Proposal for listing

Perfluorooctane sulfonate (PFOS)

in Annex A

of the Stockholm Convention on

Persistent Organic Pollutants

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Sweden

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Introduction

Perfluorooctane sulfonate (PFOS) is fully fluorinated anion, which is used as such in some applications or incorporated into larger polymers. Due to its surface-active properties it is used in a wide variety of applications e.g. in textiles, and leather products; metal plating; food packaging; fire fighting foams; floor polishes; denture cleansers; shampoos; coatings and coating additives; in the photographic and photolithographic industry; and in hydraulic fluids in the aviation industry.

PFOS can be formed by degradation from a large group of related substances, referred to as PFOS-related substances. PFOS and 96 PFOS-related substances are part of the nomination. All these substances are members of a large family of perfluoroalkylated substances (PFAS), in which also some substitutes to PFOS can be found.

This dossier focuses solely on the information required under paragraphs 1 and 2 of Annex D of the Stockholm Convention on Persistent Organic Pollutants and it is mainly based on information from the following review reports:

- Draft dossier prepared in support for a nomination of PFOS to the UN-ECE LRTAP Protocol and the Stockholm Convention prepared by the Swedish Chemicals Inspectorate, August 2004.
- OECD (2002) Co-operation on Existing Chemicals - Hazard Assessment of Perfluorooctane Sulfonate and its Salts, Environment Directorate Joint Meeting of the Chemicals Committe and the Working Party on Chemicals, Pesticides and Biothechnology, Organisation for Economic Co-operation and Development, Paris, November 2002
- UK Stage 4 Final Report, Perfluorooctane Sulphonate: Risk Reduction Strategy and Analysis of Advantages and Drawbacks, RPA in association with BRE Environment, March 2004.
- Environmental risk evaluation report: perfluorooctanesulphonate (PFOS), Environment Agency, UK, 2004.

These extensive review reports (attached) also serve as a source of further information referred to in paragraph 3 of Annex D of the Stockholm Convention on this candidate POP chemical.

1 Identification of the chemical

1.1 Names and registry numbers

CAS chemical name: Perfluorooctane Sulfonate (PFOS)

Synonyms:
1-Octanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro;
1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-1-octanesulfonic acid;
1-Octanesulfonic acid, heptadecafluoro-;
1-Perfluorooctanesulfonic acid;
Heptadecafluoro-1-octanesulfonic acid;
Perfluoro-n-octanesulfonic acid;

Perfluoroctanesulfonic acid;
Perfluoroctylsulfonic acid

CAS registry number: 307-35-7

1.2 Structure

Molecular formula: $C_8F_{17}SO_3$
Structural formula:

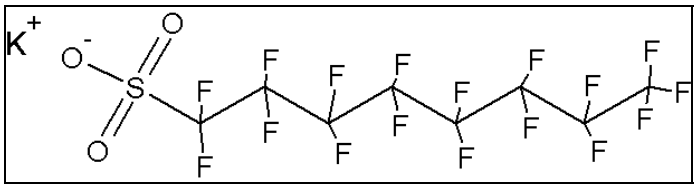

Figure 1. Structural formula of PFOS shown as its potassium salt

PFOS is a fully fluorinated anion, which is commonly used as a salt or incorporated into larger polymers. PFOS and its closely related compounds, which contain PFOS impurities or can give rise to PFOS, are members of the large family of perfluoroalkyl sulphonate substances (PFAS). The schematic structure of PFAS is given in Figure 2.

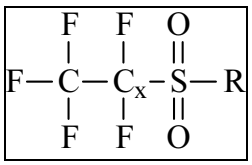

Figure 2. Schematic structure of PFAS.
R is equal to any given functional group such as OH, NH_2, etc.
For PFOS-related substances, x = 7.

2 Persistence

PFOS is extremely persistent. It has not showed any degradation in tests of hydrolysis, photolysis or biodegradation at any environmental condition tested. The only known condition whereby PFOS is degraded is through high temperature incineration.

3 Bioaccumulation

PFOS fulfils the criteria for bioaccumulation based on the much higher concentrations of PFOS in top predators, such as the polar bear, seal, bald eagle and mink (in the Arctic, the US and Sweden), than at lower trophic levels.

4 Potential for long-range environmental transport

PFOS meets the criteria for the potential for long-range atmospheric transport. This is evident through monitoring data showing highly elevated levels of PFOS in various parts of the northern hemisphere.

5 Adverse effects

PFOS fulfils the criteria for toxicity. It has demonstrated toxicity towards mammals in sub-chronic repeated dose studies at low concentrations (a few mg/kg bw/day) and displayed

reproductive toxicity with mortality of pups occurring shortly after birth, probably caused by inhibition of lung maturation.

PFOS is toxic to aquatic organisms with the lowest NOEC (0.25 mg/L) observed in mysid shrimp.

6 Statement of the reasons for concern

According to the available data, PFOS is extremely persistent in the environment. Due to its physical and chemical properties and considerably long atmospheric half-life and based on findings in environmental samples in distant locations e.g. the Arctic, it can be assumed that PFOS/PFOS-related substances can be transported long distances in air, far from its sources. PFOS is associated with serious harmful effects in mammals and aquatic organisms.

The voluntary phase out of PFOS production by the major producer in the USA has led to a significant reduction in the use of PFOS related substances. However, it can be assumed that it is still produced in some countries and there is evidence that it continues to be used in many countries. As PFOS-related substances can move in the atmosphere to locations far from its sources, measures taken by single countries or groups of countries are not sufficient to abate the pollution caused by it. Regional action has already been considered necessary and PFOS is nominated under the CLRTAP Protocol on POPs. Due to the harmful POP properties and risks related to its possible continuing production and use, global action is warranted to eliminate the pollution caused by PFOS.