

Perfluorinated compounds in POP and REACH

Internal document – Information

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August 2021

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1 C9-C14 PFCAs (REACH Annex XVII Entry 68)

C9-C14 PFCA linear and branched	C9-C14 PFCA-related substance	
$C_nF_{2n+1}-C(=O)OH$	$C_nF_{2n+1}-C\dots$	$C_nF_{2n+1}-X\dots$
n = 8, 9, 10, 11, 12, or 13	n = 8, 9, 10, 11, 12, or 13	n = 9, 10, 11, 12, 13 or 14

The following substances are excluded from this designation

- C_nF_{2n+1}-X, where X = F, Cl, or Br where n = 9, 10, 11, 12, 13 or 14, including any combinations thereof,
- C_nF_{2n+1}-C(=O)OX' where > 13 and X'=any group, including salts

2 Linear C9-C14 PFCAs

Perfluorononan-1-oic acid	PFNA	375-95-1	C ₉ HF ₁₇ O ₂
Perfluorodecanoic acid	PFDA	335-76-2	C ₁₀ HF ₁₉ O ₂
Perfluoroundecanoic acid	PFUnA	2058-94-8	C ₁₁ HF ₂₁ O ₂
Perfluorododecanoic acid	PFDoA	307-55-1	C ₁₂ HF ₂₃ O ₂
Perfluorotridecanoic acid	PFTriA (PFTriDA)	72629-94-8	C ₁₃ HF ₂₅ O ₂
Perfluorotetradecanoic acid	PFTeA (PFTDA)	376-06-7	C ₁₄ HF ₂₇ O ₂

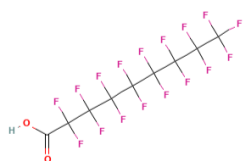


Figure 1 - Perfluorononan-1-oic acid (PFNA)

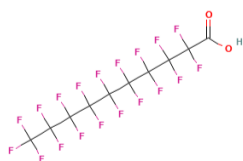


Figure 2 - Perfluorodecanoic acid (PFDA)

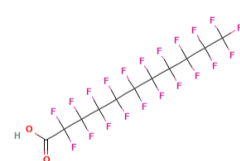


Figure 3 - Perfluoroundecanoic acid (PFUnA)

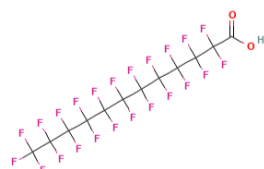


Figure 4 - Perfluorododecanoic acid (PFDoA)

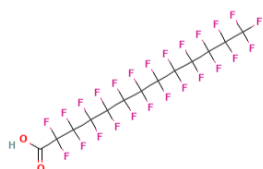


Figure 5 - Perfluorotridecanoic acid

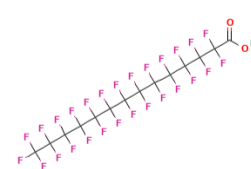


Figure 6 - Perfluorotetradecanoic acid

3 Branched C9-C14 PFCAs

Tetradecafluoro-7-(trifluoromethyl)octanoic acid		15899-31-7	C ₉ HF ₁₇ O ₂
Perfluoro-3,7-dimethyloctanoic acid	PF-3,7-DMOA	172155-07-6	C ₁₀ HF ₁₉ O ₂
Docosafluoro-11-(trifluoromethyl)lauric acid		16486-96-7	C ₁₃ HF ₂₅ O ₂

and more

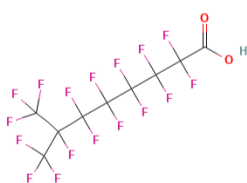


Figure 7 - Tetradecafluoro-7-(trifluoromethyl)octanoic acid

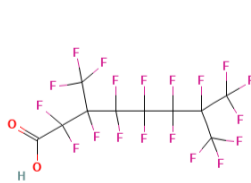


Figure 8 -Perfluoro-3,7-dimethyloctanoic acid

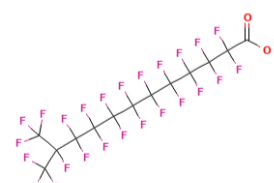


Figure 9 - Docosafluoro-11-(trifluoromethyl)lauric acid

4 Linear/branched C9-C14 PFCAs salts

Perfluorononan-1-oic acid, sodium salt	21049-39-8	$C_9F_{17}O_2Na$
Perfluorononan-1-oic acid, ammonium salt	4149-60-4	$C_9H_4F_{17}NO_2$
Sodium nonadecafluorodecanoate	3830-45-3	$C_{10}F_{19}NaO_2$
Ammonium nonadecafluorodecanoate	3108-42-7	$C_{10}H_4F_{19}NO_2$
Potassium 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11-icosafafluoroundecanoate	307-71-1	$C_{11}HF_{20}KO_2$
Decanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,10,10,10-octadecafluoro-9-(trifluoromethyl)-, ammonium salt	3658-63-7	$C_{11}H_4F_{21}NO_2$

and more

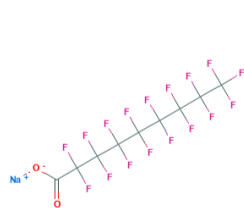


Figure 10 - Perfluorononan-1-oic acid, sodium salt

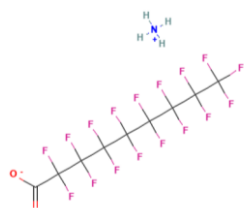


Figure 11 - Perfluorononan-1-oic acid, ammonium salt

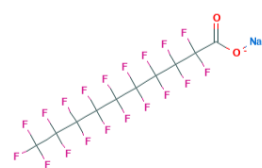


Figure 12 - Sodium nonadecafluorodecanoate

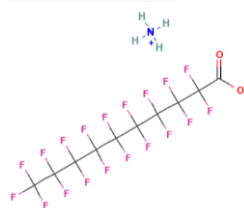


Figure 13 - Ammonium nonadecafluorodecanoate

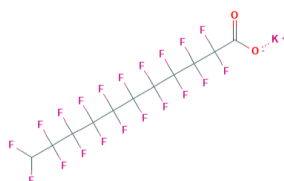


Figure 14 - Potassium 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11-icosafafluoroundecanoate

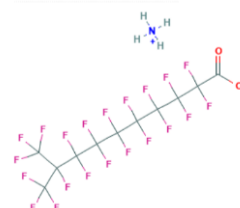


Figure 15 - Decanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,10,10,10-octadecafluoro-9-(trifluoromethyl)-, ammonium salt

5 C9-C14 PFCA Related substance

5.1 C_nF_{2n+1}- directly attached to another carbon atom

1H,1H,2H,2H-Perfluoro-1-dodecanol	10:2 FTOH	865-86-1	C ₁₂ H ₅ F ₂₁ O
2-Propenoic acid, 2-methyl-,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10, 11, 11,12,12,12-heneicosafuorododecyl ester	10:2 FTM	2144-54-9	C ₁₆ H ₉ F ₂₁ O ₂
1H,1H,2H,2H-Perfluorododecylacrylate	10:2 FTA	17741-60-5	C ₁₅ H ₇ F ₂₁ O ₂
10:2 Fluorotelomer phosphate diester		1895-26-7	C ₂₄ H ₉ F ₄₂ O ₄ P
Sodium bis(1H,1H,2H,2H-perfluorooctyl)phosphate	6:2/6:2 diPAP	407582-79-0	C ₁₆ H ₈ F ₂₆ NaO ₄ P
1H,1H,2H,2H-Perfluorododecanesulfonicacid	10:2 FTS	120226-60-0 / 108026-35-3	C ₁₂ H ₅ F ₂₁ O ₃ S/ C ₁₂ H ₄ F ₂₁ NaO ₃ S

and more

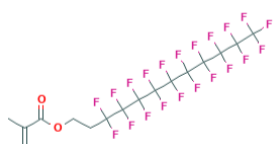


Figure 16 - 2-Propenoic acid, 2-methyl-,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10, 11, 11,12,12,12-heneicosafuorododecyl ester

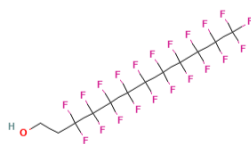


Figure 17 - 1H,1H,2H,2H-Perfluoro-1-dodecanol

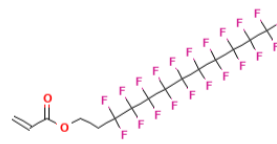


Figure 18 - 1H,1H,2H,2H-Perfluorododecylacrylate

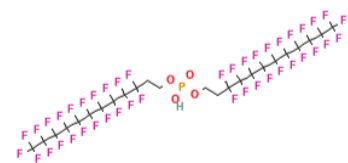


Figure 19 - 10:2 Fluorotelomer phosphate diester

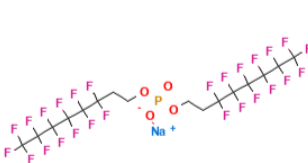


Figure 20 - Sodium bis(1H,1H,2H,2H-perfluorooctyl)phosphate

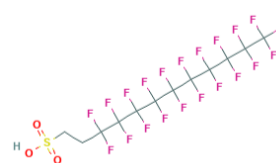


Figure 21 - 1H,1H,2H,2H-Perfluorododecanesulfonicacid

5.2 C_nF_{2n+1}- that it is not directly attached to another carbon atom

Perfluorodecyl iodide		423-62-1	C ₁₀ F ₂₁ I
Perfluorodecane sulfonic acid	PFDS	335-77-3	C ₁₀ HF ₂₁ O ₃ S
Perfluoroalkane sulfonyl fluorides	PFNS	68259-06-3	C ₉ F ₂₀ O ₂ S
(Heptadecafluorooctyl)(tridecafluorohexyl) phosphinic acid	C6/C8-PFPIA	610800-34-5	C ₁₄ HF ₃₀ O ₂ P

and more

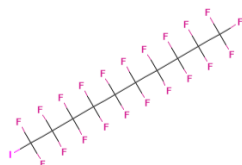


Figure 22 - Perfluorodecyl iodide

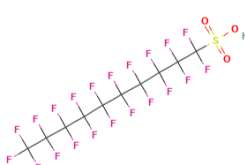


Figure 23 - Perfluorodecane sulfonic acid'

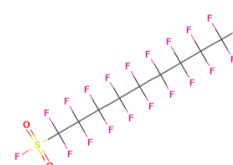


Figure 24 - Perfluoroalkane sulfonyl fluorides

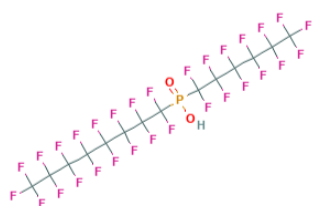


Figure 25 - (Heptadecafluorooctyl) (tridecafluorohexyl) phosphinic acid

6 PFOS (POP Annex I Part A)

Perfluorooctane sulfonic acid and its derivatives (PFOS) means the following

- i. $C_8F_{17}SO_2X$ (X = OH, Metal salt (O-M+), halide, amide, and other derivatives including polymers)

Perfluorooctanesulfonic acid	PFOS	1763-23-1	$C_8HF_{17}O_3S$
N-Methylperfluorooctanesulfonamidoethanol	Me-FOSE	24448-09-7	$C_{11}H_8F_{17}NO_3S$
2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol	N-EtFOSE	1691-99-2	$C_{12}H_{10}F_{17}NO_3S$
N-ethylperfluoro-1-octanesulfonamide	Et-FOSA	4151-50-2	$C_{10}H_6F_{17}NO_2S$
N-methylperfluoro-1-octanesulfonamide	Me-FOSA	31506-32-8	$C_9H_4F_{17}NO_2S$
Perfluorooctansulfonamide	PFOSA	754-91-6	$C_8H_2F_{17}NO_2S$
Perfluorooctanesulfonyl fluoride	POSF	307-35-7	$C_8F_{18}O_2S$
Didecyldimethylammonium perfluorooctane sulfonate		251099-16-8	$C_{30}H_{48}F_{17}NO_3S$
Ammonium perfluorosulfonate	PFOS-X	29081-56-9	$C_8H_4F_{17}NO_3S$
Lithium perfluorooctane sulfonate	PFOS-X	29457-72-5	$C_8H_2F_{17}LiO_3S$
Tetraethylammonium perfluorooctane sulfonate	PFOS-X	56773-42-3	$C_{16}H_{20}F_{17}NO_3S$
Diethanolammonium perfluorooctane sulfonate	PFOS-X	70225-14-8	$C_{12}H_{12}F_{17}NO_3S$

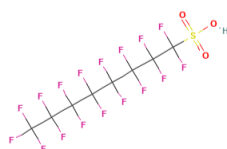


Figure 26 - Perfluorooctanesulfonic acid

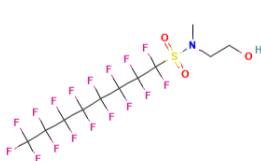


Figure 27 - N-Methylperfluorooctane sulfonamidoethanol

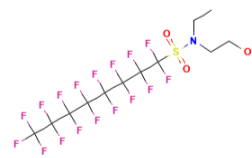


Figure 28 - 2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol

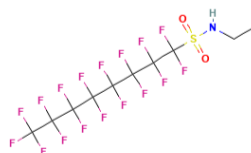


Figure 29 - N-ethylperfluoro-1-octanesulfonamide

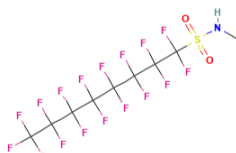


Figure 30 - N-methylperfluoro-1-octanesulfonamide

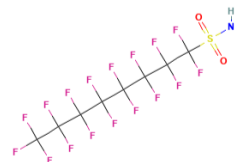


Figure 31 - Perfluorooctanesulfonamide

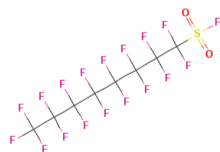


Figure 32 - Perfluorooctanesulfonyl fluoride

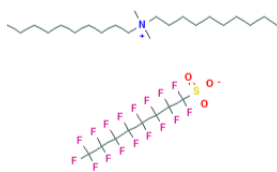


Figure 33 - Didecylmethylammonium perfluorooctane sulfonate

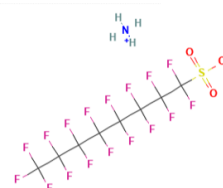


Figure 34 - Ammonium perfluorosulfonate

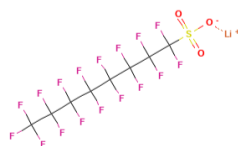


Figure 35 - Lithium perfluorooctane sulfonate

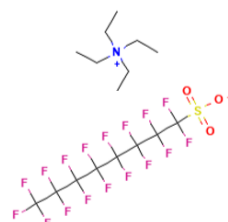


Figure 36 - Tetraethylammonium perfluorooctane sulfonate

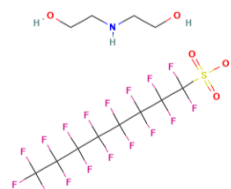


Figure 37 - Diethanolammonium perfluorooctane sulfonate

7 PFOA (POP Annex I Part A)

“Perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds” means the following:

- i. perfluorooctanoic acid, including any of its branched isomers;
- ii. its salts;
- iii. PFOA-related compounds which, for the purposes of the Convention, are any substances that degrade to PFOA, including any substances (including salts and polymers) having a linear or branched perfluoroheptyl group with the moiety (C7F15)C as one of the structural elements.

7.1 PFOA and their salt

Perfluorooctanoic acid	PFOA	335-67-1	C ₈ HF ₁₅ O ₂
Ammonium perfluorooctanoate	APFO	3825-26-1	C ₈ H ₄ F ₁₅ NO ₂
Potassium perfluorooctanoate	K-PFOA	2395-00-8	C ₈ F ₁₅ KO ₂
Silver perfluorooctanoate	Ag-PFOA	335-93-3	C ₈ AgF ₁₅ O ₂
Sodium perfluorooctanoate	Na-PFOA	335-95-5	C ₈ F ₁₅ NaO ₂
Perfluorooctanoyl fluoride	F-PFO	335-66-0	C ₈ F ₁₆ O

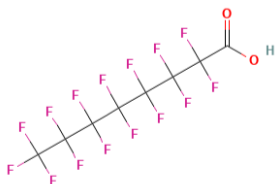


Figure 38 - Perfluorooctanoic acid

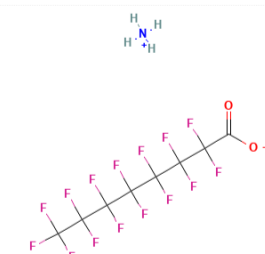


Figure 39 - Ammonium perfluorooctanoate

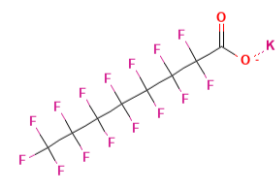


Figure 40 - Potassium perfluorooctanoate

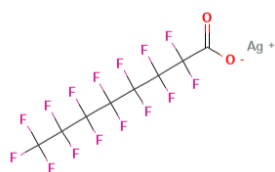


Figure 41 - Silver perfluorooctanoate

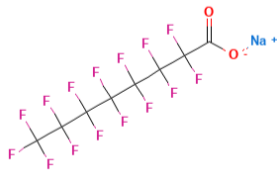


Figure 42 - Sodium perfluorooctanoate

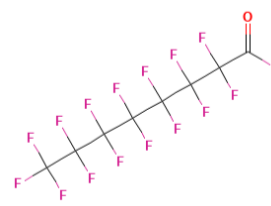


Figure 43 - Perfluorooctanoyl fluoride

7.2 PFOA related substances

Methyl perfluorooctanoate	MePFOA	376-27-2	C ₉ H ₃ F ₁₅ O ₂
Ethyl perfluorooctanoate	EtPFOA	3108-24-5	C ₁₀ H ₅ F ₁₅ O ₂
1H,1H,2H,2H-Perfluoro-1-decanol	8:2 FTOH	678-39-7	C ₁₀ H ₅ F ₁₇ O
1H,1H,2H,2H-Perfluorodecyl acrylate	8:2 FTA	27905-45-9	C ₁₃ H ₇ F ₁₇ O ₂
2H,2H,3H,3H-Perfluoroundecanoic acid	H4PFUnA	34598-33-9	C ₁₁ H ₅ F ₁₇ O ₂
8:2 Fluorotelomer methacrylate	8:2 FTMAC	1996-88-9	C ₁₄ H ₉ F ₁₇ O ₂
Mono[2-(perfluorooctyl)ethyl]Phosphate	8:2 PAP	57678-03-2	C ₁₀ H ₆ F ₁₇ O ₄ P ⁻²
8:2 Fluorotelomer sulfonic acid	8:2 FTSA	39108-34-4	C ₁₀ H ₅ F ₁₇ O ₃ S

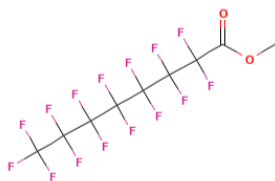


Figure 44 - Methyl perfluorooctanoate

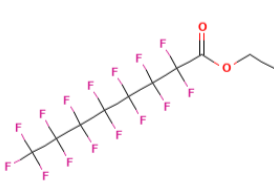


Figure 45 - Ethyl perfluorooctanoate

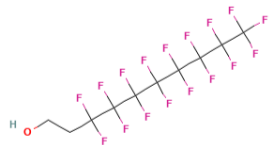


Figure 46 - 1H,1H,2H,2H-Perfluoro-1-decanol

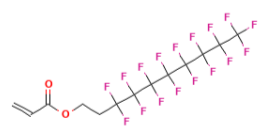


Figure 47 - 1H,1H,2H,2H-Perfluorodecyl acrylate

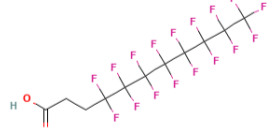


Figure 48 - 2H,2H,3H,3H-Perfluoroundecanoic acid



Figure 49 - 8:2 Fluorotelomer methacrylate

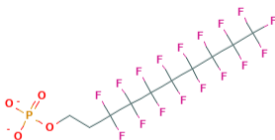


Figure 50 - Mono[2-(perfluorooctyl)ethyl]Phosphate

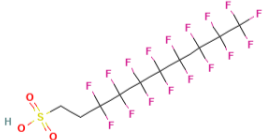


Figure 51 - 8:2 Fluorotelomer sulfonic acid