



The international bromine industry organisation
Bromine Science and Environmental Forum (BSEF)
dossier on:

Considerations for Not Including Octabromodiphenyl
ether (OctaBDE) in Annex A of the Stockholm
Convention on Persistent Organic Pollutants or in
Annex 1 of the Protocol on Long Range Transport of
Persistent Air Pollutants

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BSEF is the international organisation of the bromine chemical industry, whose remit is to inform stakeholders and commission science on brominated chemicals such as flame retardants.

BSEF ▪ Bromine Science and Environmental Forum
Avenue de Cortenbergh, 118 ▪ 1000 Brussels ▪ Belgium ▪ Phone 32 2 733 93 70 ▪ Fax 32 2 735 60 63
▪ websites www.bsef.com ▪ www.firesafetyinfo.org
▪ E-mail mail@BSEF.com

The Bromine Science and Environmental Forum (BSEF) is the global representative of the bromine industry. Its members are the world's largest manufacturers of brominated flame retardants used mainly as plastic additives and in coatings for textiles to improve the fire safety of these products.

BSEF understands that the European Union will submit a dossier for technical review of Octa-BDE under the UNECE Protocol BSEF wishes to submit the following comments on Octa-BDE.

Introduction

Octabromodiphenyl ether (CAS Number 32536-52-0; OctaBDE) is the common name used for the commercial polybrominated diphenyl ether product that contains approximately 79% by weight of organically bound bromine. The term Polybrominated Diphenyl Ether (PBDE's) refers to a group of halogenated compounds formed by substituting hydrogen with bromine on a diphenyl ether molecule. In Europe, Octa-BDE is banned under the 24th amendment to the marketing and use Directive 76/769/EEC since 15 August 2004. As a result of declining demand, the sole US manufacturer of this product voluntarily ceased production in 2004. There is presently no known commercial production of this substance remaining in the US, Europe or the Pacific Rim. Until production was stopped, this substance was mainly used as flame retardant in ABS type plastics which were used in consumer and commercial electronics and office equipment. The manufacturing process for commercial OctaBDE resulted in a product that contains diphenyl ether molecules with varying degrees of bromination. Commercial OctaBDE only contained 30-35% (by weight) molecules with exactly 8 bromine atoms. The majority of the diphenylethers molecules contain 6-9 bromine atoms, with small (<0.1%) amounts of molecules with 5 bromine atoms.

The European Union has submitted a dossier to nominate OctaBDE for inclusion into Annex 1 of the Protocol to the Convention on Long-range Transboundary Air Pollution (LRTAP) on Persistent Organic Pollutants and to Annex "A" of the Stockholm Convention on Persistent Organic Pollutants. However, based on information presently available, Octabromodiphenyl ether (OctaBDE) does not meet the criteria for adding a new substance found in Annex D of the Stockholm Convention, or the criteria agreed too by the parties in Executive Body Decision 1998/2 under the UNECE LTRAP POPs protocol.

This dossier focuses specifically on the type of data and information required under paragraphs 1 and 2 of Annex D of the Stockholm Convention and Executive Body Decision 1998/2. The information in this dossier is derived primarily from the 2003 EU Risk Assessment Final Report on Octabromodiphenyl ether. Scientific information, derived from published sources available after publication of the EU Risk Assessment, are cited and referenced where appropriate.

1 Identification of the chemical

1.1 Names and registry numbers

Octabromodiphenyl ether, OctaBDE, OBDPE

1,1'-Diphenyl ether, octabromo-

Diphenyl ether, octabromo

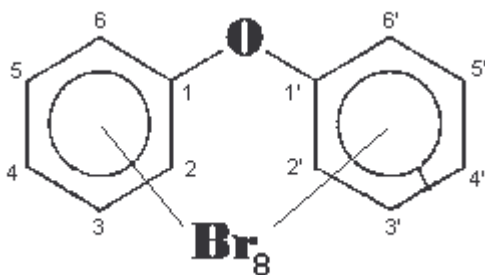
CAS No: 36355-01-8

EINECS No: 252-994-2

2 Structure

Chemical formula: $C_{12}H_2 Br_8 O$

Chemical structure:



Structural Formula source: [Brominated diphenylethers \(EHC 162, 1994\)](#)

Molecular weight: 801.3

2 Persistence

The atmospheric half life of OctaBDE is 76 days based on modelling data. The molecule is not expected to hydrolyze in the environment to any significant extent. Photolysis of OctaBDE has been demonstrated in laboratory experiments under conditions that are not typical of the environmental conditions where OctaBDE would be expected to be found. The EU risk assessment considered that OctaBDE would be strongly adsorbed to sediment and soil, but not susceptible to photodegradation to any significant extent. In fact, the Risk Assessment considered the rate of photodegradation to be effectively zero.

OctaBDE is not readily biodegradable under aerobic conditions. There is the potential, similar to some other halogenated aromatic compounds, that reductive debromination may occur under anaerobic conditions. However, the rate would be very slow and dependent upon site specific conditions that could either enhance or mitigate this process. The Risk Assessment considered the rate of biodegradation, by either aerobic or anaerobic processes, to be effectively zero.

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As a whole, it would appear that from a screening perspective the substance is likely to be sufficiently persistent to be of concern within the scope of both the Stockholm Convention and the UNECE LRTAP Protocol on POPs.

3 Bioaccumulation

All available data generated on OctaBDE, including tests on earthworms and fish, indicate that OctaBDE does not bioaccumulate. BSEF would be happy to share its data on this topic with the Secretariat.

From a screening perspective, it appears that OctaBDE is not likely to be sufficiently bioaccumulative to be of concern within the scope of either the Stockholm Convention or the UNECE LRTAP Protocol on POPs

4 Potential for long-range environmental transport

The potential for long range transport of a variety of PBDE's has been evaluated by Wania et al in their report "Assessing the Long-Range Transport Potential of Polybrominated Diphenyl Ethers: A Comparison of Four Multimedia Models". This study evaluated all the relevant physical and chemical properties of a range of PBDE's from the lower Brominated to the fully Brominated.

Their conclusions state "Highly brominated congeners such as Octabromo Diphenylether and Decabromo Diphenyl Ether are very likely not subject to significant Long Range Transport. These chemicals are so involatile that in the atmosphere they should exist exclusively sorbed to suspended particles. Long Range Transport potential is then controlled by the Long Range Transport behaviour of the particles that they are associated with."

This report goes on and compares which PBDE's have been found in remote areas far from known sources. The authors conclude that observations in the environment confirm what the models have shown. Data gathered since that time continues to show the same types of patterns. Namely that the lower Brominated PBDE's are the most commonly found PBDE's in remote areas. This despite the fact that the volume of DecaBDE produced and used over the years greatly exceeds that volume of the commercial PentaBDE product.

Based on the available modelling data and evidence in remote areas the potential for Long Range Transport is not significant for Brominated Diphenyl Ethers with 8 or more bromine atoms.

5 Adverse effects

There is a substantial number of eco and mammalian toxicology studies that have been performed on the commercial form of OctaBDE (which is actually a material containing only about 30-35% by weight of molecules with 8 bromine atoms). All of the studies available at the

time of the EU risk assessment were reviewed. While there has been an ongoing toxicological study of various PBDE's since that time, these have focussed on the congeners more commonly found in the environment and associated with tetra, penta and decaBDE.

The Environmental portion of the EU Risk Assessment concluded that there was no need for further information, or testing, for risk reduction measures beyond those already in place for risks to the aquatic compartment, the terrestrial compartment or the atmospheric compartment for the commercial OctaBDE. There was an identified need for risk reduction in the environment near facilities (but not remote from them) that processed this substance. This was related to concerns for "secondary poisoning" (contamination in the food chain), arising from the presence of one of the lower brominated (hexaBDE) congeners in commercial OctaBDE but not OctaBDE itself. There were also some uncertainties that needed additional information in order to reach a conclusion regarding risk of secondary poisoning from other sources of OctaBDE in the local and regional area that would require further testing. It is important to note that there was no concern expressed in regard to secondary poisoning on a larger, more remote (continental) scale.

The Human Health portion of the risk assessment identified occupational exposures in the manufacturing and use of OctaBDE as a possible concern and recommended risk reduction measures. Since OctaBDE is no longer made or used in the EU (or at the site of production in the US), this possible risk has been eliminated. There was no need for risk reduction identified for consumers. With regards to exposure of humans via the environment, although risk reduction measures were not recommended, the need for additional information was highlighted. Similarly there is a possible environmental risk related to potential exposure in areas relatively close to sources of release to the environment (both local and regional), but not to those exposed more remotely (i.e. on a continental basis).

6 Statement of the reasons for low concern

Octabromodiphenyl ether is very persistent in the environment. However, as stated in the EU Risk Assessment "The information available indicates that octabromodiphenyl ether has a low potential for bioconcentration and bioaccumulation." (See page 87 of the risk assessment). Unlike lesser brominated diphenyl ethers, due to its physical and chemical properties, OctaBDE is not readily transported long distances in air far from its sources. While Octabromodiphenyl ether has been shown to cause adverse effects in both eco and mammalian toxicological studies, that have relevance to environmental species and humans, these are generally at levels that are far higher than those actually encountered. In those circumstances where concerns were identified in the EU risk assessment, these were for receptors (man or animal) that were relatively close to the exposure sources. No concerns were identified for exposures that might occur at a distance from sources of exposure (i.e. on a continental basis).

Production and use of OctaBDE has ceased in all highly developed countries and there is no information that indicates it is being used or produced in developing countries.

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Under the circumstances, with the elimination of production, the low potential for bioaccumulation, the low potential for Long Range Transport and the absence of a concern for exposures (except those relatively close to the source), OctaBDE should be considered a low priority substance and not considered for including in Annex A of the Stockholm Convention on Persistent Organic Pollutants or in Annex 1 of the Protocol on Long Range Transport of Persistent Air Pollutants it appears that OctaBDE
