Australian Government | IChEMS Industrial Chemicals Environmental Management Standard

July 2023

Chemical profile

Perfluorohexanesulfonic acid (PFHxS) and related substances

Summary

- PFHxS and related substances (PFHxS chemicals) includes:
  - perfluorohexane sulfonic acid (PFHxS)
  - PFHxS salts
  - substances with the potential to degrade to PFHxS in the environment.
- PFHxS chemicals were listed on the Stockholm Convention on persistent organic pollutants (POPs) in June 2022. This group of POPs are a priority for scheduling under the Industrial Chemicals Environmental Management Standard (IChEMS).
- Uses of PFHxS chemicals in Australia have included in the metal plating industry and in firefighting foam.
- These chemicals are of concern due to their persistence, bioaccumulation, toxicity, and potential for long range transport.
- They are a subset of a broad group of synthetic chemicals known as per- and polyfluoroalkyl substances (PFAS).
- An indicative list of PFHxS chemical identities is included as part of the consultation package.

Introduction and use of PFHxS chemicals in Australia

In Australia, perfluoroalkane sulfonates (PFSA) such as PFHxS are expected to have been mainly used in mist suppressants for the metal plating industry and in firefighting. A Stockholm Convention factsheet indicates that PFHxS chemicals may also be used in papermaking, printing inks and sealants.

The Inventory Multi-layered Assessment and Prioritisation (IMAP) environment assessments of direct and indirect precursors have not identified Australian-specific information on the import or use of specific PFHxS chemicals.

The 2018 Stockholm Convention PFHxS risk profile identifies PFHxS as significant impurities in commercial PFOS products, so PFOS products could also be a source PFHxS chemicals. The risk profile notes that PFHxS has been used as a replacement for PFOS surfactants and PFOS-based water and stain protective coatings. This suggests that PFHxS chemicals are likely to be found in many of the finished goods in which PFOS was historically used such as carpet, upholstery, food packaging materials and digital imaging products.

Controls under the Stockholm Convention

In 2022 the Conference of the Parties agreed to list PFHxS, its salts and PFHxS-related compounds in Annex A to the Stockholm Convention for persistent organic pollutants, without any specific exemptions. Restrictions on import, manufacture, use and disposal of these chemicals apply in countries which ratify the PFHxS amendment. Australia has not yet ratified this amendment.

The persistent organic pollutants review committee (POPRC) has completed the risk profile, risk management evaluation and an initial indicative list of PFHxS chemicals.

The waste management requirements of Article 6 apply for PFHxS chemicals, which includes measures to manage stockpiles and waste disposal in an environmentally sound manner to eliminate or minimise releases.

Chemical identity

PFHxS chemicals include:

i) perfluorohexane sulfonic acid (PFHxS), CAS No: 355-46-4, including any of its branched isomers,

ii) PFHxS salts, and

iii) substances with the potential to degrade to PFHxS in the environment.

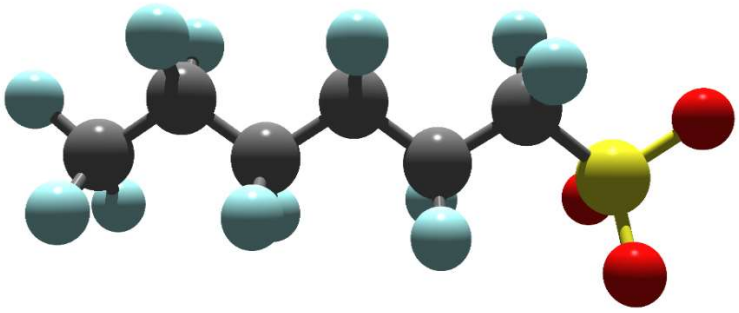

Figure 1 The perfluorohexanesulfonate anion, to which all PFHxS chemicals eventually transform in the environment. (Key: carbon: grey, fluorine: teal, sulfur: yellow, oxygen: red).

An indicative list of compounds covered by the proposed scheduling decision for PFOS is available as part of the consultation package.

Hazards and risks and risks to the environment

The Stockholm Convention PFHxS risk profile found that based on the persistence, bioaccumulation, toxicity in mammals including humans and widespread occurrence in environmental compartments including remote regions, PFHxS chemicals are likely to have significant adverse human health and environmental effects.

Studies in different food chains, including the Arctic indicate that PFHxS is likely to bioaccumulate and biomagnify. Toxic effects in aquatic organisms, amphibians, birds, and mammals can include but are not limited to reproductive, developmental, behavioural, neurotoxic and immunotoxic effects.

PFHxS chemicals have been detected in surface water, deep-sea water, drinking water, wastewater treatment plant effluent, sediment, groundwater, soil, atmosphere, dust, biota, and humans around the world with highest levels found in urban and industrial areas.

In Australia, investigations by Airservices Australia and the Department of Defence found PFHxS chemicals in the vicinity of sites where firefighting foam was used. At some sites PFAS have migrated through soil to contaminate surface and ground water and have moved into adjoining land areas.

Additional information: regulation of PFHxS chemicals in Australia

Regulatory and policy frameworks for PFHxS chemicals including the National PFAS Position Statement, Australian Industrial Chemicals Introduction Scheme (AICIS), workplace safety and hazardous waste regulatory systems, and state and territory environmental legislation.

Key regulations and policies, noting this is not a comprehensive list, include:

- Some PFHxS chemicals are listed on the Australian Inventory of Industrial Chemicals (AIIC), which means they can be introduced into Australia subject to any AICIS conditions on the listing.
- The National PFAS Position Statement sets out nationally agreed objectives for phasing-out the use of PFAS of concern in Australia. After the release of this policy the Australian Packaging Covenant Organisation (APCO) launched its industry-led action plan to remove intentionally added PFAS in fibre-based food contact packaging by the end of 2023, and will monitor progress of the phase-out through data reporting in early 2023 and mid-2024.
- The PFAS National Environmental Management Plan 2.0 (PFAS NEMP) provides nationally agreed guidance on the management of PFAS contamination in the environment, including prevention of the spread of contamination.
- PFHxS chemicals are included in Annex I of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal. In Australia this means that wastes containing PFHxS chemicals cannot be imported or exported without a permit under the *Hazardous Waste (Regulation of Exports and Imports) Act 1989*.
- PFHxS chemicals are classified as hazardous substances under the model Work Health and Safety (WHS) Regulations. The chemicals must be labelled for physical and human health hazards in accordance with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) and safety data sheets prepared by importers and manufacturers must be provided on supply of these chemicals to a workplace. The Hazardous Chemical Information System (HCIS) gives guidance on classifications for PFHxS chemicals.
- Some States have regulations on use of PFAS firefighting foams, including New South Wales's 2021 PFAS firefighting foam regulation, South Australia's 2018 regulation on use of fluorinated fire-fighting foams (PDF 328), and Queensland's 2016 Environmental Management of Firefighting Foam–Operational Policy.

Additional Information: replacements for PFHxS chemicals

The UNEP Stockholm Convention PFHxS risk management evaluation notes that many of the suggested alternatives for PFOS and in some case PFOA may also apply to PFHxS. Alternatives include substitute chemicals and alternative techniques such as design or product changes.

Key references

HEPA 2020, PFAS National Environmental Management Plan 2.0, Heads of EPAs Australia and New Zealand.

NICNAS 2015, Direct Precursors to Perfluoroheptanesulfonate (PFHpS), Perfluorohexanesulfonate (PFHxS) and Perfluoropentanesulfonate (PFPeS): Environment Tier II Assessment (PDF 243 KB), National Industrial Chemicals Notification and Assessment Scheme, Sydney, Australia.

NICNAS 2015, Indirect precursors to perfluoroalkyl sulfonates: Environment tier II assessment (PDF 652 KB), National Industrial Chemicals Notification and Assessment Scheme, Sydney, Australia.

UNEP 2018, Risk profile on Perfluorohexane Sulfonic Acid (PFHxS), its Salts and PFHxS-related Compounds (Addendum), Report of the Persistent Organic Pollutants Review Committee on the work of its fourteenth meeting, 9 October 2018.

UNEP 2019, Addendum: Risk management evaluation on perfluorohexane sulfonic acid (PFHxS), its salts and PFHxS-related compounds, Report of the Persistent Organic Pollutants Review Committee on the work of its fifteenth meeting, 31 October 2019.

More information

Email ichems.enquiry@agriculture.gov.au

Web www.dcceew.gov.au/environment/protection/chemicals-management/national-standard

Acknowledgement of Country

We recognise the First Peoples of this nation and their ongoing connection to culture and country. We acknowledge First Nations Peoples as the Traditional Owners, Custodians and Lore Keepers of the world's oldest living culture and pay respects to their Elders past, present and emerging.

© Commonwealth of Australia 2023

Unless otherwise noted, copyright (and any other intellectual property rights) in this publication is owned by the Commonwealth of Australia (referred to as the Commonwealth).

All material in this publication is licensed under a Creative Commons Attribution 4.0 International Licence except content supplied by third parties, logos and the Commonwealth Coat of Arms.

The Australian Government acting through the Department of Climate Change, Energy, the Environment and Water has exercised due care and skill in preparing and compiling the information and data in this publication. Notwithstanding, the Department of Agriculture, Water and the Environment, its employees and advisers disclaim all liability, including liability for negligence and for any loss, damage, injury, expense or cost incurred by any person as a result of accessing, using or relying on any of the information or data in this publication to the maximum extent permitted by law.