



## POLYBROMINATED DIPHENYL ETHERS

### What are polybrominated diphenyl ethers?

Polybrominated diphenyl ethers (PBDEs) are chemicals that resist catching fire. PBDEs are added to plastics and foam to make them hard to burn. These chemicals can leave these products and enter the environment.

### Where can PBDEs be found and how are they used?

Some PBDE mixtures, called decaBDEs, are made in many places around the world. Another mixture, called pentaBDEs, is made only in the United States. Brominated PBDEs are found at low levels in air, sediments, animals, and food and levels in blood, breast milk, and body fat show that most people are exposed to them. PBDE levels in people are higher in those living in the United States than in other parts of the world.

### How can people be exposed to PBDEs?

You could be exposed to PBDEs through:

- **Breathing** air containing PBDEs. The general population is exposed to very low levels as PBDEs in the air. Indoor concentrations can lead to a slightly higher exposure, especially in areas with computer equipment, television, and other electronic equipment. Concentrations that people are exposed to during daily life are typically well below what may cause health problems.
- **Drinking** PBDEs in breast milk. Nursing babies can be exposed in this way. PBDEs can be found in water but this is unusual.
- **Eating** PBDEs in fish or wildlife from polluted areas. Children could eat dirt containing PBDEs in areas near waste sites.
- **Touching** PBDEs on the job if you work where they are used or recycled. If you are exposed at work, you could carry PBDEs home on your clothes.
- **Eye contact** if you touch PBDEs with your hands, then rub your eyes.

### How do PBDEs work?

PBDEs enter and leave your body depending on their chemical structures. If you swallow food, water, or soil containing PBDEs, some enter your body through the lungs and stomach and go into the blood. If you touch soil containing PBDEs at a waste site, it is highly unlikely that they would pass through your skin into the blood. Once PBDEs are in your body, they might change into breakdown products called metabolites.

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# Frequently Asked Questions

Some PBDEs might leave your body in waste matter. Small amounts may leave in the urine in a few days. Other PBDEs might get stored in body fat for many years. PBDEs stored in body fat can be passed from mother to child in breast milk and from the mother to the unborn baby.

## **How can PBDEs affect my health?**

There is no definite information on health effects of PBDEs in people. Studies were done on rats and mice. These animals ate food with moderate amounts of PBDEs for a few days. Effects occurred in the thyroid gland. Other rats and mice ate smaller amounts for weeks or months. In these animals, the thyroid and liver were affected. Large differences were seen depending on the type of PBDEs eaten.

In animals, some studies suggest that high levels of PBDEs may have neurobehavioral effects. This means the way the brain affects emotions, behavior and learning. The immune system in animals may also be affected. Animal studies were also done on exposure to PBDEs in the womb and through nursing. The results showed effects on the thyroid. They also showed neurobehavioral effects in newborn animals. Birth defects did not occur. It is not known if PBDEs can cause birth defects in children.

We do not know if PBDEs can cause cancer in humans. Rats and mice that throughout their lives ate food with one type of PBDE all their lives developed liver tumors. Based on this evidence, some PBDEs have been named as possible cancer-causing substances. Other PBDEs are named as cancer causing substances.

## **How is PBDE poisoning treated?**

There is no treatment just for PBDE poisoning. A doctor will treat the symptoms based on the exposure.

## **What should I do if exposed to PBDEs?**

- **If you touch PBDEs**, take off your clothes. Wash with soap and water.
- **If you get PBDEs in your eyes**, flush with clean water for 15 minutes. Get medical help right away.
- **If you eat or drink PBDEs**, get medical help right away.

## **What factors limit use or exposure to PBDEs?**

You may be exposed to PBDEs by eating fish or wildlife from polluted areas. If you live near a waste site, do not let your children play in the dirt. Also keep children from eating dirt. Hands should be washed often.

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If you work where PBDEs are used or made, shower and change clothes before going home. Keep your work clothes away from other clothes. Also, do not wash your work clothes with other clothes.

### **Is there a medical test to show whether I've been exposed to PBDEs?**

There are tests that can show PBDEs in blood, body fat, and breast milk. These tests cannot show the amount or type of PBDEs to which you were exposed. They also cannot tell how long you were exposed. They cannot tell if there will be harmful effects.

### **Technical information for PBDEs**

CAS Number: 2,2',4,4' tetrabromodiphenyl ether (BDE 47) - 5436-43-1

Chemical Formula:  $C_{12}H_{(9-0)}Br_{(1-10)}O$  is the general formula for the group.

2,2',4,4',5 pentabromodiphenyl ether (BDE 99) - 60328-60-9

2,2',4,4',6 pentabromodiphenyl ether (BDE 100) - 189084-64-8

2,2',4,4',5,5' hexabromobiphenyl (255 HBB) - 59080-40-9

2,2',4,4',5,5' hexabromobiphenyl ether (BDE 153) - 68631-49-2

Carcinogenicity (EPA): PBDEs have not been classified by the EPA. The International Agency for Research on Cancer (IARC) classified PBBs as "possibly carcinogenic to humans".

MCL (Drinking Water): There is no MCL for PBDEs.

OSHA Standards: There are no workplace standards for PBDEs.

NIOSH Standards: There are no workplace standards for PBDEs.

### **Resources**

Agency for Toxic Substances and Disease Registry (ATSDR). 2017. Toxicological profile for PBBs and PBDEs. Atlanta, GA: U.S. Department of Health and Human Services. <https://wwwn.cdc.gov/TSP/ToxProfiles/ToxProfiles.aspx?id=901&tid=183>

American Conference of Governmental Industrial Hygienists (ACGIH). 2003. Guide to Occupational Exposure Values. Cincinnati, OH.

*NIOSH Pocket Guide to Chemical Hazards*. 2003. Atlanta, GA: U.S. Department of Health and Human Services.

New Jersey Department of Health and Senior Services, Right to Know Fact Sheets, p-Bromodiphenyl ether – <http://nj.gov/health/eoh/rtkweb/documents/fs/2966.pdf>

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