



PFOS (Perfluorooctane Sulphonate) and PFOA (Perfluorooctanoic Acid)

PFOS and PFOA are man-made fluorinated chemicals of considerable global concern. These were used to make aqueous film forming foams (AFFF's), key ingredients in fire fighting foams in Australia however there were a wide range of industry uses. The toxicity and bio-accumulating properties of PFOS/PFOA are such that in **May 2009 the Stockholm Convention added these to the Persistent Organic Pollutants (POPs)** listing. ALS has recently received NATA accreditation for extremely low levels of PFOS/PFOA in water.

Background on PFOS / PFOA

In 1999, the USEPA began investigating perfluorinated chemicals and soon after 3M, the major U.S. producer, announced a phase-out of PFOS/PFOA manufacture. This may still occur in China. PFOS is detected in the blood serum of almost all people in the US although levels are decreasing, whereas blood levels of PFOS appear to be rising in China.

Perfluorinated substances including PFOS are both lipid-repellent and water-repellent and a key use is providing soil, oil and water resistance to a wide range of products. Specific uses include fire fighting foams, carpets and textiles; paper and packaging; coatings, industrial and household cleaning products, pesticides and insecticides, the photographic and semi conductor industries, and in metal plating. To put usage in perspective, the EU estimated (in 2004) that 10,000kg of PFOS were used in metals plating per annum.

PFOS can be found in surface water, soil, sediment, treatment plant effluents and landfill leachates plus human serum, fish and other biota with high levels found in many species from birds and dolphins to polar bears and mink.

Geneva – May 2009: Excerpts from the UNEP Press Release

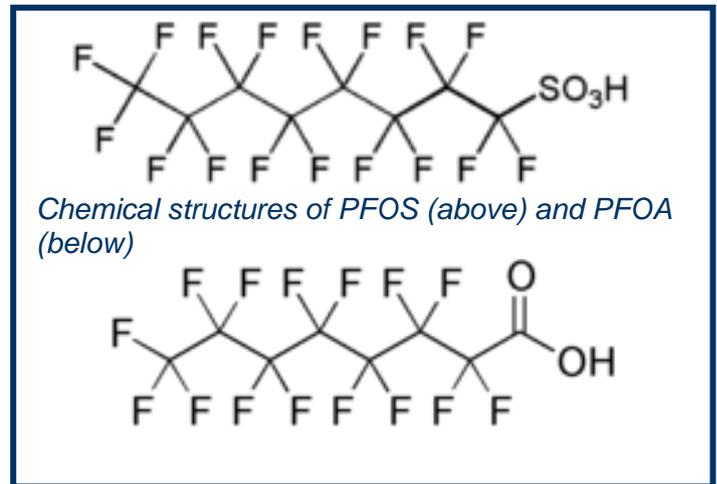
“Nine additional POPs were listed under the Stockholm Convention in May 2009, including PFOS and PFOA. Over 160 Governments recently concluded a one week conference with practical decisions that will strengthen the effort to eradicate some of the most toxic chemicals known to mankind. The conference marked a historic week for with the Stockholm Convention amended to include nine new chemicals – many of which are still widely used today. The amendment to the convention reflects international concern on the need to reduce and eventually eliminate such substances throughout the global community.

The conference also reviewed the process for evaluating the Convention’s effectiveness in reducing POPs over time. A global monitoring programme building on various regional systems will build a worldwide picture in trends and quantities of POPs in the environment and in the Human body.”

Chemistry

Chemical:	PFOS	PFOA
CAS Number:	1763-23-1	335-67-1
Formula:	C ₈ HF ₁₇ O ₃ S	C ₈ HF ₁₅ O ₂

Technical PFOS and PFOA as used in commercial products consist of a combination of the linear and branched isomers with around 70% in the linear form. Examples of the branched isomers are tabulated below.



Branched PFOS Isomers	Branched PFOA Isomers
Perfluoro-1-methylheptane sulfonate	Perfluoro-2-methylheptanoic acid
Perfluoro-2-methylheptane sulfonate	Perfluoro-3-methylheptanoic acid
Perfluoro-3-methylheptane sulfonate	Perfluoro-4-methylheptanoic acid
Perfluoro-4-methylheptane sulfonate	Perfluoro-5-methylheptanoic acid
Perfluoro-5-methylheptane sulfonate	Perfluoro-6-methylheptanoic acid
Perfluoro-6-methylheptane sulfonate	Perfluoro-5,5-dimethylhexanoic acid
Perfluoro-5,5-dimethylhexane sulfonate	Perfluoro-4,4-dimethylhexanoic acid
Perfluoro-4,4-dimethylhexane sulfonate	Perfluoro-4,5-dimethylhexanoic acid
Perfluoro-4,5-dimethylhexane sulfonate	Perfluoro-3,5-dimethylhexanoic acid
Perfluoro-3,5-dimethylhexane sulfonate	

Method Scope and LORs

The ALS methodology (EP231) for Drinking, Ground, Surface, Recycled or Catchment Water has a method detection limit (MDL) in the low ng/L and a LOR of 0.01 µg/L. The procedure is based upon an SPE / LC/MS 2008 ISO draft method. Of note, the branched isomers are also detected together with linear PFOS and PFOA. As a result of this co-elution of branched isomers with linear, Perfluorooctanoic acids and Perfluorooctane sulfonates reported under this method are determined by band integration to cover both the linear and the branched forms. The total of the above PFOS and PFOA isomers are reported as linear PFOS and PFOA.

Sample Containers and Holding Times

PFOS/PFOA analysis requires a chilled 60mL HDPE bottle for standard and Ultra trace analysis with 250ml required for super ultra-trace testing. Samples are to be analysed within 180 days. Fluoropolymer (Teflon) plus rubber should be avoided during sampling and storage (e.g. tubing,

Regulation

Although limited regulations currently exist on PFOS/PFOA in Australia Limits of 0.2µg/L for PFOS and for PFOA are 0.4µg/L are widely utilised.

For further details, please contact ALS Sydney on (02) 8784 8555 or your local ALS team.

References:

- (1) PFOA, http://en.wikipedia.org/wiki/Perfluorooctanoic_acid
- (2) PFOS, <http://en.wikipedia.org/wiki/PFOS>
- (3) Hazard Assessment of Perfluorooctane Sulphonate (PFOS) and its salts, ENV/JM/RD(2002)17/Final, OECD
- (4) 2006/122/ECOF The European Parliament and of the Council
- (5) www/UNEP.Org

For further information on specialist Services please visit the ALS website: www.alsglobal.com

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bailers). Glass containers should also be avoided due to potential analyte loss.