

## DEXSORB®

### PFAS Adsorbent for Environmental Monitoring

#### High Selectivity to PFAS

DEXSORB® is a novel cyclodextrin adsorbent, designed for the treatment and environmental monitoring of PFAS (poly- and perfluoroalkyl substances). Independent research and cross-lab validation studies have proven DEXSORB® to be broadly applicable for advanced analysis of PFAS. Superior features include: (i) rapid extraction of diverse PFAS, (ii) simple elution with quantitative PFAS recovery, (iii) consistent performance in various matrices, and (iv) low cost. These features derive from DEXSORB®'s unique adsorption mechanism of binding within uniform 0.78-nm cyclodextrin cavities, which provide molecular-level PFAS selectivity by size-inclusion and shielding from matrix effects by size-exclusion.

#### Point of Site Extraction

DEXSORB®'s rapid kinetics and high capacity enable Point of Site extraction of 55 PFAS analytes. See Appendix A for full list. Sampling by this method, tests water sources in real-time under actual conditions, and avoids costs and delays involved with water collection and transport.

#### Quantifiable Elution

DEXSORB is compatible with analytical applications like solid-phase extraction (SPE) and passive sampling. With no requirement of complex conditioning, DEXSORB can be simply applied in forms of WTK, SPE cartridges, and passive samplers to extract PFAS in diverse matrices from drinking water to wastewater. Extracted PFAS can be quantitatively recovered by a simple elution step using methanol amended with ammonia acetate. Cyclopure extraction and elution methods are in use by [SGS Laboratories in Belgium](#).

#### Analytical Methods

Cyclopure analytical laboratory employ isotope dilution methods for PFAS measurement on a HPLC-MS/MS (QExactive hybrid quadrupole orbitrap, ThermoFisher).

#### Sorbent Properties

Polymer Structure	crosslinked cyclodextrin
Appearance	yellow powder or granule
Adsorption Mechanism	hydrophobic & electrostatic
Bulk Density (wet)	0.40 g/mL; 0.40 kg/L
Specific Gravity	1.1
Effective Size (powder)	20 to 150 µm
Effective Size (granule)	200 to 2000 µm.

The analysis of drinking water samples is validated to the requirements of EPA Methods 537 and 533, whereas analysis of other matrices like groundwater, surface water, wastewater and landfill leachate follow the criteria set out in the newly released EPA 1633 draft. All methods follow instrument procedures for internal standardization and calibration certification.

#### PFAS Water Test Kit (WTK)

Cyclopure developed a PFAS test kit using DEXSORB® under a grant from NIEHS to provide a convenient, affordable and accurate way to detect PFAS compounds. WTK enables highly accurate Point of Site sample extraction by simply passing the water sample through a DEXSORB loaded extraction disc, followed by recovery and analysis at Cyclopure lab. To date, Cyclopure has tested and reported on **over 2,000 water samples in 42 States across the U.S.** The kit is being used by research institutions, including University of Florida, University of Cincinnati, University of Rhode Island and University of Queensland (Australia). NIEHS has this kit listed under its [SBIR STTR Sensor Technology for the 21st Century](#).

#### Commercial Monitoring

DEXSORB use in passive sampling is commercially applied in a [PFAS monitoring product](#) offered by iFLUX Sampling in Europe, and being explored by the University of Rhode Island under an [EPA Superfund Grant](#).



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## Appendix.

### PFAS detected by Cyclopure analytical methods.

Compound	Abbreviation	CAS#	EPA 1633
Perfluorobutanoic Acid	PFBA	375-22-4	Y
Perfluoropentanoic Acid	PFPeA	2706-90-3	Y
Perfluorohexanoic Acid	PFHxA	307-24-4	Y
Perfluoroheptanoic Acid	PFHpA	375-85-9	Y
Perfluorooctanoic Acid	PFOA	335-67-1	Y
Perfluorononanoic Acid	PFNA	375-95-1	Y
Perfluorodecanoic Acid	PFDA	335-76-2	Y
Perfluoroundecanoic Acid	PFUnA	2058-94-8	Y
Perfluorododecanoic Acid	PFDoA	307-55-1	Y
Perfluorotridecanoic Acid	PFTTrDA	72629-94-8	Y
Perfluorotetradecanoic Acid	PFTeA	376-06-7	Y
Perfluoropropane Sulfonic Acid	PFPrS	423-41-6	
Perfluorobutane Sulfonic Acid	PFBS	375-73-5	Y
Perfluoropentane Sulfonic Acid	PFPeS	2706-91-4	Y
Perfluorohexane Sulfonic Acid	PFHxS	355-46-4	Y
Perfluoroheptane Sulfonic Acid	PFHpS	375-92-8	Y
Perfluorooctane Sulfonic Acid	PFOS	1763-23-1	Y
Perfluorononane Sulfonic Acid	PFNS	474511-07-4	Y
Perfluorodecane Sulfonic Acid	PFDS	335-77-3	Y
Perfluorododecane Sulfonic Acid	PFDoS	79780-39-5	Y
4:2 Fluorotelomer Sulfonate	4:2 FTS	414911-30-1	Y
6:2 Fluorotelomer Sulfonate	6:2 FTS	425670-75-3	Y
8:2 Fluorotelomer Sulfonate	8:2 FTS	481071-78-7	Y
10:2 Fluorotelomer Sulfonate	10:2 FTS	120226-60-0	
Perfluorobutane Sulfonamide	FBSA	30334-69-1	
N-Methylperfluorobutanesulfonamide	MeFBSA	68298-12-4	
Perfluorohexane Sulfonamide	FHxSA	41997-13-1	
Perfluorooctane Sulfonamide	PFOSA	754-91-6	Y
Perfluorodecane Sulfonamide	FDSA	N/A	
N-Ethylperfluorooctane-1-Sulfonamide	NEtFOSA	4151-50-2	Y
N-Methylperfluorooctane-1-Sulfonamide	NMeFOSA	31506-32-8	Y
Perfluorooctane Sulfonamido Acetic Acid	FOSAA	2806-24-8	
N-Ethyl Perfluorooctane Sulfonamido Acetic Acid	NEtFOSAA	2991-50-6	Y
N-Methyl Perfluorooctane Sulfonamido Acetic Acid	NMeFOSAA	2355-31-9	Y
N-methyl perfluorooctanesulfonamidoethanol	NMeFOSE	24448-09-7	Y
N-ethyl perfluorooctanesulfonamidoethanol	NEtFOSE	1691-99-2	Y
Hexafluoropropylene Oxide Dimer Acid	HFPO-DA	13252-13-6	Y
4,8-Dioxa-3H-Perfluorononanoate	ADONA	919005-14-4	Y
Perfluoro-3-Methoxypropanoic Acid	PFMPA	377-73-1	Y
Perfluoro-4-Methoxybutanoic Acid	PFMBA	863090-89-5	Y
Perfluoro-3,6-Dioxaheptanoic Acid	NFDHA	151772-58-6	Y
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid	9Cl-PF3ONS	756426-58-1	Y
11-Chloroeicosafluoro-3-Oxanonane-1-Sulfonic Acid	11Cl-PF3OUdS	763051-92-9	Y
Perfluoro(2-ethoxyethane) Sulfonic acid	PFEESA	113507-82-7	Y
Perfluoro-4-ethylcyclohexane Sulfonic Acid	PFECHS	646-83-3	
8-Chloroperfluoro-1-Octanesulfonic Acid	8Cl-PFOS	777011-38-8	
3-Perfluoropropyl Propanoic Acid	3:3FTCA	356-02-5	Y
2h,2h,3h,3h-Perfluorooctanoic Acid	5:3FTCA	914637-49-3	Y
3-Perfluoroheptyl propanoic acid	7:3FTCA	812-70-4	Y
2H-Perfluoro-2-dodecenoic acid	FDUEA	70887-94-4	
2H-perfluoro-2-decenoic acid	FOUEA	70887-84-2	
Bis(perfluorohexyl) phosphinic acid	6:6PFPI	40143-77-9	
(Heptadecafluorooctyl) (tridecafluorohexyl) Phosphinic Acid	6:8PFPI	610800-34-5	
Bis(perfluorooctyl) phosphinic acid	8:8PFPI	40143-79-1	
N-(3-dimethylaminopropan-1-yl) perfluoro-1-hexanesulfonamide	N-AP-FHxSA	50598-28-2	