



Per-(Poly) Fluoroalkyl Substances (PFAS)

Key Contact

Trent Temperly
trent.temperly@gel.com
(317) 370-9644

Analysis of Per-(Poly) Fluoroalkyl Substances (PFAS)

GEL Laboratories, LLC (GEL) holds certifications for analysis of PFAS by EPA Method 537.1 and 533 for drinking water and Method 537.1 modified for liquid, solid, tissue, and Aqueous Film Forming Foams (AFFF) samples using LC/MS/MS technology to detect and differentiate the compounds. GEL holds DoD ELAP ISO 17025:2017 accreditation for these methods, the modification being fully compliant with QSM 5.3 Table B-15. GEL is NELAP certified for drinking water, non-potable water, and liquid and solid wastes (including soils) using these methods. Additionally, GEL is finalizing certification submittals for EPA Draft Method 1633 for analysis of PFAS compounds in aqueous, solid, biosolid and tissue samples for DoD ELAP ISO 17025:2017 and Utah accreditation. We plan to have Draft Method 1633 available to our clients in fourth quarter of 2022.

A complete list of the 47 PFAS compounds (including GenX) that GEL offers and their associated limits are provided in this document.

Our extensive history supporting the Department of Defense, coupled with our dedicated team of chemists makes GEL the right choice for meeting your data quality objectives for projects requiring PFAS analysis.

Snapshot of PFAS Methodology and Capability:

- GEL has five AB SCIEX Triple Quad 5500 LC/MS/MS systems dedicated to this analysis and plans are underway to add two additional AB SCIEX Triple Quad 5500 LC/MS/MS systems in 2023.
- Full compliance with QSM 5.3 Table B-15 for non-potable water, AFFF, liquid, solid wastes, and surface wipes
- Full compliance with Draft Method 1633 for non-potable water, liquid, solid and tissue
- Full compliance with EPA Method 537.1 for drinking water
- Full compliance with EPA Method 533 for drinking water
- NELAP Certified for drinking water, non-potable water, and liquids and solid wastes
- Multiple state certifications in all matrices, where available

PFAS Compounds List

Analyte	CAS Number	EPA 533	EPA 537.1	EPA 1633	GEL's Full List
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEESA)	113507-82-7	x		x	x
1H, 1H, 2H, 2H-perfluorododecane sulfonic acid (10:2 FTS)	120226-60-0				x
Hexafluoropropyleneoxide dimer acid (HFPO-DA) (Gen-X)	13252-13-6	x	x	x	x
Nonafluoro-3,6-dioxahexanoic acid (NFDHA)	151772-58-6	x		x	x
Perfluorooctadecanoic acid (PFODA)	16517-11-6				Water only
N-Ethylperfluorooctane sulfonamido ethanol (NEtFOSE)	1691-99-2			x	x
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	x	x	x	x
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	x	x	x	x
N-Methylperfluorooctane sulfonamido acetic acid (NMe-FOSAA)	2355-31-9		x	x	x
N-Methylperfluorooctane sulfonamido ethanol (NMeFOSE)	24448-09-7			x	x
Perfluoropentanoic acid (PFPeA)	2706-90-3	x		x	x
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	x		x	x
1H, 1H, 2H, 2H-Perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	x		x	x
2-Perfluorooctyl ethanoic acid (8:2 FTA) (FOEA)	27854-31-5				x
N-Ethylperfluorooctane sulfonamido acetic acid (NEtFOSAA)	2991-50-6		x	x	x
Perfluorobutylsulfonamide (FBSA)	30334-69-1				x
Perfluorohexanoic acid (PFHxA)	307-24-4	x	x	x	x
Perfluorododecanoic acid (PFDOA)	307-55-1	x	x	x	x
N-Methylperfluorooctane sulfonamide (NMeFOSA)	31506-32-8			x	x
Perfluorooctanoic acid (PFOA)	335-67-1	x	x	x	x
Perfluorodecanoic acid (PFDA)	335-76-2	x	x	x	x
Perfluorodecane sulfonic acid (PFDS)	335-77-3			x	x
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	x	x	x	x
4,4,5,5,6,6-Heptafluorohexanoic acid (3:3 FTCA)	356-02-5			x	x
Perfluorobutanoic acid (PFBA)	375-22-4	x		x	x
Perfluorobutane sulfonic acid (PFBS)	375-73-5	x	x	x	x
Perfluoroheptanoic acid (PFHpA)	375-85-9	x	x	x	x
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	x		x	x
Perfluorononanoic acid (PFNA)	375-95-1	x	x	x	x
Perfluorotetradecanoic acid (PFTDA)	376-06-7		x	x	x

PFAS Compounds List

Analyte	CAS Number	EPA 533	EPA 537.1	EPA 1633	GEL's Full List
Perfluoro-3-methoxypropanoic acid (PFMPA)	377-73-1	x		x	x
1H, 1H, 2H, 2H-Perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	x		x	x
N-Ethylperfluorooctane sulfonamide (EtFOSAm)	4151-50-2			x	x
2-Perfluorohexyl ethanoic acid (6:2 FTA) (FHEA)	53826-12-3				x
2-Perfluorodecyl ethanoic acid (10:2 FTA) (FDEA)	53826-13-4				x
Perfluorohexadecanoic acid (PFHxDA)	67905-19-5				Water only
Perfluorononane sulfonic acid (PFNS)	68259-12-1			x	x
Perfluorotridecanoic acid (PFTrDA)	72629-94-8		x	x	x
Perfluorooctane sulfonamide (PFOSAm)	754-91-6			x	x
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9-Cl-PF3ONS)	756426-58-1	x	x	x	x
1H, 1H, 2H, 2H-Perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	x		x	x
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11-Cl-PF3OUdS)	763051-92-9	x	x	x	x
Perfluorododecane sulfonic acid (PFDoS)	79780-39-5			x	x
2H,2H,3H,3H-Perfluorodecanoic acid (7:3 FTCA)	812-70-4			x	x
Perfluoro-4-methoxybutanoic acid (PFMBA)	863090-89-5	x		x	x
2H,2H,3H,3H-Perfluorooctanoic acid (5:3 FTCA)	914637-49-3			x	x
4,8-Dioxa-3H-perfluorononanoic acid (DONA)	919005-14-4	x	x	x	x

DoD Compliance Table B-15 Modified and EPA 537.1 Limits

Analyte	CAS Number	MDL (ng/L)	LOD (ng/L)	LOQ (ng/L)	MDL (ug/Kg)	LOD (ug/Kg)	LOQ (ug/Kg)
1H, 1H, 2H, 2H-perfluorododecane sulfonic acid (10:2 FTS)	120226-60-0	1.32	2.64	3.84	0.33	0.66	0.96
Hexafluoropropyleneoxide dimer acid (HFPO-DA) (Gen-X) ¹	13252-13-6	0.66	1.32	2	0.165	0.33	0.5
Perfluorooctadecanoic acid (PFODA)	16517-11-6	1.32	2.64	4	N/A	N/A	N/A
N-Ethylperfluorooctane sulfonamido ethanol (NEtFOSE)	1691-99-2	1.32	2.64	4	0.395	0.79	1
Perfluorooctane sulfonic acid (PFOS) ¹	1763-23-1	0.76	1.52	2	0.2	0.4	0.5
Perfluoroundecanoic acid (PFUnDA) ¹	2058-94-8	0.66	1.32	2	0.165	0.33	0.5
N-Methylperfluorooctane sulfonamido acetic acid (NMeFOSAA) ¹	2355-31-9	1.32	2.64	4	0.33	0.66	1
N-Methylperfluorooctane sulfonamido ethanol (NMeFOSE)	24448-09-7	1.32	2.64	4	0.39	0.78	1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.66	1.32	2	0.165	0.33	0.5
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.66	1.32	1.88	0.165	0.33	0.47
1H, 1H, 2H, 2H-Perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	1.32	2.64	3.8	0.39	0.78	0.95
N-Ethylperfluorooctane sulfonamido acetic acid (NEtFOSAA) ¹	2991-50-6	1.32	2.64	4	0.275	0.55	1
Perfluorohexanoic acid (PFHxA) ¹	307-24-4	0.66	1.32	2	0.2	0.4	0.5
Perfluorododecanoic acid (PFDOA) ¹	307-55-1	0.66	1.32	2	0.165	0.33	0.5
N-Methylperfluorooctane sulfonamide (NMeFOSA)	31506-32-8	1.32	2.64	4	0.435	0.87	1
Perfluorooctanoic acid (PFOA) ¹	335-67-1	0.8	1.32	2	0.2	0.4	0.5
Perfluorodecanoic acid (PFDA) ¹	335-76-2	0.78	1.32	2	0.37	0.74	1
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.66	1.32	1.94	0.165	0.33	0.485
Perfluorohexane sulfonic acid (PFHxS) ¹	355-46-4	0.66	1.32	1.82	0.165	0.33	0.455
4,4,5,5,6,6-Heptafluorohexanoic acid (3:3 FTCA)	356-02-5	1.32	2.64	4	0.33	0.66	1
Perfluorobutanoic acid (PFBA)	375-22-4	0.8	1.6	2	0.2	0.4	0.5
Perfluorobutane sulfonic acid (PFBS) ¹	375-73-5	0.66	1.32	1.78	0.165	0.33	0.445
Perfluoroheptanoic acid (PFHpA) ¹	375-85-9	0.66	1.32	2	0.165	0.33	0.5
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.66	1.32	1.9	0.185	0.37	0.475
Perfluorononanoic acid (PFNA) ¹	375-95-1	0.66	1.32	2	0.165	0.33	0.5
Perfluorotetradecanoic acid (PFTDA) ¹	376-06-7	0.8	1.6	2	0.2	0.4	0.5
1H, 1H, 2H, 2H-Perfluorodecanesulfonic acid (8:2 FTS)	39108-34-4	1.32	2.64	3.84	0.385	0.77	0.96

DoD Compliance Table B-15 Modified and EPA 537.1 Limits

Analyte	CAS Number	MDL (ng/L)	LOD (ng/L)	LOQ (ng/L)	MDL (ug/Kg)	LOD (ug/Kg)	LOQ (ug/Kg)
N-Ethylperfluorooctane sulfonamide (EtFOSAm)	4151-50-2	1.32	2.64	4	0.41	0.82	1
Perfluorohexadecanoic acid (PFHxDA)	67905-19-5	1.32	2.64	4	N/A	N/A	N/A
Perfluorononane sulfonic acid (PFNS)	68259-12-1	0.66	1.32	1.92	0.165	0.33	0.48
Perfluorotridecanoic acid (PFTrDA) ¹	72629-94-8	0.66	1.32	2	0.165	0.33	0.5
Perfluorooctane sulfonamide (PFOSAm)	754-91-6	0.66	1.32	2	0.165	0.33	0.5
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9-CI-PF3ONS) ¹	756426-58-1	0.66	1.32	1.864	0.165	0.33	0.466
1H, 1H, 2H, 2H-Perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	1.32	2.64	3.76	0.4	0.8	0.94
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11-CI-PF3OUdS) ¹	763051-92-9	0.66	1.32	1.884	0.165	0.33	0.471
Perfluorododecane sulfonic acid (PFDoS)	79780-39-5	0.66	1.32	1.936	0.165	0.33	0.484
2H,2H,3H,3H-Perfluorodecanoic acid (7:3 FTCA)	812-70-4	1.32	2.64	4	0.33	0.66	1
2H,2H,3H,3H-Perfluorooctanoic acid (5:3 FTCA)	914637-49-3	1.32	2.64	4	0.33	0.66	1
4,8-Dioxa-3H-perfluorononanoic acid (DONA) ¹	919005-14-4	0.66	1.32	2	0.165	0.33	0.5
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	113507-82-7	0.66	2.64	2	0.165	0.33	0.5
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	151772-58-6	1.32	2.64	4	0.165	0.33	1
2-Perfluorooctyl ethanoic acid (8:2 FTA) (FOEA)	27854-31-5	1.32	2.64	4	0.33	0.66	1
Perfluorobutylsulfonamide (FBSA)	30334-69-1	1.32	2.64	4	0.165	0.33	1
Perfluoro-3-methoxypropanoic acid (PFMPA)	377-73-1	1.32	2.64	4	0.33	0.66	1
2-Perfluorohexyl ethanoic acid (6:2 FTA) (FHEA) ¹	53826-12-3	1.32	2.64	4	0.33	0.66	1
2-Perfluorodecyl ethanoic acid (10:2 FTA) (FDEA) ¹	53826-13-4	1.32	2.64	4	0.33	0.66	1
Perfluoro-4-methoxybutanoic acid (PFMBA) ¹	863090-89-5	1.32	2.64	4	0.33	0.66	1

1. EPA 537.1 Drinking Water Only

EPA 533 Drinking Water Limits

Analyte	CAS Number	MDL (ng/L)	LOD (ng/L)	LOQ (ng/L)
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEESA)	113507-82-7	0.7019	1.4038	2
Hexafluoropropyleneoxide dimer acid (HFPO-DA)(Gen-X)	13252-13-6	0.68788	1.37576	2
Nonafluoro-3,6-dioxahexanoic acid (NFDHA)	151772-58-6	1.32	2.64	4
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.66	1.32	2
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.66	1.32	2
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.66	1.32	2
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.66	1.32	1.88
1H, 1H, 2H, 2H-Perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	1.32	2.64	3.8
Perfluorohexanoic acid (PFHxA)	307-24-4	0.66	1.32	2
Perfluorododecanoic acid (PFDOA)	307-55-1	0.66	1.32	2
Perfluorooctanoic acid (PFOA)	335-67-1	0.66	1.32	2
Perfluorodecanoic acid (PFDA)	335-76-2	0.66	1.32	2
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.66	1.32	1.82
Perfluorobutanoic acid (PFBA)	375-22-4	0.66	1.32	2
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.66	1.32	1.78
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.66	1.32	2
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.66	1.32	1.9
Perfluorononanoic acid (PFNA)	375-95-1	0.66	1.32	2
Perfluoro-3-methoxypropanoic acid (PFMPA)	377-73-1	1.32	2.64	4
1H, 1H, 2H, 2H-Perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	1.32	2.64	3.84
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9-Cl-PF3ONS)	756426-58-1	0.66	1.32	1.864
1H, 1H, 2H, 2H-Perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	1.32	2.64	3.76
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11-Cl-PF3OUdS)	763051-92-9	0.66	1.32	1.884
Perfluoro-4-methoxybutanoic acid (PFMBA)	863090-89-5	1.32	2.64	4
4,8-Dioxa-3H-perfluorononanoic acid (DONA)	919005-14-4	0.66	1.32	2

EPA 1633 Limits							
Analyte	CAS Number	Liquid (ng/L)		Solid (ug/kg)		Tissue (ug/kg)	
		MDL	PQL	MDL	PQL	MDL	PQL
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	113507-82-7	1.1867	3.56	0.11867	0.356	0.296675	0.89
Hexafluoropropyleneoxide dimer acid (HFPO-DA)(Gen-X)	13252-13-6	2.6667	8	0.26667	0.8	0.666675	2
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	151772-58-6	1.3333	4	0.13333	0.4	0.333325	1
N-Ethylperfluorooctane sulfonamido ethanol (NEtFOSE)	1691-99-2	6.6667	20	0.66667	2	1.666675	5
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.6187	1.856	0.06187	0.1856	0.154675	0.464
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.6667	2	0.06667	0.2	0.166675	0.5
N-Methylperfluorooctane sulfonamido acetic acid (NMeFOSAA)	2355-31-9	0.6667	2	0.06667	0.2	0.166675	0.5
N-Methylperfluorooctane sulfonamido ethanol (NMeFOSE)	24448-09-7	6.6667	20	0.66667	2	1.666675	5
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.6667	2	0.06667	0.2	0.166675	0.5
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.6273	1.882	0.06273	0.1882	0.156825	0.4705
1H, 1H, 2H, 2H-Perfluorooctane sulfonic acid (6:2 FTS)	27619-97-2	2.5333	7.6	0.25333	0.76	0.633325	1.9
N-Ethylperfluorooctane sulfonamido acetic acid (NEtFOSAA)	2991-50-6	0.6667	2	0.06667	0.2	0.166675	0.5
Perfluorohexanoic acid (PFHxA)	307-24-4	0.6667	2	0.06667	0.2	0.166675	0.5
Perfluorododecanoic acid (PFDOA)	307-55-1	0.6667	2	0.06667	0.2	0.166675	0.5
N-Methylperfluorooctane sulfonamide (NMeFOSA)	31506-32-8	0.6667	2	0.06667	0.2	0.166675	0.5
Perfluorooctanoic acid (PFOA)	335-67-1	0.6667	2	0.06667	0.2	0.166675	0.5
Perfluorodecanoic acid (PFDA)	335-76-2	0.6667	2	0.06667	0.2	0.166675	0.5
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.6433	1.93	0.06433	0.193	0.160825	0.4825
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.6093	1.828	0.06093	0.1828	0.152325	0.457
4,4,5,5,6,6-Heptafluorohexanoic acid (3:3 FTCA)	356-02-5	2.6667	8	0.26667	0.8	0.666675	2
Perfluorobutanoic acid (PFBA)	375-22-4	2.6667	8	0.26667	0.8	0.666675	2
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.5913	1.774	0.05913	0.1774	0.147825	0.4435
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.6667	2	0.06667	0.2	0.166675	0.5
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.6353	1.906	0.06353	0.1906	0.158825	0.4765
Perfluorononanoic acid (PFNA)	375-95-1	0.6667	2	0.06667	0.2	0.166675	0.5
Perfluorotetradecanoic acid (PFTDA)	376-06-7	0.6667	2	0.06667	0.2	0.166675	0.5

EPA 1633 Limits							
Analyte	CAS Number	Liquid (ng/L)		Solid (ug/kg)		Tissue (ug/kg)	
		MDL	PQL	MDL	PQL	MDL	PQL
Perfluoro-3-methoxypropanoic acid (PFMPA)	377-73-1	1.3333	4	0.13333	0.4	0.333325	1
1H, 1H, 2H, 2H-Perfluorodecane sulfonic acid (8:2 FTS)	39108-34-4	2.56	7.68	0.256	0.768	0.64	1.92
N-Ethylperfluorooctane sulfonamide (EtFOSAm)	4151-50-2	0.6667	2	0.06667	0.2	0.166675	0.5
Perfluorononane sulfonic acid (PFNS)	68259-12-1	1.924	1.924	0.064	0.1924	0.16	0.481
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.6667	2	0.06667	0.2	0.166675	0.5
Perfluorooctane sulfonamide (PFOSAm)	754-91-6	0.6667	2	0.06667	0.2	0.166675	0.5
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9-Cl-PF3ONS)	756426-58-1	2.4933	7.48	0.24933	0.748	0.623325	1.87
1H, 1H, 2H, 2H-Perfluorohexane sulfonic acid (4:2 FTS)	757124-72-4	2.5	7.5	0.25	0.75	0.625	1.875
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11-Cl-PF3OUdS)	763051-92-9	2.52	7.56	0.252	0.756	0.63	1.89
Perfluorododecane sulfonic acid (PFDoS)	79780-39-5	0.6467	1.94	0.06467	0.194	0.161675	0.485
2H,2H,3H,3H-Perfluorodecanoic acid (7:3 FTCA)	812-70-4	13.3333	40	1.33333	4	3.333325	10
Perfluoro-4-methoxybutanoic acid (PFMBA)	863090-89-5	1.3333	4	0.13333	0.4	0.333325	1
2H,2H,3H,3H-Perfluorooctanoic acid (5:3 FTCA)	914637-49-3	1.3333	40	0.13333	4	0.333325	10
4,8-Dioxa-3H-perfluorononanoic acid (DONA)	919005-14-4	2.52	7.56	0.252	0.756	0.63	1.89