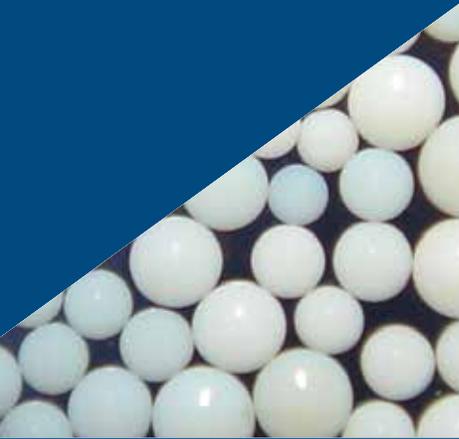
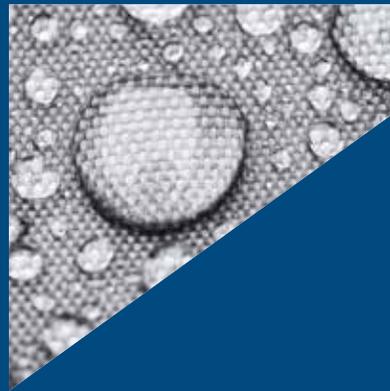




RESINTECH INC.

INNOVATIONS IN ION EXCHANGE



**Ion Exchange Solutions
for PFAS Removal**



ResinTech's world-class laboratory can identify the specific PFAS compounds in your water or soil and recommend the best possible treatment.



WHAT ARE PFAS?

Per- and Polyfluoroalkyl substances (PFAS) are fluorinated organic chemicals that are not found naturally in the environment. They are long chain compounds containing not only carbon-fluorine bonds and C-C bonds but also other heteroatoms. Since they do not occur naturally, they are (by definition) man-made chemicals or derivatives of man-made chemicals that have broken down.

Previously referred to as PFCs (Perfluorinated chemicals) they are sometimes called “forever chemicals” because of their durability, persistence, and tendency to bioaccumulate in the blood and organs over time.

PFAS are also known as:

- Perfluorinated chemicals
- Perfluorochemicals
- Perfluoroalkyls
- Perfluorinated alkyl acids
- Polyfluorinated chemicals
- Polyfluorinated compounds
- Polyfluoroalkyl substances

These chemicals have been used in:

- CARPET
- CLOTHING
- SHOES
- COOKWARE
- PACKAGING
- OIL
- WATER REPELLENTS
- FURNITURE
- TAKE-OUT FOOD CONTAINERS



RECOGNIZABLE BRANDS

Household brands like Scotchgard®, Teflon®, Gore-Tex®, Simoniz®, and Stainmaster® are just a few recognizable names whose products are closely associated with PFAS.

PFAS compounds have also been used by the Department of Defense (DoD) for fire extinguishing foam at military base airfields at locations throughout the United States.

It is unfortunate that the very same characteristics that provide value in commercial applications are what make the compound particularly difficult to destroy.

NOTE: Teflon is also used as the trade name for a polymer with similar properties, perfluoroalkoxy polymer resin (PFA).

PFAS IN THE ENVIRONMENT

PFAS compounds are found all around us in the environment — from our atmosphere, to our waterways, in the soil, the dust, the groundwater, and food supply.

Consumers ingest them daily through the food we eat and drink or the surrounding packaging; the chemicals and cosmetics we use; even the clothes we wear. As PFAS impregnated garbage accumulates in landfills, the compounds seeps into our soil, ground and surface water and ultimately into our drinking water.



HEALTH RISKS

PFAS compounds bind to proteins in the blood and are reabsorbed by the human kidney. However, the hydro- and oleophobic characteristics (ability to repel both oil and water) of PFAS make it difficult to eliminate and allow it to remain in circulation. The compounds have a half-life of 4 to 9 years within the body.

The largest epidemiological study on the health effects associated with these compounds found “probable links” to high cholesterol, thyroid disease, Ulcerative colitis, testicular cancer, kidney cancer, and pregnancy-induced hypertension*.

STANDARDS AND MEASUREMENT

PFAS concentrations are measured in parts per trillion** (ppt).

While the U.S. Environmental Protection Agency (EPA) has not yet established a national limit on PFAS exposure, it has established a health advisory of 70 parts per trillion. Many individual states have begun to establish their own regulations for PFAS exposure at levels as low as 10 parts/trillion.

* Epidemiologic Evidence on the Health Effects of Perfluorooctanoic Acid (PFOA), ENVIRONMENTAL HEALTH PERSPECTIVES, April 2010.

**One part per trillion is the equivalent to a single drop of water in 20 olympic-sized swimming pools.

ResinTech Lab Services is capable of measuring PFAS at minimum detection levels.

INFORMATION NEEDED FOR IX DESIGN FOR PFAS REMOVAL

Inlet information needed:

TOC - ppm
VOC - ppt
Individual PFCs – ppt

Is water pretreated by an air stripper?

Target Reduction Level – ppt
Flow rate – gpm (m3/h)
Volume of water treated daily (GPD, m3/d)

Background water chemistry:

Sulfate
Nitrate ppm as N or NO₃ (specify which)
Bicarbonate alkalinity
Chloride
Uranium
Perchlorate
Chromate
Arsenic



ACCESS TO IX SPECIALIST
EVALUATE TREATMENT OPTIONS
SINGLE-USE MEDIA
REGENERABLE MEDIA
RECOMMENDED EBCT
LEAD-LAG VESSEL DESIGN
ESTIMATED CAPACITY
CAPEX ESTIMATE
OPERATING COST ESTIMATE
NSF/ANSI - 61 CERTIFIED RESINS

Resintech can identify and remove:

PFOA - Perfluorooctanoic acid
PFOS - Perfluorooctanesulfonic acid
PFNA - Perfluorononanoic acid
PFHxA - Perfluorohexanoic acid
PFHxS - Perfluorohexanesulphonic acid
PFBS - Perfluorobutanesulfonic acid
HFPO-DA (GenX) - Hexafluoropropylene oxide dimer acid



NOTE: While no testing standard has thus far been established for measuring PFAS components in wastewater, ResinTech has chosen to apply the testing methods set forth in EPA 537.1.

WHY TEST FOR PFAS?

More than 500 forever chemicals are being actively used in products and industries around the world. Two such compounds, perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), have been studied the most and are largely accepted as being bad for humans.

A significant amount of research involving those two compounds as well as many other PFC's are currently being studied and published. The industry is in the early stages of dealing with these compounds and it seems likely that the list of compounds and limits might change as we learn more.

TESTING METHODS WE USE

ResinTech utilizes the testing methodologies set forth by the Environmental Protection Agency (EPA) whenever such standards have been established.

In cases where the EPA has yet to establish a standard, ResinTech utilizes the most widely accepted standard that has thus far been established.

Currently, the testing methods being used to measure the amount of PFAS chemicals present in water are different from the methods used to measure the same chemicals in soils or solids.

WATER TESTING — EPA 537.1

The EPA has established analytical method EPA 537.1 as the prescriptive Drinking Water Method for measuring PFCs.

EPA 537 can only be used to measure the list of PFAS substances for which it is EPA-approved (the list can be found on the following page) and is limited in the allowable modifications, according to the method.

This method will be applied for drinking, waste, ground and surface water sample matrices

SOIL/SOLIDS TESTING: ASTM D7968-7

To support our customers' site investigation efforts, ResinTech performs the analysis of soil samples for PFAS set forth by the American Society of Testing & Materials (ASTM) since the EPA has yet to designate a standard.

Applicable sample matrices include soil and sediment samples.

Analytical method ASTM D7968-17, developed by the U.S. EPA Region 5 Chicago Regional Laboratory, is an LC-MS-MS method specific for PFAS in soil. Soil samples are prepared for analysis with a solvent extraction prior to analysis.

MINIMUM DETECTION LEVELS

The following are the lowest levels at which PFAS compounds can be measured:

IN WATER: 2.8 ppt

IN SOIL: 70 ppt

WHAT COMPOUNDS CAN RESINTECH TEST FOR?

ANALYTE	ACRONYM NUMBER	CHEMICAL ABSTRACT SERVICES REGISTRY NUMBER (CASRN)
Perfluorooctanesulfonic acid	PFOS	1763-23-1
Perfluorooctanoic acid	PFOA	335-67-1
Hexafluoropropylene oxide dimer acid (GenX)	HFPO-DA	13252-13-6
N-ethylperfluorooctane sulfonamidoacetic acid	NEtFOSAA	2991-50-6
N-methylperfluorooctane sulfonamidoacetic	NMeFOSAA	2355-31-9
Perfluorobutanesulfonic acid	PFBS	375-73-5
Perfluorodecanoic acid	PFDA	335-76-2
Perfluorododecanoic acid	PFDoA	307-55-1
Perfluoroheptanoic acid	PFHpA	375-85-9
Perfluorohexanesulfonic acid	PFHxS	355-46-4
Perfluorohexanoic acid	PFHxA	307-24-4
Perfluorononanoic acid	PFNA	375-95-1
Perfluorotetradecanoic acid	PFTA	376-06-7
Perfluorotridecanoic acid	PFTrDA	72629-94-8
Perfluoroundecanoic acid	PFUnA	2058-94-8
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	11CL-PF3OUdS	763051-92-9
9-Chlorohexadecafluoro-3-oxanone-1-sulfonic acid	9CL-PF3ONS	756426-58-1
4,8-Dioxa-3h-perfluorononanoic acid	ADONA	919005-14-4

COSTS

PFOS/PFOA testing only	\$250 per compound (PFOS/PFOA)
Full Spectrum	\$400 (18 compounds included)

WHAT ARE THE SAMPLE CONTAINERS AND PRESERVATION REQUIREMENTS FOR PFAS?

Whatever the method, customers should take care to gather and deliver samples according to the requirements prescribed below:

MATRIX	HOLD TIME	CONTAINER	PRESERVATION
Water	14 Days / 28 Days	2 - 250 mL Polypropylene containers	5.0 g/L Trizma
Soil	14 Days / 28 Days	1 - 250 mL Polypropylene container	N/A

NOTE: ResinTech provides customers with proper sample containers and preservatives along with complete sampling and shipping instructions.



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INNOVATIONS IN ION EXCHANGE

CONTACT

To request sample materials
or arrange for PFAS testing of
water or soil samples, contact:

Marianne Metzger

Lab Sales

PHONE **216-678-0185**

EMAIL **mmetzger@resintech.com**

We will guide you through the
sample collection container
needs, compound lists, holding
times, and method selection.

CALL **856.768.9600**

OR VISIT US ONLINE **RESINTECH.COM**