Stockholm Convention on
Persistent Organic Pollutants (POPs)

The Nine New POPs

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

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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 for each chemical in **Risk Profiles** and **Risk Management Evaluations** available for download from the Convention's website (http://pops.int/poprc/).

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

Contact the Secretariat for more information: ssc@pops.int

Implications of listing new chemicals

Implications of listing new chemicals include the following:

- Implement control measures for each chemical (Article 3 and 4);
- Develop and implement action plans for unintentionally produced chemicals (Article 5);
- Develop inventories of stockpiles of the chemicals (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).

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

Acceptable purposes:

Photo-imaging, photo-resist and anti-reflective coatings for semi-conductor, etching agent for compound semi-conductor and ceramic filter, aviation hydraulic fluids, Metal plating (hard metal plating) only in closed-loop systems, 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 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 ant, and termites, chemically driven oil production, carpets, leather and apparel, textiles and upholstery, paper and packaging, coatings and coating additives, rubber and plastics

Amendments to Annex A, B, and C of the Convention

At its fourth meeting, the COP decided to list nine new chemicals in the following Annexes of the Convention:

Chemical	Annex	Specific exemption
Chlordecone●	A	**Production**: none **Use**: none
Hexabromobiphenyl▲	A	**Production**: none **Use**: none
Lindane●	A	**Production**: none **Use**: Human health pharmaceutical for control of head lice and scabies as second line treatment
Alpha hexachlorocyclohexane●/■	A	**Production**: none **Use**: none
Beta hexachlorocyclohexane●/■	A	**Production**: none **Use**: none
Tetrabromodiphenyl ether and pentabromodiphenyl ether ▲	A	**Production**: none **Use**: Articles in accordance with the provisions of Part IV of Annex A
Hexabromodiphenyl ether and heptabromodiphenyl ether ▲	A	**Production**: none **Use**: Articles in accordance with the provisions of Part IV of Annex A
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 box in page 15 for the list of exemptions)
Pentachlorobenzene●/▲/■	A and C	**Production**: none **Use**: none

●Pesticides / ▲Industrical chemicals / ■By-products

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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, **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 a global treaty to protect human health and the environment from POPs. It entered into force in 2004 and initially covered 12 chemicals. Currently, over 160 countries and one regional economic integration organization are Parties to the Stockholm Convention.

POPs Review Committee (POPRC)

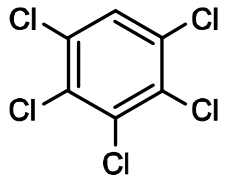
The **POPRC** consists of 31 government-designated experts in areas of chemical assessment or management from all UN regions. The Committee **reviews proposals** submitted by Parties to the Convention for listing new chemicals in accordance with **Article 8** of the Convention.

Pentachlorobenzene (PeCB)

Listed under Annex A without specific exemptions and under Annex C.

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

Use and production

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

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.

Replacement of PeCB

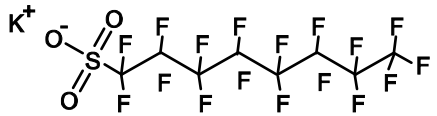
The production of PeCB ceased some decades ago in the main producer countries as efficient and cost-effective alternatives are available. Applying Best Available Techniques and Best Environmental Practices would significantly reduce the unintentional production of PeCB.

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.



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.

POPs characteristics of PFOS

PFOS is extremely persistent and has substantial bioaccumulating 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.

Replacement of PFOS

While alternatives to PFOS are available for some applications, this is not always the case in developing countries where existing alternatives may need to be phased in. For some applications like photo imaging, semi-conductor or aviation hydraulic fluids, technically feasible alternatives to PFOS are not available to date.

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 releases** of chemicals listed under Annex C with the goal of continuing minimization and, where feasible, ultimate elimination.

Annex A (Elimination)

●Aldrin, ●Chlordane, ●Dieldrin
●Endrin, ●Heptachlor, ●/▲Hexachlorobenzene
●Mirex, ●Toxaphene, ▲PCBs¨

Annex B (Restriction)

●DDT

Annex C (Unintentional production)

■Dioxin, ■Furan, ■Hexachlorobenzene, ■PCBs

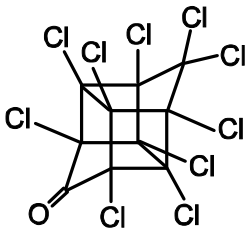
●Pesticides / ▲Industrical chemicals / ■By-products

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

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 introduced commercially in 1958. Currently, no use or production of the chemical is reported.

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.

Replacement of chlordecone

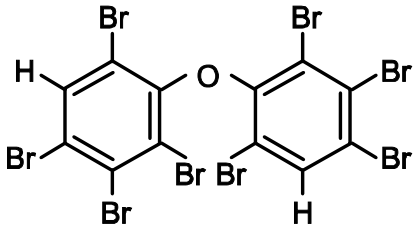
Alternatives to chlordecone exist and can be implemented inexpensively. Many countries have already banned its sale and use. The main objective to phase out chlordecone would be to identify and manage obsolete stockpiles and wastes.

Hexabromodiphenyl ether and heptabromodiphenyl ether

Listed under Annex A with a specific exemption for use as articles containing these chemicals for recycling 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

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 and there is no information about any current production. However, it is reported that many articles in use still contain these chemicals.

Debromination and precursors

Polybromodiphenyl ethers can be subject to debromination, i.e. the replacement of bromine on the aromatic ring with hydrogen.

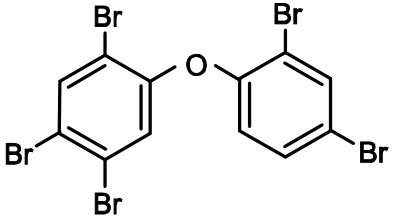
Higher bromodiphenyl ether congeners may be converted to lower, and possibly more toxic, congeners. The higher congeners might therefore be precursors to the tetraBDE, pentaBDE, hexaBDE, or heptaBDE.

Tetrabromodiphenyl ether and pentabromodiphenyl ether

Listed under Annex A with a specific exemption for use as articles containing these chemicals for recycling in accordance with the provision in Part IV of Annex A.

Chemical identity and properties

Tetrabromodiphenyl ether and pentabromodiphenyl ether are the main components of commercial pentabromodiphenyl ether.



CAS No: 40088-47-9
32534-81-9

POPs characteristics of tetraBDE and pentaBDE

Commercial mixture of pentaBDE is highly persistent in the environment, bioaccumulative and has a high potential for long-range environmental transport. These chemicals have been detected in humans in all regions. There is evidence of its potential for toxic effects in wildlife, including mammals.

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. Alternatives might not be available for use in military airplanes. The identification and also handling of equipment and wastes containing brominated diphenyl ethers is considered a challenge.

Polybromodiphenyl ethers

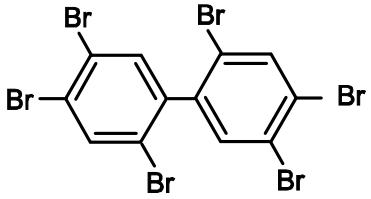
Polybromodiphenyl ether congeners including tetraBDE, pentaBDE, hexaBDE, and heptaBDE inhibit or suppress combustion in organic materials and therefore are used as additive flame retardants.

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

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.

POPs characteristics of hexabromobiphenyl

The chemical is highly persistent in the environment, highly bioaccumulative and has a strong possibility for long-range environmental transport. As hexabromobiphenyl is classified as a possible human carcinogen and has other chronic toxic effects, the Committee recommended its listing as a POP.

Replacement of hexabromobiphenyl

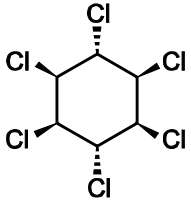
Alternatives are available for all uses of hexabromobiphenyl, so prohibiting its use and production is feasible and inexpensive. This chemical is already subject to several national and international regulations, restricting its use and production.

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

Lindane is the common name for the gamma isomer of hexachlorocyclohexane (HCH). Technical HCH is an isomeric mixture that contains mainly five forms, namely alpha-, beta-, gamma-, delta- and epsilon-HCH.



Lindane (gamma-HCH)

CAS No: 58-89-9

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 and only few countries are still known to produce lindane.

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.

Replacement of lindane

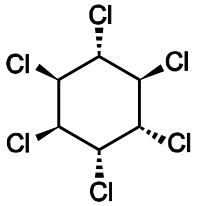
Alternatives for lindane are generally available, except for use as a human health pharmaceutical to control head lice and scabies. Regulations on the production, use and monitoring of lindane already exist in several countries.

Alpha hexachlorocyclohexane and beta hexachlorocyclohexane

Listed under Annex A without specific exemptions.

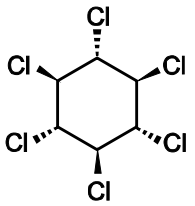
Chemical identity and properties

alpha-HCH



CAS No: 319-84-6

beta-HCH



CAS No: 319-85-7

Use and production

Although the intentional use of alpha- and beta-HCH as an insecticide was phased out years ago, these chemicals are still produced as unintentional by-products of lindane. For each ton of lindane produced, around 6-10 tons of the other isomers including alpha- and beta-HCH are created. Large stockpiles of alpha- and beta-HCH are therefore present in the environment.

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. These chemicals are subject to long-range transport, are classified as potentially carcinogenic to humans and adversely affect wildlife and human health in contaminated regions.

Replacement of alpha- and beta-HCH

Today, alpha- and beta-HCH are only produced unintentionally during the production of lindane. Releases also occur from stockpiles and contaminated sites.