



# Polybromodiphenyl ethers (Decabromodiphenyl ether)

## General Information

### Key Points

#### **Fire**

- Non flammable
- Degrades to lower brominated diphenyl ethers when exposed to UV light and when heated to decomposition
- In the event of a fire involving polybromodiphenyl ethers, use fine water spray and normal fire kit with breathing apparatus

#### **Health**

- Decabromodiphenyl ether (Deca-BDE) has a low acute toxicity following inhalation, ingestion or dermal exposure
- Likely targets for toxicity of lower brominated polybromodiphenyl ether (PBDEs) in humans include the liver and thyroid

#### **Environment**

- Avoid release into the environment
- Inform Environment Agency of substantial incidents

## Background

Polybromodiphenyl ethers (PBDEs) are a large group of 209 compounds with similar chemical structures. In the past, three commercial PBDEs, namely penta-BDE, octa-BDE and deca-BDE, have been available in the UK for use as flame retardants. Only deca-BDE is currently commercially available since the marketing and use of penta- and octa-BDE was banned throughout the EU in 2004 due to the potential to bioaccumulate in the environment.



Deca-BDE does not occur naturally and is only produced industrially. Flame retardants such as deca-BDE are added to materials to increase their resistance to burning. Deca-BDE is used in electrical equipment, including casings for televisions, computers, audio/visual equipment and mobile phones; in textiles for furnishings and upholstery such as sofas, office chairs, curtains and in materials such as communication cables, pipes and lamp sockets.



The toxicity of PBDEs varies, with deca-BDE being the least toxic. Deca-BDE can degrade in the environment into other PBDEs such as nona- and octa-BDE, which may have greater toxicity. Such BDEs are not readily broken down in the environment and may be present at low

levels in soils and sediments for several years. Lower brominated PBDEs such as penta-BDE may be present at low levels in air, sediments and food animals such as fish. Individuals may therefore be exposed by inhalation or ingestion. Higher brominated PBDEs such as deca-BDE may also be inhaled or ingested, but are much less likely to pass into the blood stream. PBDEs are not likely to be absorbed through the skin following dermal contact.



There is very little information regarding adverse health effects in humans following exposure to PBDEs. Studies in animals have shown that the toxicity of deca-BDE by all routes of exposure is low. Experimental animals exposed to lower-brominated PBDEs have shown some changes in thyroid and liver function. Some impairment of nervous system behaviour, learning and memory have also been observed.

Children exposed to PBDEs would be expected to show similar health effects to adults. Developing infants may be more susceptible to effects of PBDEs on the nervous system and thyroid than adults. Lower-brominated PBDEs accumulate in fat and breast milk and may be passed from the mother to infants during feeding.

Due to the lack of human data and the limited data in animals, it is not known whether deca-BDE causes cancer therefore the International Agency for Research on Cancer (IARC) considered it as being not classifiable (group 3).

## Frequently Asked Questions

### ***What is polybromodiphenyl ethers?***

Polybromodiphenyl ethers (PBDEs) are a large group of 209 compounds with similar chemical structures. Decabromodiphenyl ether (deca-BDE) is now the only commercially available PBDE for use as a flame retardant in the EU.

### ***How does polybromodiphenyl ethers get into the environment?***

PBDEs such as deca-BDE are flame retardants which are present in many household items. Some items which may contain deca-BDE include casings of televisions, computers and audio/visual equipment, and upholstery such as sofas and curtains. These flame retardants may be released (or leach-out) in small amounts from any material which contains them as particles or dust. PBDEs are not readily broken down in the environment and may be present at low levels in soils and sediments for several years.

### ***How will I be exposed to does polybromodiphenyl ethers?***

Lower brominated PBDEs such as tetra-BDE and penta-BDE are persistent in the environment. They have been used in the past and may be present at low levels in air, sediments and food animals such as fish. Individuals may therefore be exposed to these by inhalation or ingestion. Higher brominated PBDEs such as deca-BDE may also be inhaled or ingested, but are much less likely to pass into the blood stream. PBDEs are not likely to be absorbed through the skin following dermal contact.

### ***If there is does polybromodiphenyl ethers in the environment will I have any adverse health effects?***

The presence of polybromodiphenyl ethers in the environment does not always lead to exposure. Clearly, in order for it to cause any adverse health effects you must come into contact with it. You may be exposed by breathing, eating, or drinking the substance or by skin contact. Following exposure to any chemical, the adverse health effects you may encounter depend on several factors, including the amount to which you are exposed (dose), the way you are exposed, the duration of exposure, the form of the chemical and if you were exposed to any other chemicals.

There is very little information regarding adverse health effects in humans following exposure to PBDEs. Studies in animals have shown that the toxicity of deca-BDE by all routes of exposure is low. Experimental animals exposed to lower-brominated PBDEs have shown some changes in thyroid and liver function.

### ***Can polybromodiphenyl ethers cause cancer?***

There is no evidence to suggest that exposure to PBDEs would cause cancer in humans. Due to the lack of human data and the limited data in animals, the International Agency for Research on Cancer (IARC) categorised deca-BDE as not being classifiable as to its carcinogenicity to humans (group 3). PBDEs are also not classified as carcinogens in the EU.

### ***Does polybromodiphenyl ethers affect children or damage the unborn child?***

Children will be affected by PBDEs in the same way as adults. Developing infants may be more susceptible to effects of PBDEs on the nervous system and thyroid than adults. There is some evidence from animal studies to suggest that exposure to lower-brominated PBDEs during development may be associated with some impairment of nervous system behaviour, learning and memory. Lower-brominated PBDEs accumulate in fat and breast milk and may

therefore be passed from the mother to infants during feeding. There is no evidence to suggest that exposure to deca-BDE can affect the health of the unborn child.

***What should I do if I am exposed to polybromodiphenyl ethers?***

It is very unlikely that the general population will be exposed to a level of polybromodiphenyl ethers high enough to cause adverse health effects.