Stockholm Convention on
Persistent Organic Pollutants (POPs)

The 9 new POPs

An introduction to the nine chemicals added to the Stockholm Convention by the Conference of the Parties at its fourth meeting

August 2010

UNEP

This booklet introduces basic information on the **nine chemicals** added to the **Stockholm Convention on Persistent Organic Pollutants**.

In accordance with the procedure in **Article 8** of the Convention, the **POPs Review Committee (POPRC)** reviewed the chemicals and recommended that the Conference of the Parties consider listing under Annex A, B, or C of the Convention. The results of the Committee's review are documented in detail for each chemical in **Risk Profiles** and **Risk Management Evaluations**, available for download from the Convention's website (http://pops.int/poprc/ in the Chemicals' section).

At the fourth meeting of the Conference of the Parties held from 4 to 8 May 2009, the COP considered the Committee's recommendations and decided on listing nine chemicals. The text of these decisions is contained in the meeting report (UNEP/POPS/COP.4/38) and published online (http://www.pops.int).

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Table of Contents

Introduction

What are “POPs”?

Persistent organic pollutants (POPs) are organic compounds that are resistant to environmental degradation through chemical, biological, and photolytic processes.

POPs **persist** in the environment for long periods, are capable of **long-range transport**, **bioaccumulate** in human and animal tissue and **biomagnify** in food chains, and have **potentially significant impacts** on human health and the environment.

Exposure to POPs can cause serious health problems including certain cancers, birth defects, dysfunctional immune and reproductive systems, greater susceptibility to disease and even diminished intelligence.

Stockholm Convention on POPs

The **Stockholm Convention** is an international treaty to protect human health and the environment from POPs. It entered into force in 2004 and initially covered 12 chemicals. Currently, there are **close to 170 Parties** to the Stockholm Convention.

POPs Review Committee (POPRC)

The **POPRC** consists of 31 government-designated experts in areas of chemical assessment or management from all UN regions. The Committee **reviews proposals** submitted by Parties to the Convention for listing new chemicals in accordance with **Article 8** of the Convention.

The initial 12 POPs

Annex A: Parties must take measures to **eliminate** the production and use of the chemicals listed under Annex A. Specific exemptions for use or production are listed in the Annex and apply only to Parties that register for them.

Annex B: Parties must take measures to **restrict** the production and use of the chemicals listed under Annex B in light of any applicable acceptable purposes and/or specific exemptions listed in the Annex.

Annex C: Parties must take measures to reduce the **unintentional release** of chemicals listed under Annex C with the goal of continuous minimization and, where feasible, ultimate elimination.

Annex A (Elimination)

●Aldrin	●Chlordane	●Dieldrin
●Endrin	●Heptachlor	●/▲Hexachlorobenzene
●Mirex	●Toxaphene	▲PCB

Annex B (Restriction)

●DDT

Annex C (Unintentional production)

■Polychlorinated dibenzo-*p*-dioxins and dibenzofurans

■Hexachlorobenzene ■PCB

●Pesticides / ▲Industrial chemicals / ■By-products

The 9 new POPs

At its fourth meeting in 2009, the COP decided to amend Annexes A, B and C of the Convention by adding the following chemicals:

Chemical	Annex	Specific exemptions / acceptable purposes
Alpha hexachlorocyclohexane ●/■	A	**Production**: none **Use**: none
Beta hexachlorocyclohexane ●/■	A	**Production**: none **Use**: none
Chlordecone ●	A	**Production**: none **Use**: none
Hexabromobiphenyl ▲	A	**Production**: none **Use**: none
Hexabromodiphenyl ether and heptabromodiphenyl ether (commercial octabromodiphenyl ether) ▲	A	**Production**: none **Use**: articles in accordance with the provisions of Part IV of Annex A
Lindane ●	A	**Production**: none **Use**: human health pharmaceutical for control of head lice and scabies as second line treatment
Pentachlorobenzene ●/▲/■	A and C	**Production**: none **Use**: none
Perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride ▲	B	**Production**: for the use below **Use**: acceptable purposes and specific exemptions in accordance with Part III of Annex B (see the full list on page 7)
Tetrabromodiphenyl ether and pentabromodiphenyl ether (commercial pentabromodiphenyl ether) ▲	A	**Production**: none **Use**: articles in accordance with the provisions of Part IV of Annex A

●Pesticides / ▲Industrial chemicals / ■By-products

List of acceptable purposes and specific exemptions for production and use of PFOS, its salts and PFOS-F

Acceptable purposes:

Photo‑imaging, photoresistant and anti-reflective coatings for semi-conductors, etching agent for compound semi-conductors and ceramic filters, aviation hydraulic fluids, metal plating (hard metal plating) in closed-loop systems only, certain medical devices (such as ethylene tetrafluoroethylene copolymer/ETFE layers and radio-opaque ETFE production, in‑vitro diagnostic medical devices, and CCD colour filters), fire‑fighting foam, insect baits for the control of leaf-cutting ants from *Atta spp*. and *Acromyrmex spp*.

Specific exemptions:

Photo masks in the semiconductor and liquid crystal display (LCD) industries, metal plating (hard metal plating, decorative plating), electric and electronic parts for some colour printers and colour copy machines, insecticides for control of red imported fire ants and termites, chemically driven oil production, carpets, leather and apparel, textiles and upholstery, paper and packaging, coatings and coating additives, rubber and plastics.

When listing new chemicals, Parties need to:

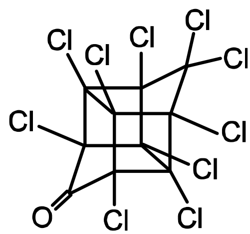
- Implement control measures for each chemical (Article 3 and 4);
- Develop and implement action plans for unintentionally produced chemicals (Article 5);
- Develop inventories of the chemicals' stockpiles (Article 6);
- Review and update the National Implementation Plan (Article 7);
- Include the new chemicals in the reporting (Article 15);
- Include the new chemicals in the programme for the effectiveness evaluation (Article 16).

Chlordecone

Listed under Annex A without specific exemptions

Chemical identity and properties

Chlordecone is chemically related to Mirex, a pesticide listed in Annex A of the Convention.



CAS No: 143-50-0
Trade name: Kepone® and GC-1189

POPs characteristics of chlordecone

Chlordecone is highly persistent in the environment, has a high potential for bioaccumulation and biomagnification and based on physico-chemical properties and modelling data, chlordecone can be transported for long distances. It is classified as a possible human carcinogen and is very toxic to aquatic organisms.

Use and production

Chlordecone is a synthetic chlorinated organic compound, which was mainly used as an agricultural pesticide. It was first produced in 1951 and commercially introduced in 1958. Currently, no use or production of the chemical is reported, as many countries have already banned its sale and use.

Replacement of chlordecone

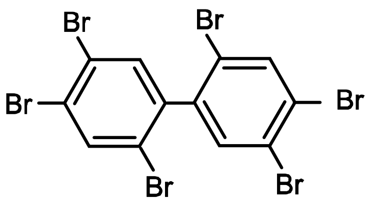
Alternatives to chlordecone exist and can be implemented inexpensively. Phasing out chlordecone further requires identifying and managing obsolete stockpiles and wastes.

Hexabromobiphenyl

Listed under Annex A without specific exemptions

Chemical identity and properties

Hexabromobiphenyl belongs to the group of polybrominated biphenyls, which are brominated hydrocarbons formed by substituting hydrogen with bromine in biphenyl.



CAS No: 36355-01-8
Trade name: FireMaster

POPs characteristics of hexabromobiphenyl

The chemical is highly persistent in the environment, highly bioaccumulative and has a strong potential for long-range environmental transport. It is classified as a possible human carcinogen and has other chronic toxic effects.

Use and production

Hexabromobiphenyl is an industrial chemical that has been used as a flame retardant, mainly in the 1970s. According to available information, hexabromobiphenyl is no longer produced or used in most countries due to restrictions under national and international regulations.

Replacement of hexabromobiphenyl

Alternatives to hexabromobiphenyl are available, so prohibiting its use and production is feasible and inexpensive.

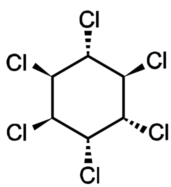
Alpha hexachlorocyclohexane and beta hexachlorocyclohexane

Listed under Annex A without specific exemptions

Chemical identity and properties

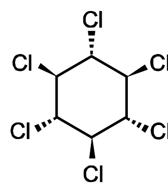
The technical mixture of hexachlorocyclohexane (HCH) contains mainly five forms of isomers, namely alpha-, beta-, gamma-, delta- and epsilon-HCH. Lindane is the common name for the gamma isomer of HCH.

alpha-HCH



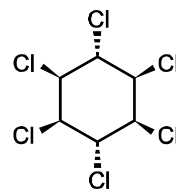
CAS No: 319-84-6

beta-HCH



CAS No: 319-85-7

Lindane (gamma-HCH)



CAS No: 58-89-9

POPs characteristics of alpha- and beta-HCH

Alpha- and beta-HCH are highly persistent in water in colder regions and may bioaccumulate and biomagnify in biota and arctic food webs. They are subject to long-range transport, are classified as potentially carcinogenic to humans and adversely affect wildlife and human health in contaminated regions.

Use and production

Use of alpha- and beta-HCH as insecticides was phased out years ago, but these chemicals have been produced as by-products of lindane. For each ton of lindane produced, around 6-10 tons of alpha- and beta-HCH are also produced. Therefore there are large stockpiles leading to site contamination.

Replacement of alpha- and beta HCH

As there is no intentional use of alpha- and beta-HCH, it is not required to identify alternatives.

Lindane

Listed under Annex A with a specific exemption for use as a human health pharmaceutical for control of head lice and scabies as second line treatment

Chemical identity and properties

See alpha- and beta hexachlorocyclohexane section (p.10).

POPs characteristics of lindane

Lindane is persistent, bioaccumulates easily in the food chain and bioconcentrates rapidly. There is evidence for long-range transport and toxic effects (immunotoxic, reproductive and developmental effects) in laboratory animals and aquatic organisms.

Use and production

Lindane has been used as a broad-spectrum insecticide for seed and soil treatment, foliar applications, tree and wood treatment and against ectoparasites in both veterinary and human applications.

The production of lindane has decreased rapidly in the last few years, due to regulations in several countries (also concerning its use and monitoring). However, a few countries are still known to produce it.

Replacement of lindane

Alternatives for lindane are generally available, except for use as a human health pharmaceutical to control head lice and scabies.

What is a "specific exemption"?

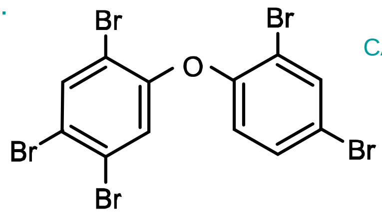
The Stockholm Convention provides obligations on elimination and restriction of chemicals listed in Annex A and B. The implementation of these obligations may be subject to specific exemptions in accordance with Article 4. Parties that have notified the Secretariat for registration of a specific exemption are allowed to continue to use or produce a chemical for a particular purpose.

Tetrabromodiphenyl ether and pentabromodiphenyl ether

Listed under Annex A with a specific exemption for use (recycling articles that contain these chemicals), in accordance with the provision in Part V of Annex A

Chemical identity and properties

Tetrabromodiphenyl ether and pentabromodiphenyl ether are the main components of commercial pentabromodiphenyl ether. They belong to a group of chemicals known as “polybromodiphenyl ethers” (PBDEs).



CAS No: 5436-43-1
60348-60-9

POPs characteristics of tetraBDE and pentaBDE

The commercial mixture of pentaBDE is highly persistent in the environment, bioaccumulative and has a potential for long-range environmental transport (it has been detected in humans throughout all regions). There is evidence of its toxic effects in wildlife, including mammals.

Use and production of polybromodiphenyl ethers

Polybromodiphenyl ethers including tetra-, penta-, hexa-, and heptaBDEs inhibit or suppress combustion in organic materials and therefore are used as additive flame retardants. The production of tetra- and pentaBDEs has ceased in certain regions of the world, while no production of hexa- and heptaBDEs is reported.

Replacement of tetraBDE and pentaBDE

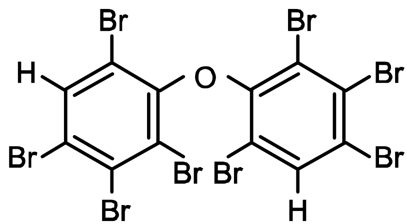
Alternatives are available and used to replace these substances in many countries, although they might also have adverse effects on human health and the environment. The identification and also handling of equipment and wastes containing brominated diphenyl ethers is considered a challenge.

Hexabromodiphenyl ether and heptabromodiphenyl ether

Listed under Annex A with a specific exemption for use (recycling articles that contain these chemicals), in accordance with the provision in Part IV of Annex A

Chemical identity and properties

Hexabromodiphenyl ether and heptabromodiphenyl ether are the main components of commercial octabromodiphenyl ether.



CAS No: 68631-49-2
207122-15-4
446255-22-7
207122-16-5

POPs characteristics of hexaBDE and heptaBDE

The commercial mixture of octaBDE is highly persistent, has a high potential for bioaccumulation and food-web biomagnification, as well as for long-range transport. The only degradation pathway is through debromination and producing other bromodiphenyl ethers.

Replacement of hexaBDE and heptaBDE

Alternatives generally exist. However, it is reported that many articles in use still contain these chemicals.

Polybromodiphenyl ethers: Debromination and precursors

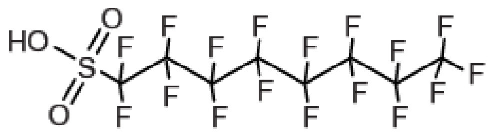
Polybromodiphenyl ethers can be subject to debromination, i.e. the replacement of bromine on the aromatic ring with hydrogen. Higher bromodiphenyl ether congeners may be converted to lower, and possibly more toxic, congeners. The higher congeners might therefore be precursors to the tetraBDE, pentaBDE, hexaBDE or heptaBDE.

Perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOS-F)

Listed under Annex B with acceptable purposes and specific exemptions

Chemical identity and properties

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 may contain PFOS impurities or substances that can result in PFOS, are members of the large family of perfluoroalkyl sulfonate substances.



PFOS
CAS No: 1763-23-1

POPs characteristics of PFOS

PFOS is extremely persistent and has substantial bioaccumulations and biomagnifying properties, although it does not follow the classic pattern of other POPs by partitioning into fatty tissues, but instead binds to proteins in the blood and the liver. It has a capacity to undergo long-range transport and also fulfills the toxicity criteria of the Stockholm Convention.

Use and production

PFOS is both intentionally produced and an unintended degradation product of related anthropogenic chemicals. The current intentional use of PFOS is widespread and includes: electric and electronic parts, fire fighting foam, photo imaging, hydraulic fluids and textiles. PFOS is still produced in several countries.

Replacement of PFOS

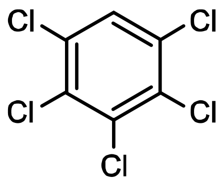
Alternatives to PFOS are available for some applications. However, this is not always the case in developing countries, where they still need to be phased in. Some applications like photo imaging, use for semi-conductors or aviation hydraulic fluids are considered as acceptable purposes, because for these, technically feasible alternatives to PFOS are not available to date.

Pentachlorobenzene (PeCB)

Listed under Annexes A and C without specific exemptions

Chemical identity and properties

PeCB belongs to a group of chlorobenzenes that are characterized by a benzene ring in which the hydrogen atoms are substituted by one or more chlorines.



CAS No: 608-93-5

POPs characteristics of PeCB

PeCB is persistent in the environment, highly bioaccumulative and has a potential for long-range environmental transport. It is moderately toxic to humans and very toxic to aquatic organisms.

Use and production

Previously, PeCB was used in PCB products, in dyestuff carriers, as a fungicide and a flame retardant. It might still be used as a chemical intermediate (e.g. for the production of quintozene). It is also produced unintentionally during combustion, thermal and industrial processes, and present under the form of impurities, in products such as solvents or pesticides.

Replacement of PeCB

PeCB production ceased several decades ago in the main producing countries, as efficient and cost-effective alternatives became available. In order to significantly reduce the unintentional production of PeCB, Best Available Techniques and Best Environmental Practices need to be applied.

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