

**Stockholm Convention
on Persistent Organic
Pollutants****Persistent Organic Pollutants Review Committee
Thirteenth meeting**

Rome, 17–20 October 2017

Item 5 (a) (ii) of the provisional agenda*

**Technical work: consideration of draft risk management
evaluations: pentadecafluorooctanoic acid
(CAS No: 335-67-1, PFOA, perfluorooctanoic acid),
its salts and PFOA-related compounds****Supporting information related to the draft risk management
evaluation on pentadecafluorooctanoic acid (CAS No: 335-67-1,
PFOA, perfluorooctanoic acid), its salts and PFOA-related
compounds****Addendum****Non-exhaustive lists of substances covered and not covered by the draft
risk management evaluation****Note by the Secretariat**

As referred to in the note by the Secretariat on a draft risk management evaluation on pentadecafluorooctanoic acid (CAS No: 335-67-1, PFOA, perfluorooctanoic acid), its salts and PFOA-related compounds (UNEP/POPS/POPRC.13/3), the annex to the present note sets out non-exhaustive lists of substances covered and not covered by the draft risk management evaluation. The present note, including its annex, has not been formally edited.

* UNEP/POPS/POPRC.13/1.

Annex

**PFOA, ITS SALTS AND PFOA-RELATED
COMPOUNDS**

DRAFT RISK MANAGEMENT EVALUATION

**NON-EXHAUSTIVE LISTS OF SUBSTANCES
COVERED AND NOT COVERED BY THE
DRAFT RISK MANAGEMENT EVALUATION**

10 July 2017

Non-exhaustive lists of substances covered and not covered by the draft risk management evaluation

1. Non-exhaustive lists of chemical substances and substance groups covered and not covered by the draft risk management evaluation on PFOA, its salts and PFOA-related compounds (UNEP/POPS/POPRC.13/3) are provided in Table 1: Non-exhaustive list of substances covered by the risk management evaluation on PFOA, its salts and PFOA-related compounds (page 4–12) and Table 2: Non-exhaustive list of substances not covered by the risk management evaluation on PFOA, its salts and PFOA-related compounds (page 13–14), respectively.

2. Paragraph 17 of the draft risk management evaluation specifies substances covered by the risk management evaluation (a, b, c including (i)–(iii) and other) and those not covered (including (i)–(v) and other) as follows:

“The risk management evaluation covers:

- (a) PFOA (pentadecafluorooctanoic acid, CAS No: 335-67-1, EC No: 206-397-9) including any of its branched isomers;
- (b) Its salts; and
- (c) PFOA-related compounds which, for the purposes of this risk management evaluation, 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, for example:
 - (i) Polymers with ≥ C₈ based perfluoroalkyl side chains;¹
 - (ii) 8:2 fluorotelomer compounds;
 - (iii) 10:2 fluorotelomer compounds.

The compounds below do not degrade to PFOA and are therefore not included as PFOA-related compounds:

- (i) C₈F₁₇-X, where X= F, Cl, Br;
- (ii) Fluoropolymers² that are covered by CF₃[CF₂]_n-R', where R'=any group, n>16;³ or
- (iii) Perfluoroalkyl carboxylic and phosphonic acids (including their salts, esters, halides and anhydrides) with ≥ 8 perfluorinated carbons; or
- (iv) Perfluoroalkane sulfonic acids (including their salts, esters, halides and anhydrides) with ≥ 9 perfluorinated carbons;
- (v) Perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOF) as listed in Annex B to the Stockholm Convention.”

3. The non-exhaustive lists of substances have been prepared in order to support and facilitate the assignment of substances and comprehension of the scope of the risk management evaluation.

4. Figure 1: **Major synthesis routes of fluorotelomer-based substances including side-chain fluorinated polymers (FOEN, 2017)** (page 15) provides major synthesis routes of fluorotelomer-based substances including side-chain fluorinated polymers (see section I of FOEN, 2017).

¹ DuPont, 1998. Technical information: Zonyl fluorochemical intermediates.

² Fluoropolymers have a carbon-only polymer backbone with F directly attached to backbone C atoms.

³ Such as PTFE (polytetrafluoroethylene), FEP (fluorinated ethylene propylene polymer) and PFA (perfluoroalkoxy polymer).

Table 1: Non-exhaustive list of substances covered by the risk management evaluation on PFOA, its salts and PFOA-related compounds

Note:

1. Polymers with $\geq C_8$ based perfluoroalkyl side chains;
2. 8:2 fluorotelomer compounds;
3. 10:2 fluorotelomer compounds.
4. Whenever a compound contains a component degrading into PFOA, it is considered to be within the scope of the risk management evaluation. This applies even if the compound contains other components that do not themselves degrade into PFOA. Such compounds are marked with an asterisk (*).

			(a)	(b)	(c)			
			PFOA	PFOA salts	PFOA-related compounds			
CAS No.	Acronym	Designation			(i) ¹	(ii) ²	(iii) ³	Other ⁴
PFOA								
335-67-1	PFOA	Perfluorooctanoic acid	x					
45285-51-6	PFO	Perfluorooctanoate (conjugate base of the free acid)	x					
PFOA isomers								
90480-55-0		Branched perfluorooctanoic acid	x					
1882109-81-0		Hexanoic acid, 2,2,3,4,5,5,6,6,6-nonafluoro-3,4-bis(trifluoromethyl)-	x					
1882109-80-9		Hexanoic acid, 2,3,3,4,4,5,6,6,6-nonafluoro-2,5-bis(trifluoromethyl)-	x					
1882109-79-6		Hexanoic acid, 2,2,3,3,4,5,5,6,6,6-decafluoro-4-(1,1,2,2,2-pentafluoroethyl)-	x					
1882109-78-5		Hexanoic acid, 2,2,3,4,4,5,5,6,6,6-decafluoro-3-(1,1,2,2,2-pentafluoroethyl)-	x					
1882109-77-4		Pentanoic acid, 2,3,3,4,4,5,5,5-octafluoro-2-(1,1,2,2,3,3,3-heptafluoropropyl)-	x					
1882109-76-3		Pentanoic acid, 2,3,3,4,4,5,5,5-octafluoro-2-[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]-	x					
1882109-75-2		Pentanoic acid, 2,2,3,5,5,5-hexafluoro-3,4,4-tris(trifluoromethyl)-	x					
1882109-74-1		Pentanoic acid, 2,2,4,5,5,5-hexafluoro-3,3,4-tris(trifluoromethyl)-	x					
1882109-73-0		Pentanoic acid, 2,3,3,5,5,5-hexafluoro-2,4,4-tris(trifluoromethyl)-	x					
1882109-72-9		Pentanoic acid, 2,3,4,5,5,5-hexafluoro-2,3,4-tris(trifluoromethyl)-	x					
1882109-71-8		Pentanoic acid, 2,4,4,5,5,5-hexafluoro-2,3,3-tris(trifluoromethyl)-	x					
1882109-70-7		Pentanoic acid, 3,3,4,5,5,5-hexafluoro-2,2,4-tris(trifluoromethyl)-	x					
1882109-68-3		Pentanoic acid, 2,2,3,4,5,5,5-heptafluoro-3-(1,1,2,2,2-pentafluoroethyl)-4-(trifluoromethyl)-	x					
1882109-67-2		Pentanoic acid, 2,2,4,4,5,5,5-heptafluoro-3-(1,1,2,2,2-pentafluoroethyl)-3-(trifluoromethyl)-	x					
1882109-66-1		Pentanoic acid, 2,3,4,4,5,5,5-heptafluoro-3-(1,1,2,2,2-pentafluoroethyl)-2-(trifluoromethyl)-	x					
1882109-65-0		Pentanoic acid, 2,3,3,4,5,5,5-heptafluoro-2-(1,1,2,2,2-pentafluoroethyl)-4-(trifluoromethyl)-	x					
1882109-64-9		Pentanoic acid, 2,3,4,4,5,5,5-heptafluoro-2-(1,1,2,2,2-pentafluoroethyl)-3-(trifluoromethyl)-	x					
1882109-63-8		Pentanoic acid, 3,3,4,4,5,5,5-heptafluoro-2-(1,1,2,2,2-pentafluoroethyl)-2-(trifluoromethyl)-	x					
1882109-69-4		Pentanoic acid, 3,4,4,5,5,5-hexafluoro-2,2,3-(trifluoromethyl)-	x					
1882109-62-7		Butanoic acid, 4,4,4-trifluoro-2,2,3,3-tetrakis(trifluoromethyl)-	x					
1882109-61-6		Butanoic acid, 2,3,4,4,4-pentafluoro-2-[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]-3-(trifluoromethyl)-	x					
1882109-60-5		Butanoic acid, 2,3,3,4,4,4-hexafluoro-2-[2,2,2-trifluoro-1,1-bis(trifluoromethyl)ethyl]-	x					

			(a)	(b)	(c)			
			PFOA	PFOA salts	PFOA-related compounds			
CAS No.	Acronym	Designation			(i) ¹	(ii) ²	(iii) ³	Other ⁴
1882109-59-2		Butanoic acid, 3,3,4,4,4-pentafluoro-2-[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]-2-(trifluoromethyl)-	x					
1882109-58-1		Butanoic acid, 3,3,4,4,4-pentafluoro-2,2-bis(1,1,2,2,2-pentafluoroethyl)-	x					
1812247-20-3		Hexanoic acid, 2,2,4,4,5,5,6,6,6-nonafluoro-3,3-bis(trifluoromethyl)-	x					
1812247-19-0		Hexanoic acid, 2,3,3,4,4,5,5,6,6,6-nonafluoro-2,4-bis(trifluoromethyl)-	x					
1812247-18-9		Hexanoic acid, 2,3,4,4,5,5,6,6,6-nonafluoro-2,3-bis(trifluoromethyl)-	x					
1812247-17-8		Hexanoic acid, 3,3,4,4,5,5,6,6,6-nonafluoro-2,2-bis(trifluoromethyl)-	x					
1192593-79-5		Hexanoic acid, 2,2,3,3,5,5,6,6,6-nonafluoro-4,4-bis(trifluoromethyl)-	x					
1144512-36-6		Hexanoic acid, 2,2,3,3,4,5,6,6,6-nonafluoro-4,5-bis(trifluoromethyl)-	x					
1144512-35-5		Hexanoic acid, 2,2,3,3,4,4,5,6,6,6-nonafluoro-3,5-bis(trifluoromethyl)-	x					
1144512-34-4		Hexanoic acid, 2,2,3,3,4,4,6,6,6-nonafluoro-5,5-bis(trifluoromethyl)-	x					
1144512-18-4		Heptanoic acid, 2,2,3,3,4,5,5,6,6,7,7,7-dodecafluoro-4-(trifluoromethyl)-	x					
909009-42-3		Heptanoic acid, 2,2,3,3,4,4,5,6,6,7,7,7-dodecafluoro-5-(trifluoromethyl)-	x					
705240-04-6		Heptanoic acid, 2,2,3,4,4,5,5,6,6,7,7,7-dodecafluoro-3-(trifluoromethyl)-	x					
207678-51-1		Heptanoic acid, 2,3,3,4,4,5,5,6,6,7,7,7-dodecafluoro-2-(trifluoromethyl)-	x					
123116-17-6		Isooctanoic acid, pentadecafluoro-	x					
35605-76-6		Hexanoic acid, 2,3,3,4,4,5,5,6,6,6-decafluoro-2-(1,1,2,2,2-pentafluoroethyl)-	x					
15166-06-0		Heptanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,7-dodecafluoro-6-(trifluoromethyl)-	x					
PFOA salts (including linear and branched isomers)								
90480-56-1	APFO	Ammonium salt, linear/branched PFOA (Octanoic acid, pentadecafluoro-, branched, ammonium salt)		x				
3825-26-1	APFO	Octanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-, ammonium salt (1:1)		x				
335-95-5	Na-PFOA	Octanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-, sodium salt (1:1)		x				
2395-00-8	K-PFOA	Octanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-, potassium salt (1:1)		x				
335-93-3		Octanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-, silver(1+) salt (1:1)		x				
68141-02-6		Octanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-, chromium(3+) salt (3:1)		x				
98241-25-9		Ethanaminium, N,N,N-triethyl-, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluorooctanoate (1:1)		x				
13058-06-5		Hexanoic acid, 2,3,3,4,4,5,5,6,6,6-decafluoro-2-(1,1,2,2,2-pentafluoroethyl)-, ammonium salt (1:1)		x				
1195164-59-0		Hexanoic acid, 2,3,3,4,4,5,5,6,6,6-decafluoro-2-(1,1,2,2,2-pentafluoroethyl)-, sodium salt (1:1)		x				
19742-57-5		Heptanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,7-dodecafluoro-6-(trifluoromethyl)-, ammonium salt (1:1)		x				
61436-04-2		Heptanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,7-dodecafluoro-6-(trifluoromethyl)-, iron salt (1:x)		x				
29457-73-6		Heptanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,7-dodecafluoro-6-(trifluoromethyl)-, potassium salt (1:1)		x				
18017-22-6		Heptanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,7-dodecafluoro-6-(trifluoromethyl)-, sodium salt (1:1)		x				

			(a)	(b)	(c)			
			PFOA	PFOA salts	PFOA-related compounds			
CAS No.	Acronym	Designation			(i) ¹	(ii) ²	(iii) ³	Other ⁴
15739-82-9		Heptanoic acid, 2,2,3,3,4,4,5,5,6,7,7,7-dodecafluoro-6-(trifluoromethyl)-, chromium salt (1:x)		x				
15715-47-6		Heptanoic acid, 2,2,3,3,4,4,5,5,6,7,7,7-dodecafluoro-6-(trifluoromethyl)-, aluminum salt (3:1)		x				
Other PFCA mixtures containing PFOA								
68333-92-6		Fatty acids, C7-13, perfluoro						x*
91032-01-8		Fatty acids, C7-19, perfluoro						x*
72968-38-8		Fatty acids, C7-13, perfluoro, ammonium salts						x*
PFOA esters and anhydrides								
376-27-2		Octanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-, methyl ester						x
3108-24-5		Octanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-, ethyl ester						x
33496-48-9		Octanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-, 1,1'-anhydride						x
Perfluoroalkyl phosphonic and phosphinic acids (PFPA and PFPIAs)								
68412-69-1		Phosphinic acid, bis(perfluoro-C6-12-alkyl) derivs.						x*
93062-53-4		Phosphinic acid, bis(perfluoro-C6-12-alkyl) derivs., aluminum salts						x*
40143-79-1	C8/C8-PFPIA	Bis(perfluorooctyl)phosphinic acid						x
610800-34-5	C6/C8-PFPIA	Perfluorohexylperfluorooctyl phosphinate						x
Perfluoroalkyl halides (incl. linear and branched isomers)								
335-66-0		Octanoyl fluoride, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-						x
507-63-1	PFOI	Perfluorooctyl iodide						x
307-50-6		Undecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11-tricosafuoro-11-iodo-						x
307-60-8		Dodecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12-pentacosafuoro-12-iodo-						x
307-63-1		Tetradecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14-nonacosafuoro-14-iodo-						x
335-79-5		Pentadecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15-hentriacontafuoro-15-iodo-						x
376-04-5		Tridecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13-heptacosafuoro-13-iodo-						x
423-62-1		Decane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10-heneicosafuoro-10-iodo-						x
558-97-4		Nonane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9-nonadecafluoro-9-iodo-						x
677-93-0		Decane, 1,1,1,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10-eicosafuoro-10-iodo-2-(trifluoromethyl)-						x
3248-61-1		Dodecane, 1,1,1,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12-tetracosafuoro-12-iodo-2-(trifluoromethyl)-						x
3248-63-3		Tetradecane, 1,1,1,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14-octacosafuoro-14-iodo-2-(trifluoromethyl)-						x
307-43-7		Decane, 1-bromo-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10-heneicosafuoro-						x

			(a)	(b)	(c)			
			PFOA	PFOA salts	PFOA-related compounds			
CAS No.	Acronym	Designation			(i) ¹	(ii) ²	(iii) ³	Other ⁴
90622-71-2		Alkyl iodides, C6-18, perfluoro						x*
Fluorotelomer iodides (FTIs)								
2043-53-0	8:2 FTI	Decane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8-heptadecafluoro-10-iodo-				x		
2043-54-1	10:2 FTI	Dodecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10-heneicosafuoro-12-iodo-					x	
30046-31-2	12:2 FTI	Tetradecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12-pentacosafuoro-14-iodo-						x
65510-55-6	14:2 FTI	Hexadecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14-nonacosafuoro-16-iodo-						x
65510-56-7	9:2 FTI	Undecane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9-nonadecafluoro-11-iodo-						x
68188-12-5	FTIs	Alkyl iodides, C4-20, γ - ω -perfluoro						x*
68390-33-0	FTIs	Alkyl iodides, C10-12, γ - ω -perfluoro						x
Fluorotelomer olefins (FTOs)								
21652-58-4	8:2 FTO	8:2 Fluorotelomer olefin				x		
		1-Decene, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluoro-						
30389-25-4	10:2 FTO	1-Dodecene, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-heneicosafuoro-					x	
Fluorotelomer alcohols (FTOHs)								
60699-51-6	14:2 FTOH	1-Hexadecanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,16-nonacosafuoro-						x
39239-77-5	12:2 FTOH	1-Tetradecanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,14-pentacosafuoro-						x
865-86-1	10:2 FTOH	1-Dodecanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-heneicosafuoro-					x	
678-39-7	8:2 FTOH	1-Decanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluoro-				x		
Fluorotelomer saturated and non-saturated acids (FTCAs and FTUCAs)								
70887-94-4	10:2 FTUCA	2-Dodecenoic acid, 3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-eicosafuoro-					x	
53826-13-4	10:2 FTCA	Dodecanoic acid, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-heneicosafuoro-					x	
70887-84-2	8:2 FTUCA	2-Decenoic acid, 3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-hexadecafluoro-				x		
27854-31-5	8:2 FTCA	Decanoic acid, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluoro-				x		
Fluorotelomer phosphate esters (PAPs)								
63295-27-2		1,2-Tridecanediol, 4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,13,13,13-eicosafuoro-12-(trifluoromethyl)-, 1-(dihydrogen phosphate)						x
63295-28-3		1,2-Pentadecanediol, 4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,15,15,15-tetracosafuoro-14-(trifluoromethyl)-, 1-(dihydrogen phosphate)						x

			(a)	(b)	(c)			
			PFOA	PFOA salts	PFOA-related compounds			
CAS No.	Acronym	Designation			(i) ¹	(ii) ²	(iii) ³	Other ⁴
63295-29-4		1,2-Heptadecanediol, 4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,17,17,17-octacosafuoro-16-(trifluoromethyl)-, 1-(dihydrogen phosphate)						x
94158-70-0		1,2-Tridecanediol, 4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,13-heneicosafuoro-, 1-(dihydrogen phosphate)						x
94200-46-1		1,2-Tridecanediol, 4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,13-heneicosafuoro-, 1-(dihydrogen phosphate), diammonium salt						x
94200-47-2		1,2-Pentadecanediol, 4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,15-pentacosafuoro-, 1-(dihydrogen phosphate), diammonium salt						x
94200-48-3		1,2-Heptadecanediol, 4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,17,17,17-nonacosafuoro-, 1-(dihydrogen phosphate), diammonium salt						x
94200-50-7		1,2-Tridecanediol, 4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,13,13,13-eicosafuoro-12-(trifluoromethyl)-, 1-(dihydrogen phosphate), diammonium salt						x
94200-51-8		1,2-Pentadecanediol, 4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,15,15,15-tetracosafuoro-14-(trifluoromethyl)-, 1-(dihydrogen phosphate), diammonium salt						x
94200-52-9		1,2-Heptadecanediol, 4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,17,17,17-octacosafuoro-16-(trifluoromethyl)-, 1-(dihydrogen phosphate), diammonium salt						x
57678-03-2	8:2 monoPAP	8:2 Fluorotelomer phosphate monoester				x		
		1-Decanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluoro-, 1-(dihydrogen phosphate)						
678-41-1	8:2 diPAP	8:2 Fluorotelomer phosphate diester				x		
		1-Decanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluoro-, 1,1'-(hydrogen phosphate)						
93857-44-4		1-Decanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluoro-, dihydrogen phosphate, diammonium salt				x		
57678-05-4	10:2 monoPAP	1-Dodecanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-heneicosafuoro-, 1-(dihydrogen phosphate)					x	
1895-26-7	10:2 diPAP	1-Dodecanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-heneicosafuoro-, 1,1'-(hydrogen phosphate)					x	
Fluorotelomer acrylates and methacrylates (FTACs and FTMACs)								
16083-78-6		2-Propenoic acid, 4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,17,17,17-octacosafuoro-2-hydroxy-16-(trifluoromethyl)heptadecyl ester						x
4980-53-4	14:2 FTMAC	2-Propenoic acid, 2-methyl-, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,16-nonacosafuorohexadecyl ester						x
6014-75-1	12:2 FTMAC	2-Propenoic acid, 2-methyl-, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,14-pentacosafuorotetradecyl ester						x
16083-87-7		2-Propenoic acid, 4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,15,15,15-tetracosafuoro-2-hydroxy-14-(trifluoromethyl)pentadecyl ester						x
52956-82-8		2-Propenoic acid, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,14,14,14-tetracosafuoro-13-(trifluoromethyl)tetradecyl ester						x

			(a)	(b)	(c)			
			PFOA	PFOA salts	PFOA-related compounds			
CAS No.	Acronym	Designation			(i) ¹	(ii) ²	(iii) ³	Other ⁴
74256-14-7		2-Propenoic acid, 2-methyl-, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,12,12,12-eicosafiuoro-11-(trifluoromethyl)dodecyl ester						x
74256-15-8		2-Propenoic acid, 2-methyl-, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,14,14,14-tetracosafiuoro-13-(trifluoromethyl)tetradecyl ester						x
17741-60-5	10:2 FTAC	2-(Perfluorodecyl) ethyl acrylate					x	
		2-Propenoic acid, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-heneicosafiuorododecyl ester						
2144-54-9	10:2 FTMAC	2-(Perfluorodecyl) ethyl methacrylate					x	
		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-heneicosafiuorododecyl ester						
27905-45-9	8:2 FTAC	8:2 Fluorotelomer acrylate				x		
		2-Propenoic acid, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl ester						
1996-88-9	8:2 FTMAC	8:2 Fluorotelomer methacrylate				x		
		2-Propenoic acid, 2-methyl-, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl ester						
85631-54-5	FTACs	2-Propenoic acid, γ - ω -perfluoro-C8-14-alkyl esters				x	x	x
91615-22-4		2-Propenoic acid, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,16,16,16-octacosafiuoro-15-(trifluoromethyl)hexadecyl ester						x
94158-63-1		2-Propenoic acid, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,17,18,18,18-dotriacontafiuoro-17-(trifluoromethyl)octadecyl ester						x
94158-64-2		2-Propenoic acid, 2-methyl-, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,16,16,16-octacosafiuoro-15-(trifluoromethyl)hexadecyl ester						x
94158-65-3		2-Propenoic acid, 2-methyl-, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,17,18,18,18-dotriacontafiuoro-17-(trifluoromethyl)octadecyl ester						x
Other fluorotelomer-based non-polymers								
93776-12-6		1-Propanaminium, <i>N</i> -(2-carboxyethyl)- <i>N,N</i> -dimethyl-3-[(4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,15-pentacosafiuoro-2-hydroxypentadecyl) amino]-, inner salt						x
93776-13-7		1-Propanaminium, <i>N</i> -(2-carboxyethyl)-3-[(4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,13-heneicosafiuoro-2-hydroxytridecyl)amino]- <i>N,N</i> -dimethyl-, inner salt					x	
93776-15-9		1-Propanaminium, <i>N</i> -(2-carboxyethyl)- <i>N,N</i> -dimethyl-3-[[4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,15,15,15-tetracosafiuoro-2-hydroxy-14-(trifluoromethyl)pentadecyl]amino]-, inner salt						
94159-83-8		2-Tridecanol, 1-[[3-(dimethylamino)propyl]amino]-4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,13,13,13-eicosafiuoro-12-(trifluoromethyl)-						x
94159-79-2		2-Pentadecanol, 1-[[3-(dimethylamino)propyl]amino]-4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,15-pentacosafiuoro-						x
94159-80-5		2-Tridecanol, 1-[[3-(dimethylamino)propyl]amino]-4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,13-heneicosafiuoro-					x	

			(a)	(b)	(c)			
			PFOA	PFOA salts	PFOA-related compounds			
CAS No.	Acronym	Designation			(i) ¹	(ii) ²	(iii) ³	Other ⁴
94159-82-7		2-Pentadecanol, 1-[[3-(dimethylamino)propyl]amino]-4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,15,15,15-tetracosafuoro-14-(trifluoromethyl)-						x
99955-83-6	8:2 FTS	8:2 Fluorotelomer stearate monoester				x		
		Octadecanoic acid, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl ester						
302911-86-0		8:2 Fluorotelomer citrate triester				x		
		Pentanedioic acid, 3-[2-[(3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl)oxy]-2-oxoethyl]-3-hydroxy-, 1,5-bis(3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl) ester						
3102-79-2		Perfluorooctylethyldichloromethyl silane				x		
74612-30-9		Perfluorooctylethyldimethylchlorosilane				x		
101947-16-4		Perfluorooctylethyltriethoxysilane				x		
78560-44-8		Perfluorooctylethyltrichlorosilane				x		
83048-65-1		Perfluorooctylethyltrimethoxysilane				x		
68187-42-8		Propanamide, 3-[(γ-ω-perfluoro-C ₄₋₁₀ -alkyl)thio] derivatives				x		
70969-47-0		Thiols, C ₈₋₂₀ , γ-ω-perfluoro, telomers with acrylamide			x			
95370-51-7		Carbamic acid, [2-(sulphothio)ethyl]-, C-(γ-ω-perfluoro-C ₆₋₉ -alkyl) esters, monosodium salts						x
148240-85-1		1,3-Propanediol, 2,2-bis[[γ-ω-perfluoro-C ₄₋₁₀ -alkyl)thio]methyl] derivatives, phosphates, ammonium salts				x		
148240-87-3		1,3-Propanediol, 2,2-bis[[γ-ω-perfluoro-C ₆₋₁₂ -alkyl)thio]methyl] derivatives, phosphates, ammonium salts			x			
148240-89-5		1,3-Propanediol, 2,2-bis[[γ-ω-perfluoro-C ₁₀₋₂₀ -alkyl)thio]methyl] derivs., phosphates, ammonium salts				x	x	x
183146-60-3		Oxirane, methyl-, polymer with oxirane, mono[2-hydroxy-3-[(γ-ω-perfluoro-C ₈₋₂₀ -alkyl)thio]propyl] ethers			x			
71608-61-2		Pentanoic acid, 4,4-bis[(γ-ω-perfluoro-C ₈₋₂₀ -alkyl)thio]derivs., compds. with diethanolamine				x	x	x
94200-45-0		1,2-Undecanediol, 4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,11-heptadecafluoro-, 1-(dihydrogen phosphate), ammonium salt (1:2)				x		
93776-00-2		2-Pentadecanol, 1,1'-[oxybis[(1-methyl-2,1-ethanediyloxy]]bis[4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,15-pentacosafuoro-						x

Fluorotelomer-based side-chain fluorinated polymers								
115592-83-1		2-Propenoic acid, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-heneicosafuorododecyl ester, polymer with 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl 2-propenoate, hexadecyl 2-propenoate, N-(hydroxymethyl)-2-propenamide, octadecyl 2-propenoate, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,14-pentacosafuorotetradecyl 2-propenoate and 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl 2-propenoate			x	x	x	x
129783-45-5		2-Propenoic acid, 2-methyl-, C10-16-alkyl esters, polymers with 2-hydroxyethyl methacrylate, Me methacrylate and γ - ω -perfluoro-C8-14-alkyl acrylate			x	x	x	x
144031-01-6		2-Propenoic acid, dodecyl ester, polymers with Bu (1-oxo-2-propenyl)carbamate and γ - ω -perfluoro-C8-14-alkyl acrylate			x	x	x	x
116984-14-6		2-Propenoic acid, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-heneicosafuorododecyl ester, polymer with 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl 2-propenoate, alpha-(2-methyl-1-oxo-2-propenyl)-omega-[(2-methyl-1-oxo-2-propenyl)oxy]poly(oxy-1, 2-ethanediyl), 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,16-nonacosafuorohexadecyl 2-propenoate, octadecyl 2-propenoate, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,14-pentacosafuorotetradecyl 2-propenoate and 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,16,16,17,17,18,18,18-tritriacontafuorooctadecyl 2-propenoate			x			
74049-08-4	PFOEA	Poly[2-(perfluorooctyl)ethyl acrylate]			x	x		
		2-Propenoic acid, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl ester, homopolymer						
65104-45-2		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, polymer with 3,3,4,4,5,5,6,6,7,7,8,8,9,9, 10,10,10-heptadecafluorodecyl 2-methyl-2-propenoate, methyl 2-methyl-2-propenoate, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,14-pentacosafuorotetradecyl 2-methyl-2-propenoate and 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl 2-methyl-2-propenoate			x	x	x	x
53515-73-4		2-Propenoic acid, 2-methyl-, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluorooctyl ester, polymer with 2-propenoic acid						x
Other substances								
90622-99-4		Amides, C7-19, α - ω -perfluoro-N,N-bis(hydroxyethyl)						x
71356-38-2		Piperazinium, 1-(carboxymethyl)-1-(2-hydroxyethyl)-4-(2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-nonadecafluoro-1-oxodecyl)-, inner salt						x
85681-64-7		2-Propenoic acid, perfluoro-C8-16-alkyl esters						x
125328-29-2		2-Propenoic acid, 2-methyl-, C10-16-alkyl esters, polymers with 2-hydroxyethylmethacrylate, Me methacrylate and perfluoro-C8-14-alkyl acrylate						x
325459-92-5		Phosphine, tris[4-(3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl)phenyl]-				x		
326475-46-1		Palladium, dichlorobis[tris[4-(3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl)phenyl]phosphine- κ P]-				x		

39186-68-0		1-Propanaminium, N-(2-carboxyethyl)-N,N-bis(2-hydroxyethyl)-3-[(2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-1-oxooctyl)amino]-, inner salt							x
41358-63-8		Octanamide, N-[3-[bis(2-hydroxyethyl)amino]propyl]-2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-							x
24216-05-5		Benzenesulfonyl chloride, 3,4-bis[(2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-1-oxooctyl)amino]-							x
53517-98-9		1-Propanaminium,N,N,N-trimethyl-3-[(2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-1-oxooctyl) amino]-, chloride (1:1)							x
85938-56-3		Octanamide, N-(3-aminopropyl)-2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-							x
89685-61-0		1-Propanesulfonic acid,3-[ethyl (2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-1-oxooctyl)amino]-,sodium salt (1:1)							x
84029-60-7		Nonene, heptadecafluoro-1-[(2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluorooctyl)oxy]-							x
4151-50-2	N-EtFOSA	N-Ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-1-octanesulfonamide, N-Ethylperfluorooctane-1-sulfonamide							x

Table 2: Non-exhaustive list of substances not covered by the risk management evaluation on PFOA, its salts and PFOA-related compounds

Note:

1. C₈F₁₇-X, where X= F, Cl, Br.
2. Fluoropolymers that are covered by CF₃[CF₂]_n-R', where R'=any group, n>16.
3. Perfluoroalkyl carboxylic and phosphonic acids (including their salts, esters, halides and anhydrides) with ≥ 8 perfluorinated carbons.
4. Perfluoroalkane sulfonic acids (including their salts, esters, halides and anhydrides) with ≥ 9 perfluorinated carbons.
5. PFOS, its salts and PFOSF as listed in Annex B to the Stockholm Convention.

CAS No.	Acronym	Designation	Out of scope: compounds that do not degrade to PFOA					
			(i) ¹	(ii) ²	(iii) ³	(iv) ⁴	(v) ⁵	other
PFOA								
Fluorotelomer alcohols								
647-42-7	6:2 FTOH	6:2 Fluorotelomer alcohol						x
		1-Octanol, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro-						
Perfluoroalkyl phosphonic and phosphinic acids								
68412-68-0		Phosphonic acid, perfluoro-C6-12-alkyl derivs.			x			
Polyfluoroalkyl carboxylic acids								
1765-48-6		Undecanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11- eicosafuoro-						x
Perfluoroalkylcarboxylic acids other than PFOA, their isomers, and salts								
375-22-4	PFBA	Perfluorobutanoic acid						x
307-24-4	PFPeA	Perfluoropentanoic acid						x
357-24-4	PFHxA	Perfluorohexanoic acid						x
375-85-9	PFHpA	Perfluoroheptanoic acid						x
375-95-1	C ₉ -PFCA or PFNA	Perfluorononan-1-oic acid			x			
335-76-2	C ₁₀ -PFCA or PFDA	Perfluorodecanoic acid			x			
2058-94-8	C ₁₁ -PFCA or PFUnA	Perfluoroundecanoic acid			x			
307-55-1	C ₁₂ -PFCA or PFDaA	Perfluorododecanoic acid			x			
72629-94-8	C ₁₃ -PFCA or PFTrA	Perfluorotridecanoic acid			x			
376-06-7	C ₁₄ -PFCA or PFTeA	Perfluorotetradecanoic acid			x			
141074-63-7	C ₁₅ -PFCA	Perfluoropentadecanoic acid			x			
67905-19-5	C ₁₆ -PFCA	Perfluorohexadecanoic acid			x			
57475-95-3	C ₁₇ -PFCA	Perfluoroheptadecanoic acid			x			
16517-11-6	C ₁₈ -PFCA	Perfluorooctadecanoic acid			x			
133921-38-7	C ₁₉ -PFCA	Perfluorononadecanoic acid			x			
68310-12-3	C ₂₀ -PFCA	Perfluoroeicosanoic acid			x			
15811-52-6		Dodecanoyl fluoride, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,12,12,12- docosafluoro-11-(trifluoromethyl)-						x
16486-96-7		Dodecanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,12,12,12- docosafluoro-11-(trifluoromethyl)-			x			

CAS No.	Acronym	Designation	Out of scope: compounds that do not degrade to PFOA					other
			(i) ¹	(ii) ²	(iii) ³	(iv) ⁴	(v) ⁵	
18024-09-4		Tetradecanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,14,14,14-hexacosafuoro-13-(trifluoromethyl)-			x			
68015-87-2		Dodecanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,12,12,12-docosafuoro-11-(trifluoromethyl)-, compd. With ethanamine (1:1)			x			
68025-62-7		Tetradecanoyl fluoride, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,14,14,14-hexacosafuoro-13-(trifluoromethyl)-						x
3108-42-7		Ammonium nonadecafluorodecanoate			x			
3658-63-7		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 (1:1)			x			
3793-74-6		Ammonium tricosafuorododecanoate			x			
307-71-1		Undecanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,10,10,11,11-eicosafuoro-,potassium salt			x			
Perfluoroalkanesulfonic acids								
375-73-5	PFBS	Perfluorobutane sulfonic acid						x
2706-91-4	PFPeS	Perfluoropentane sulfonic acid						x
355-46-4	PFHxS	Perfluorohexane sulfonic acid						x
375-92-8	PFHpS	Perfluoroheptane sulfonic acid						x
1763-23-1	PFOS (3)	Perfluorooctane sulfonic acid					x	
Per- and polyfluoroalkyl ether carboxylic acids								
1071817-33-8	ADONA	Propanoic acid, 2,2,3,3-tetrafluoro-3-[1,1,2,2,3,3-hexafluoro-3- (trifluoromethoxy)propoxy]-, ammonium salt (1:1)						x
908020-52-0	EEA-NH4	Ammonium salt of perfluoro[(2-ethyloxy-ethoxy)acetic acid						x
		Acetic acid, 2,2-difluoro-2-[1,1,2,2-tetrafluoro-2-(1,1,2,2,2-pentafluoroethoxy)ethoxy]-, ammonium salt (1:1)						
Fluoropolymers								
9002-84-0	PTFE	Polytetrafluoroethylene		x				
25067-11-2	FEP	Fluorinated Ethylene Propylene Copolymer		x				
26655-00-5, 31784-04-0	PFA	Perfluoro Alkoxy Polymer		x				
26425-79-6	MFA	Perfluoro Methyl Alkoxy Polymer		x				

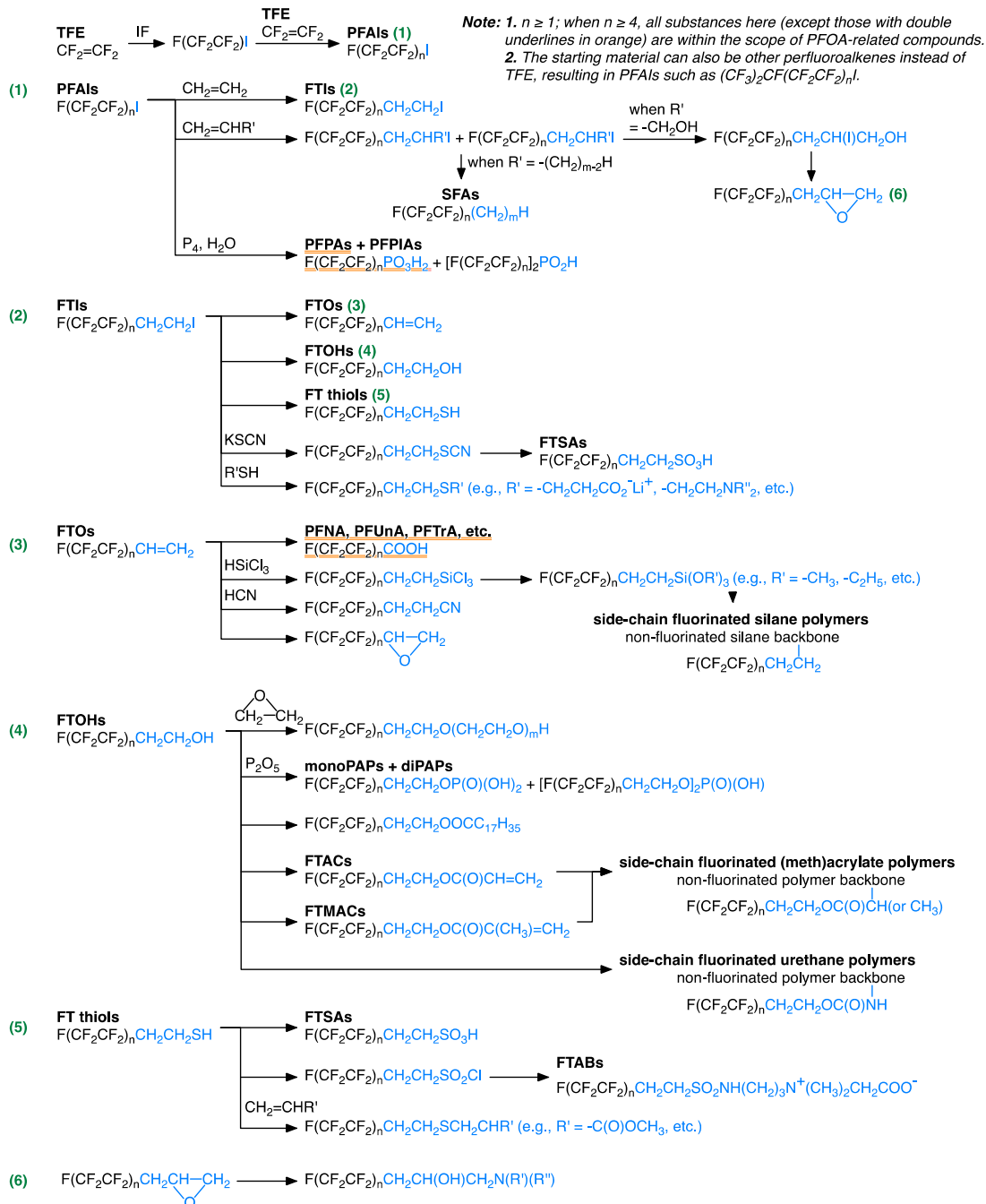


Figure. Major synthesis routes of fluorotelomer-based substances including side-chain fluorinated polymers.
 TFE = tetrafluoroethylene; PFAls = perfluoroalkyl iodides; FTIs = fluorotelomer iodides; SFAs = semifluorinated alkanes;
 PFPAs = perfluoroalkyl phosphonic acids; PFPIAs = perfluoroalkyl phosphinic acids; FTOs = fluorotelomer olefins;
 FTOHs = fluorotelomer alcohols; FTSAs = fluorotelomer sulfonic acids; PFNA = perfluorononanoic acid; PFUnA = perfluoroundecanoic acid;
 PFTrA = perfluorotridecanoic acid; mono- & diPAPs = fluorotelomer phosphate mono- & di-esters; FT(M)ACs = fluorotelomer (meth)acrylates;
 FTABs = fluorotelomer sulfonamide betains

Figure 1: Major synthesis routes of fluorotelomer-based substances including side-chain fluorinated polymers (FOEN, 2017)