxS	355-46-4
8581.6	Perfluorohexanesulfonic acid, potassium salt	PFHxS-K	3871-99-6
12433.7	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
12467.7	Perfluoroheptanesulfonic acid, sodium salt	PFHpS-Na	21934-50-9
2037.8	Perfluorooctanesulfonic acid	PFOS	1763-23-1
2193.8	Perfluorooctanesulfonic acid, potassium salt	PFOS-K	2795-39-3
8012.8	Perfluorooctanesulfonyl fluoride	PFOSF	307-35-7
14717.30	Didecyltrimethylammonium perfluorooctane sulfonate	PFOS-N	251099-16-8
12746.9	Methyl perfluorooctane sulfonate	Me-PFOS	71417-25-9
12747.10	Ethyl perfluorooctane sulfonate	Et-PFOS	71417-26-0
2192.8	Perfluoro-4-ethylcyclohexanesulfonic acid, potassium salt	PFECyS-K	335-24-0
14798.9	Perfluorononanesulfonic acid	PFNS	68259-12-1
14799.9	Perfluorononanesulfonic acid, sodium salt	PFNS-Na	98789-57-2
11157.10	Perfluorodecane sulfonic acid	PFDS	335-77-3
11309.10	Perfluorodecane sulfonic acid, sodium salt	PFDS-Na	2806-15-7
<b>Telomeric PFA Sulfonic acid, FTSA</b>			
			<i>6:2 FTSA; 6:2-FtS</i>
12748.6	1H,1H,2H,2H-Perfluorohexanesulfonic acid	4:2 FTSA; 4:2-FtS	757124-72-4
2559.8	1H,1H,2H,2H-Perfluorooctanesulfonic acid	6:2 FTSA; 6:2-FtS	27619-97-2
12749.10	1H,1H,2H,2H-Perfluorodecane sulfonic acid	8:2 FTSA; 8:2-FtS	39108-34-4
12750.12	1H,1H,2H,2H-Perfluorododecane sulfonic acid	10:2 FTSA; 10:2-FtS	120226-60-0
<b>PFA Sulfonamides</b>			
			<i>FOSA; PFOSA</i>
14170.4	n-Perfluorobutanesulfonamide	FBSA	30334-69-1
14171.5	N-Methyl-n-perfluorobutanesulfonamide	MeFBSA	68298-12-4
14172.7	N-Methyl-n-perfluorobutylsulfonylglycine	MeFBsAA	159381-10-9
2043.8	Perfluorooctanesulfonamide, techn., n-isomer (major)	FOSA; PFOSA	754-91-6
11932.9	N-Methyl-n-perfluorooctanesulfonamide	N-MeFOSA; n-isomer	31506-32-8
13580.9	N-Methylperfluorooctanesulfonamide, isomer mix	N-MeFOSA; isomer mixture	N/A
13260.9	N-Methyl-n-perfluorooctanesulfonamide-d3	N-MeFOSA-d3; n-isomer	936109-37-4
13579.9	N-Methylperfluorooctanesulfonamide-d3, isomer mix	N-MeFOSA-d3; isomer mix	N/A
13586.10	N,N-Dimethyl-n-perfluorooctanesulfonamide	N,N-Me2FOSA; n-isomer	213181-78-3
11933.10	N-Ethyl-n-perfluorooctanesulfonamide	N-EtFOSA; n-isomer; Sulfluramid; n-isomer	4151-50-2
13587.10	N-Ethylperfluorooctanesulfonamide, isomer mix	N-EtFOSA; isomer mix; Sulfluramid; isomer mix	N/A
13412.10	N-Ethyl-n-perfluorooctanesulfonamide-d5	N-EtFOSA-d5; n-isomer; Sulfluramid-d5; n-isomer	936109-40-9
13588.10	N-Ethylperfluorooctanesulfonamide-d5, isomer mix	N-EtFOSA-d5; isomer mix; Sulfluramid-d5; isomer mix	936109-40-9 (for n-isomer)
14526.10	N-Perfluorooctanesulfonamidoacetic acid	FOSAA	2806-24-8
10979.11	N-(2-Hydroxyethyl)-N-methylperfluorooctanesulfonamide	N-MeFOSE	24448-09-7
11931.12	N-Ethyl-N-(2-hydroxyethyl)perfluorooctylsulfonamide	N-EtFOSE	1691-99-2
13257.11	N-Methyl-n-perfluorooctanesulfonamidoacetic acid	N-MeFOSAA; n-isomer	2355-31-9
13589.11	N-Methylperfluorooctanesulfonamidoacetic acid, isomer mix	N-MeFOSAA; isomer mix	N/A
13258.11	N-Methyl-n-perfluorooctanesulfonamidoacetic acid-d3	N-MeFOSAA-d3; n-isomer	1400690-70-1
13585.11	N-Methylperfluorooctanesulfonamidoacetic acid-d3, isomer mix	N-MeFOSAA-d3; isomer mix	N/A
13259.12	N-Ethyl-n-perfluorooctanesulfonamidoacetic acid	N-EtFOSAA; n-isomer	2991-50-6
13590.12	N-Ethylperfluorooctanesulfonamidoacetic acid, isomer mix	N-EtFOSAA; isomer mix	N/A
13413.12	N-Ethyl-n-perfluorooctanesulfonamidoacetic acid-d5	N-EtFOSAA-d5; n-isomer	1265205-97-7
13591.12	N-Ethylperfluorooctanesulfonamidoacetic acid-d5, isomer mix	N-EtFOSAA-d5; isomer mix	N/A
<b>PFA acids</b>			
			<i>PFOA</i>
2820.7	Perfluorocyclohexanoic acid	PFCHxA	374-88-9
2810.4	Perfluorobutyric acid	PFBA; Heptafluorobutyric acid	375-22-4
2189.4	Perfluorobutyric acid, sodium salt	PFBA-Na; Heptafluorobutyric acid sodium salt	2218-54-4
2835.7	7H-Perfluoroheptanoic acid	7H PFHPA; HPFHpA	1546-95-8
2821.7	n-Perfluoroheptanoic acid	PFHpA	375-85-9
2590.6	Perfluorohexanoic acid	PFHxA	307-24-4
2042.8	n-Perfluorooctanoic acid	PFOA	335-67-1
2822.8	n-Perfluorooctanoic acid, ammonium salt	PFOA-NH4	3825-26-1
2191.8	Perfluorooctanoic acid, sodium salt	PFOA-Na	335-95-5
2834.5	5H-Perfluoropentanoic acid	5H PFPA; 5H-Octafluoropentanoic acid	376-72-7
2819.5	n-Perfluoropentanoic acid	PFPA; n-Nonafluoropentanoic acid	2706-90-3
2190.3	Perfluoropropionic acid, sodium salt	PFPrA-Na; Pentafluoropropionic acid sodium salt	378-77-8
12744.9	Methyl perfluorooctanoate		376-27-2
12745.10	Ethyl perfluorooctanoate		3108-24-5
2836.9	9H-Perfluorononanoic acid	9H PFNA	76-21-1
2715.9	Perfluorononanoic acid	PFNA	375-95-1

# PFAS product listing

Chiron No.	Name	Synonym / Example Structure	CAS
2832.9	Perfluoro-3,5,5-trimethylhexanoic acid	PF-3,5,5-TriMeHxA	238403-51-5
2823.10	n-Perfluorodecanoic acid	PFDA	335-76-2
2824.10	Perfluoro-3,7-dimethyloctanoic acid	PF3,7DiMeOA	172155-07-6
2825.11	11H-Perfluoroundecanoic acid	11H PFUndA	1765-48-6
2874.11	Perfluoroundecanoic acid, n-isomer (major)	PFUndA	2058-94-8
2826.12	n-Perfluorododecanoic acid	PFDodA	307-55-1
11367.13	Perfluorotridecanoic acid, n-isomer (major)	PFTrdA	72629-94-8
2827.14	Perfluorotetradecanoic acid, n-isomer (major)	PFTedA	376-06-7
15262.15	Perfluoropentadecanoic acid	PFPeDA	141074-63-7
2828.16	Perfluorohexadecanoic acid	PFHxdA	67905-19-5
2829.18	Perfluorooctadecanoic acid	PFOdA	16517-11-6

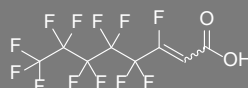
## Telomeric acids, FTCAs



8:2 FTCA; H2PFDA

2830.6	2H,2H,3H,3H-Perfluorohexanoic acid	3:3 FTCA	356-02-5
2831.9	2H,2H,3H,3H-Perfluorononanoic acid	6:3 FTCA	27854-30-4
8548.10	2H,2H-Perfluorodecanoic acid	8:2 FTCA; H2PFDA	27854-31-5
8547.11	2H,2H,3H,3H-Perfluoroundecanoic acid	8:3 FTCA; H4PFUnA; H-PFUdA	34598-33-9

## Unsaturated telomeric acid, FTUCAs and unsaturated acids

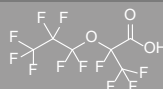


6:2 FTUCA; 6:2 fluorotelomer unsaturated carboxylic acid

2833.6	2H,3H-Perfluoro-2-hexenoic acid	3:3 FTUCA; 3:3 fluorotelomer unsaturated carboxylic acid	37759-76-5
15264.8	2H-Perfluoro-2-octenoic acid	6:2 FTUCA; 6:2 fluorotelomer unsaturated carboxylic acid	70887-88-6
14173.10	2H-Perfluoro-2-decenoic acid	8:2 FTUCA; 8:2 fluorotelomer unsaturated carboxylic acid	70887-84-2
14474.12	2H-Perfluoro-2-dodecenoic acid	10:2 FTUCA; 10:2 fluorotelomer unsaturated carboxylic acid	70887-94-4

## PFA acid ethers

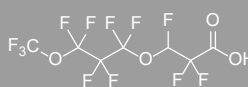
### GenX and related



HFPO-DA

14110.6	2,3,3,3-Tetrafluoro-2-(heptafluoropropoxy)propionic acid	HFPO-DA; "GENX" precursor; FRD-903; PFPrOPrA	13252-13-6
14111.6	2,3,3,3-Tetrafluoro-2-(heptafluoropropoxy)propanoyl chloride	"GenX" chloride; Perfluoro-2-propoxypropanoic acid chloride	72848-57-8
14112.6	2,3,3,3-Tetrafluoro-2-(heptafluoropropoxy)propionic acid ammonium salt	GenX; FRD-902; Perfluoro-2-propoxypropanoic acid ammonium salt	62037-80-3
14115.7	Methyl 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propionate	HFPO-DA methyl ester; GENX methyl ester	13140-34-6
14515.5	1,1,1,2,2,3,3-Heptafluoro-3-(1,2,2,2-tetrafluoroethoxy)propane	Freon E1; Dupont E1	3330-15-2

### ADONA and related



ADONA

14460.7	Dodecafluoro-3H,4,8-dioxanonanoate (>90%)	ADONA	919005-14-4
---------	---	-------	-------------

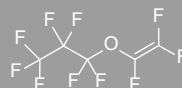
### 9Cl-PF3ONS and 11Cl-PF3OUNS and related



9Cl-PF3ONS K

14174.8	9-Chlorohexadecafluoro-3-oxanone-1-sulfonic acid potassium salt	9Cl-PF3ONS K; C8Cl PFESA K; F-53B K; 6:2 Cl-PFESA K	73606-19-6
14462.10	11Cl-PF3OUdS potassium salt	11Cl-PF3OUdS potassium salt	83329-89-9

### Other:



PPVE

14513.5	Trifluoro(heptafluoro-1-propoxy)ethylene	PPVE; Cheminox PPVE	1623-05-8
14514.6	1,1,2,2,3,3-Hexafluoro-1-(trifluoromethoxy)-3-[(1,2,2-trifluorovinyl)oxy]propane	MV 31	40573-09-9
14398.9	2-Trifluoromethyl-3-ethoxydodecafluorohexane	Novac HFE 7500; HFE 7500	297730-93-9
14056.5	Perfluoro-4-methoxybutanoic acid	PFMOBA; PFMBA	863090-89-5
14721.4	Perfluoro-3-methoxypropanoic acid	PFMPA	377-73-1
14722.4	Perfluoro(2-ethoxyethane)sulfonic acid	PFEESA	113507-82-7

## PFA acid internal standards

5H-Perfluoropentanoic acid, see 2834.5

7H-Perfluoroheptanoic acid, see 2835.7

9H-Perfluorononanoic acid, see 2836.9

11H-Perfluoroundecanoic acid, see 2825.11


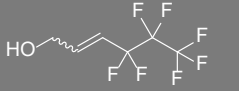


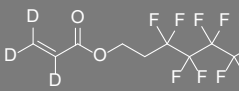
## PFA amides



Perfluorooctanamide

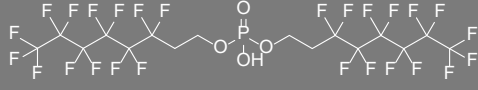
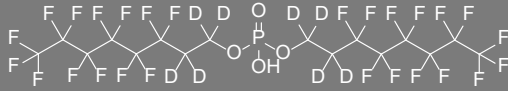

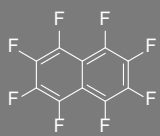
2837.4	Perfluorobutyramide	Heptafluorobutyramide	662-50-0
2838.8	Perfluorooctanamide		307-31-3

# PFAS product listing

Chiron No.	Name	Synonym / Example Structure	CAS
<p><b>Telomeric alcohols</b></p>  <p style="text-align: right;">6:2 FTOH</p>			
14416.2	2,2,2-Trifluoroethanol	Trifluoroethyl alcohol	75-89-8
14829.3	2,2-Difluoropropan-1-ol 3H,3H,3H	2:1 FTOH	33420-52-9
14828.3	3,3,3-Trifluoropropan-1-ol	1:2 FTOH	2240-88-2
14827.3	2,2,3,3,3-Pentafluoropropan-1-ol	2:1 FTOH	422-05-9
14831.4	1H,1H,2H,2H,3H,3H-Perfluorobutan-1-ol	1:3 FTOH	461-18-7
14830.4	1H,1H-Perfluorobutan-1-ol	3:1 FTOH	375-01-9
2839.4	1H,1H,2H,2H-Perfluorobutan-1-ol	2:2 FTOH	54949-74-5
2860.5	1H,1H,5H-Perfluoropentan-1-ol	5H 4:1 FTOH	355-80-6
8802.6	1H,1H,2H,2H-Perfluorohexan-1-ol (2-Perfluorobutyl ethanol)	4:2 FTOH	2043-47-2
2841.6	1H,1H,2H,2H,3H,3H-Perfluorohexan-1-ol	3:3 FTOH	679-02-7
2842.6	1H,1H-Perfluorohexan-1-ol	5:1 FTOH	423-46-1
2861.7	1H,1H,7H-Perfluoroheptan-1-ol	7H 6:1 FTOH	335-99-9
2843.7	1H,1H-Perfluoroheptan-1-ol	6:1 FTOH	375-82-6
2147.8	1H,1H,2H,2H-Perfluorooctan-1-ol	6:2 FTOH	647-42-7
2146.8	1H,1H,8H-Perfluorooctan-1-ol	8H 7:1 FTOH	10331-08-5
2145.8	1H,1H-Perfluorooctan-1-ol	7:1 FTOH	307-30-2
2844.9	1H,1H,2H,2H,3H,3H-Perfluorononan-1-ol	6:3 FTOH	80806-68-4
2847.9	1H,1H,2H,2H-Perfluoro-7-methyloctan-1-ol	7Me 6:1 FTOH	20015-46-7
2846.9	1H,1H,9H-Perfluorononan-1-ol	9H 8:1 FTOH	376-18-1
2845.9	1H,1H-Perfluorononan-1-ol	8:1 FTOH	423-56-3
2851.10	1H,1H,10H,10H-Perfluoro-1,10-decanediol	1:8:1 FTdiOH	754-96-1
2849.10	1H,1H,2H,2H-Perfluorodecan-1-ol	8:2 FTOH	678-39-7
2848.10	1H,1H-Perfluorodecan-1-ol	9:1 FTOH	307-37-9
2850.10	1H,1H-Perfluoro-3,7-dimethyloctan-1-ol	3,7-DiMe 7:1 FTOH	232587-50-7
2854.11	1H,1H,2H,2H-Perfluoro-9-methyldecan-1-ol	9Me 8:2 FTOH	31200-98-3
2853.11	1H,1H,11H-Perfluoroundecan-1-ol	11H 10:1 FTOH	307-70-0
2852.11	1H,1H-Perfluoroundecan-1-ol	10:1 FTOH	307-46-0
2767.12	1H,1H,2H,2H-Perfluorododecan-1-ol	10:2 FTOH	865-86-1
3821.13	1H,1H,13H-Perfluorotridecan-1-ol	13H 12:1 FTOH	423-72-3
12220.14	1H,1H,2H,2H-Perfluorotetradecan-1-ol	12:2 FTOH	39239-77-5
2855.14	1H,1H-Perfluorotetradecan-1-ol	13:1 FTOH	15622-57-8
2856.16	1H,1H-Perfluorohexadecan-1-ol	15:1 FTOH	216144-94-4
2857.18	1H,1H-Perfluorooctadecan-1-ol	17:1 FTOH	242142-82-1
<p><b>Allylic alcohols</b></p>  <p style="text-align: right;">Allylic 3:3 FTOH</p>			
2858.6	1H,1H,2H,3H-Perfluorohex-2-en-1-ol	Allylic 3:3 FTOH	37759-88-9
2859.9	1H,1H,2H,3H-Perfluoronon-2-en-1-ol	Allylic 6:3 FTOH	38550-47-9
<p><b>Internal standards</b></p>  <p style="text-align: right;">6:2 FTOH-d2</p>			
	1H,1H,5H-Perfluoropentan-1-ol, see 2860.5		
	1H,1H,7H-Perfluoroheptan-1-ol, see 2861.7		
	1H,1H,8H-Perfluorooctan-1-ol, see 2146.8		
11202.6	1D,1D,2H,2H-1-Hydroxyperfluorohexane	4:2 FTOH-d2	N/A
11203.8	1D,1D,2H,2H-1-Hydroxyperfluorooctane	6:2 FTOH-d2	647-42-7 (unlabelled)
9825.10	1D,1D,2H,2H-1-Hydroxyperfluorodecane	8:2 FTOH-d2	N/A
10089.12	1D,1D,2H,2H-1-Hydroxyperfluorododecane	10:2 FTOH-d2	N/A
<p><b>PFA aldehydes</b></p>  <p style="text-align: right;">7H-Perfluoroheptanal</p>			
2862.7	7H-Perfluoroheptanal		647-44-9
<p><b>PFA esters of telomeric alcohols including internal standards</b></p>  <p style="text-align: right;">6:2 FTAC-d3; 8:2 FTO acrylic acid-d3</p>			
10698.11	1H,1H,2H,2H-Perfluoro-n-octyl acrylate	6:2 FTAC; 6:2 Perfluorotelomer acrylate; 6:2 FTO acrylate	17527-29-6
11204.11	1H,1H,2H,2H-Perfluoro-n-octyl acrylate-d3	6:2 FTAC-d3; 8:2 FTO acrylic acid-d3	17527-29-6 (unlabelled)
11857.12	[Methyl((tridecafluorohexyl)sulphonyl)amino]ethyl acrylate		67584-57-0
9228.13	1H,1H,2H,2H-Perfluoro-n-decyl acrylate	8:2 FTAC; 8:2 FTO acrylic acid; Repellion 120 C1	27905-45-9
9520.13	1H,1H,2H,2H-Perfluoro-n-decyl acrylate-d3	8:2 FTAC-d3; 8:2 FTO acrylic acid-d3	N/A
10699.15	1H,1H,2H,2H-Perfluoro-n-dodecyl acrylate	10:2 FTAC; 10:2 Fluorotelomer acrylate	17741-60-5
11205.15	1H,1H,2H,2H-Perfluoro-n-dodecyl acrylate-d3	10:2 FTAC-d3; 10:2 FTO acrylic acid-d3	N/A
11206.12	1H,1H,2H,2H-Perfluoro-n-octyl methacrylate	6:2 FTMAC; 6:2 FTO methacrylic acid	2144-53-8
11207.12	1H,1H,2H,2H-Perfluoro-n-octyl methacrylate-d5	6:2 FTMAC-d5; 6:2 FTO methacrylic acid-d5	2144-53-8 (unlabelled)
9519.14	1H,1H,2H,2H-Perfluoro-n-decyl methacrylate	8:2 FTMAC; 8:2 FTO methacrylic acid	1996-88-9
9521.14	1H,1H,2H,2H-Perfluoro-n-decyl methacrylate-d5	8:2 FTMAC-d5; 8:2 FTO methacrylic acid-d5	N/A
11208.16	1H,1H,2H,2H-Perfluoro-n-dodecyl methacrylate	10:2 FTMAC; 10:2 FTO methacrylic acid	2144-54-9
11209.16	1H,1H,2H,2H-Perfluoro-n-dodecyl methacrylate-d5	10:2 FTMAC-d5; 10:2 FTO methacrylic acid-d5	N/A



# PFAS product listing

Chiron No.	Name	Synonym / Example Structure	CAS
 6:2 DiPAPS			
15280.6	4:2 MonoPAPS	Mono[2-(perfluorobutyl)ethyl] phosphate	150065-76-2
9563.8	6:2 MonoPAPS		57678-01-0
11340.16	6:2 DiPAPS sodium salt		407582-79-0
9565.24	6:2 TriPAPS		165325-62-2
9391.10	8:2 MonoPAPS		57678-03-2
14573.10	8:2 MonoPAPS sodium salt		130771-95-8 (Conjugated base)
9392.20	8:2 DiPAPS		678-41-1
14572.20	8:2 DiPAPS sodium salt		114519-85-6
9394.30	8:2 TriPAPS		149790-22-7
9566.12	10:2 MonoPAPS		57678-05-4
13264.24	10:2 DiPAPS sodium salt		120433-74-1
 6:2 DiPAPS-d4			
10105.10	8:2 MonoPAPS-d2		N/A
9928.16	6:2 DiPAPS-d4		N/A
9929.20	8:2 DiPAPS-d4		N/A
9930.24	10:2 DiPAPS-d4		N/A
 Perfluoro-n-octane			
12462.1	Tetrafluoromethane		75-73-0
12461.2	Hexafluoroethane		76-16-4
12464.3	Perfluoropropane		76-19-7
12463.5	Perfluoro-n-pentane		678-26-2
8400.6	Perfluoro-n-hexane		355-42-0
8401.7	Perfluoroheptane, isomer mixture		335-57-9
8402.8	Perfluoro-n-octane		307-34-6
8403.9	Perfluoro-n-nonane		375-96-2
8404.10	Perfluoro-n-decane		307-45-9
8405.11	1H-Perfluoro-n-undecane		66256-53-9
8406.12	Perfluoro-n-dodecane		307-59-5
8407.13	Perfluoro-n-tridecane		376-03-4
8408.14	Perfluoro-n-tetradecane		307-62-0
8409.15	Perfluoro-n-pentadecane		2264-03-1
8410.16	Perfluoro-n-hexadecane		355-49-7
8414.20	Perfluoro-n-eicosane		37589-57-4
12715.24	Perfluorotetracosane		1766-41-2
8923.16	Perfluorokerosene (bp. 70-200) for Mass spectrometry		N/A
10114.14	1-Iodo-1H,1H,2H,2H-pentacosafuorotetradecane	12:2 Fluorotelomer iodide	30046-31-2
 Octafluoronaphthalene			
12460.4	Perfluorocyclobutane		115-25-3
8416.10	Perfluorodecalin (mix E/Z)		306-94-5
8417.14	Perfluoro(ethylidimethyldecalin)		N/A
8418.14	Perfluoroperhydrophenanthrene		306-91-2
8029.10	Perfluoronaphthalene	Octafluoronaphthalene	313-72-4
<b>Commercial products</b>			
9358.X	Forafac 1157N	Du Pont	133875-90-8
9359.X	Forafac 1183	Du Pont	133875-91-9
9836.X	Zonyl® UR	Du Pont	75496-28-5

# PFAS mixes

Chiron No.	Name (Mix number)	Composition (Synonym) [CAS]	Concentration / Solvent
S-4594-5-ME	Mix of C4-C10 carboxylic acids and C4, C6, C8 sulfonates (PFAS Mix 01)	2810.4 n-Perfluorobutyric acid (PFBA) [375-22-4] 2819.5 n-Perfluoropentanoic acid (PFPeA) [2706-90-3] 2590.6 n-Perfluorohexanoic acid (PFHxA) [307-24-4] 2821.7 n-Perfluoroheptanoic acid (PFHpA) [375-85-9] 2042.8 n-Perfluorooctanoic acid (PFOA) [335-67-1] 2715.9 n-Perfluorononanoic acid (PFNA) [375-95-1] 2823.10 n-Perfluorodecanoic acid (PFDA) [335-76-2] 2719.4 n-Perfluorobutane sulphonate, potassium salt (PFBS) [29420-49-3] 8581.6 n-Perfluorohexane sulfonic acid, potassium salt (PFHxS) [3871-99-6] 2193.8 Perfluorooctane sulfonic acid, potassium salt (PFOS) [2795-39-3]	5 µg/mL in Methanol
S-4867-50-ME	PFAS Mixture of 27 compounds (PFAS Mix 02)	2042.8 n-Perfluorooctanoic acid (PFOA) [335-67-1] 2715.9 Perfluorononanoic acid (PFNA) [375-95-1] 2041.4 Perfluorobutanesulfonic acid (PFBS) [375-73-5] 2037.8 Perfluorooctanesulfonic acid (PFOS) [1763-23-1] 8802.6 1H,1H,2H,2H-Perfluorohexan-1-ol (2-Perfluorobutyl ethanol) (4:2 FTOH) [2043-47-2] 2147.8 1H,1H,2H,2H-Perfluorooctan-1-ol (6:2 FTOH) [647-42-7] 2849.10 1H,1H,2H,2H-Perfluorodecan-1-ol (8:2 FTOH) [678-39-7] 2767.12 1H,1H,2H,2H-Perfluorododecan-1-ol (10:2 FTOH) [865-86-1] 8012.8 Perfluorooctanesulfonyl fluoride (POSF) [307-35-7] 8581.6 Perfluorohexanesulfonic acid, potassium salt (PFHxS-K) [3871-99-6] 2590.6 Perfluorohexanoic acid (PFHxA) [307-24-4] 2043.8 Perfluorooctanesulfonamide, techn., n-isomer (major) (PFOSA) [754-91-6] 10979.11 N-(2-Hydroxyethyl)-N-methylperfluorooctanesulfonamide (N-MeFOSE) [24448-09-7] 2810.4 Perfluorobutyric acid (PFBA) [375-22-4] 2819.5 n-Perfluoropentanoic acid (PFPA) [2706-90-3] 2821.7 n-Perfluoroheptanoic acid (PFHpA) [375-85-9] 2823.10 n-Perfluorodecanoic acid (PFDA) [335-76-2] 2874.11 Perfluoroundecanoic acid, n-isomer (major) (PFUndA) [2058-94-8] 2826.12 n-Perfluorododecanoic acid (PFDodA) [307-55-1] 2827.14 Perfluorotetradecanoic acid, n-isomer (major) (PFTedA) [376-06-7] 10698.11 1H,1H,2H,2H-Perfluoro-n-octyl acrylate (6:2 FTAC) [17527-29-6] 9228.13 1H,1H,2H,2H-Perfluoro-n-decyl acrylate (8:2 FTAC) [27905-45-9] 10699.15 1H,1H,2H,2H-Perfluoro-n-dodecyl acrylate (10:2 FTAC) [17741-60-5] 2824.10 Perfluoro-3,7-dimethyloctanoic acid (PF3,7DiMeOA) [172155-07-6] 2835.7 7H-Perfluoroheptanoic acid (HPFHpA) [1546-95-8] 8547.11 2H,2H,3H,3H-Perfluoroundecanoic acid (H4PFUnA) [34598-33-9] 2559.8 1H,1H,2H,2H-Perfluorooctanesulfonic acid (6:2 FTSA) [27619-97-2]	50 µg/mL in Methanol
S-4871-ASS-MX	PFOS+OCP Mix (Pesticide Mix 49, PFAS Mix 03)	2037.8 Perfluorooctanesulfonic acid (PFOS) [1763-23-1] 2.0 mg/mL 2027.4 Hexachloro-1,3-butadiene [87-68-3] 0.5 mg/mL 1356.6 Hexachlorobenzene [118-74-1] 0.5 mg/mL 10280.10 Chordecone [143-50-0] 0.5 mg/mL 3457.10 Mirex [2385-85-5] 0.5 mg/mL	Assorted in Acetone:Toluene (95:5)
S-4775-500-DC	POP Mix 1	2037.8 Perfluorooctanesulfonic acid (PFOS) [1763-23-1] 2027.4 Hexachloro-1,3-butadiene [87-68-3] 1356.6 Hexachlorobenzene [118-74-1] 10280.10 Chordecone [143-50-0] 3457.10 Mirex [2385-85-5] 2663.10 Toxaphene [8001-35-2]	500 µg/mL in Dichloromethane
S-4941-50-THF	FTOH-Et/MeFOSE Mixture of 6 compounds (PFAS Mix 04)	11931.12 N-Ethyl-N-(2-hydroxyethyl)perfluorooctylsulphonamide (EtFOSE) [1691-99-2] 10979.11 N-(2-Hydroxyethyl)-N-methylperfluorooctane sulfonamide (MeFOSE) [24448-09-7] 8802.6 1H,1H,2H,2H-Perfluorohexan-1-ol (FTOH 4:2) [2043-47-2] 2147.8 1H,1H,2H,2H-Perfluorooctan-1-ol (FTOH 6:2) [647-42-7] 2849.10 1H,1H,2H,2H-Perfluorodecan-1-ol (FTOH 8:2) [678-39-7] 2767.12 1H,1H,2H,2H-Perfluorododecan-1-ol (FTOH 10:2) [865-86-1]	50 µg/mL in Tetrahydrofuran
S-4876-50-ME	Fluorotelomer Mix 1 (PFAS Mix 05, Fluorotelomer Mix 01)	10698.11 1H,1H,2H,2H-Perfluoro-n-octyl acrylate (6:2 FTAC) [17527-29-6] 9228.13 1H,1H,2H,2H-Perfluorodecyl acrylate (8:2 FTAC) [27905-45-9] 10699.15 1H,1H,2H,2H-Perfluorododecyl acrylate (10:2 FTAC) [17741-60-5]	50 µg/mL in Methanol
S-4877-50-ME	Fluorotelomer Mix 2 (PFAS Mix 06, Fluorotelomer Mix 02)	8802.6 1H,1H,2H,2H-Perfluorohexan-1-ol (4:2 FTOH) [2043-47-2] 2147.8 1H,1H,2H,2H-Perfluorooctan-1-ol (6:2 FTOH) [647-42-7] 2849.10 1H,1H,2H,2H-Perfluorodecan-1-ol (8:2-FTOH) [678-39-7] 2767.12 1H,1H,2H,2H-Perfluorododecan-1-ol (10:2 FTOH) [865-86-1]	50 µg/mL in Methanol
S-4878-50-ME	Fluorotelomer Mix 3 (PFAS Mix 07, Fluorotelomer Mix 03)	11206.11 1H,1H,2H,2H-Perfluorooctyl methacrylate (6:2 FTMAC) [2144-53-8] 9519.14 1H,1H,2H,2H-Perfluorodecyl methacrylate (8:2 FTMAC) [1996-88-9] 11208.16 1H,1H,2H,2H-Perfluorododecyl methacrylate (10:2 FTMAC) [2144-54-9]	50 µg/mL in Methanol
S-4999-50-ME	Fluorotelomer (PT) Mixture of 9 comp, Chain lengths C6-C12 (PFAS Mix 09)	11931.12 N-Ethyl-N-(2-hydroxyethyl)perfluorooctyl sulphonamide (N-EtFOSE) [1691-99-2] 10979.11 N-(2-Hydroxyethyl)-N-methylperfluorooctyl sulfonamide (N-MeFOSE) [24448-09-7] 8802.6 1H,1H,2H,2H-Perfluorohexan-1-ol (2-Perfluorobutyl ethanol) (4:2 FTOH) [2043-47-2] 2147.8 1H,1H,2H,2H-Perfluorooctan-1-ol (6:2 FTOH) [647-42-7] 2849.10 1H,1H,2H,2H-Perfluorodecan-1-ol (8:2 FTOH) [678-39-7] 2767.12 1H,1H,2H,2H-Perfluorododecan-1-ol (10:2 FTOH) [865-86-1] 10698.11 1H,1H,2H,2H-Perfluoro-n-octyl acrylate (6:2 FTAC) [17527-29-6] 9228.13 1H,1H,2H,2H-Perfluoro-n-decyl acrylate (8:2 FTAC) [27905-45-9] 10699.15 1H,1H,2H,2H-Perfluoro-n-dodecyl acrylate (10:2 FTAC) [17741-60-5]	50 µg/mL in Methanol



ALSO  
VIEW  
OUR



These substances pose potential impacts on both human health and the environment.

SVHC identifies chemicals equivalent to carcinogens, mutagens and reprotoxicants, which are very persistent, bioaccumulative and toxic.

To date, two PFAS and their derivatives are classed as SVHC<sup>10</sup>:

Perfluorobutane sulfonic acid (PFBS)

2,3,3,3-Tetrafluoro-2-(heptafluoropropoxy) propionic acid (HFPO-DA)

Unable to download, please follow this link:  
[www.chiron.no/en/about-us/news-archive/product-news/bmf-87-substances-of-very-high-concern-svhc/](http://www.chiron.no/en/about-us/news-archive/product-news/bmf-87-substances-of-very-high-concern-svhc/)

Your quality is our business

[www.chiron.no/en](http://www.chiron.no/en)

Stay connected   







*For ordering and information about prices and delivery in your country, please contact your local distributor:*



**Your quality is our business**

**Chiron AS** | Stiklestadveien 1 | N-7041 | Trondheim | Norway

 +47 73 87 44 90 |  Fax.: +47 73 87 44 99 |  [sales@chiron.no](mailto:sales@chiron.no) |  [www.chiron.no](http://www.chiron.no)



BMF 98 | v1 | 06/21