

# Flame Retardant Standards

2011-  
2012

New  
HO-PBDEs &  
HO-PBCDEs,  
Organophosphates



AccuStandard®

# Brominated Flame Retardants in the Environment

Brominated Flame Retardants (BFRs) such as polybrominated diphenyl ethers (PBDEs) and hexabromocyclododecane (HBCD) have become ubiquitous global environmental contaminants because of their widespread use in numerous household and commercial products, such as polyurethane furniture foam, carpet, high impact cases, circuit boards, appliances, electrical equipment, polystyrene foams, and backcoating of fabrics. They have been detected in sediments, biota, house dust, sewage sludge, air, water samples, and human and wildlife tissues. In the past years an impressive amount of information has become accessible on the persistence, as well as bioaccumulative and toxic properties of PBDEs and HBCD.

There are 209 congeners of PBDEs. They are produced industrially as mixtures (designated penta-BDE, octa-BDE, and deca-BDE). Some PBDEs break down further in the environment and in the body to other PBDEs and to other compounds. AccuStandard has synthesized 205 of the 209 congeners, plus 30 of their hydroxy and 30 of their methoxy metabolites.

AccuStandard has separated the three major constituents of technical mixtures of HBCD (alpha, beta, gamma). The individual three stereoisomers, as well as a technical mixture, are available as chemical reference standards at AccuStandard.

In addition, AccuStandard offers a wide variety of PBDE mixtures and calibration sets which are designed for US EPA and International PBDE monitoring. Standards of branded technical products such as Bromkal™ and Firemaster™, and many other industrial flame retardants can also be requested. Fluorinated PBDEs, Bromobiphenyls, Bromophenols and Bromoanisols add to the increasing number of brominated compounds available through AccuStandard.

Other Industrial BFRs have come to the attention of European Pollution Control Authorities who have initiated a study to substantially reduce the release of at least 5 of the 21 targeted "prioritized" BFRs.

Upon special request, compounds can be offered in various concentrations and mixes, or as neat materials. Custom standards are an economical and time saving way to have a standard prepared for your individual needs. To make an online Custom Quotes Request, go to [AccuStandard.com](http://AccuStandard.com).

## Product Highlights

*Latest list of  
205 PBDE Congeners*

*Latest list of  
60 PBDE Metabolites  
(Hydroxy & Methoxy  
derivatives)*

*Methods  
EPA 1614  
EPA 527  
ISO/DIS 22032*

*Fluorinated PBDE  
Congeners (ISTD)*

*New PBCDE Metabolites*

*Bromobiphenyl  
Congeners*

*Bromophenols and  
Bromoanisoles*

*Industrial  
Flame Retardants \**

*New Organophosphates (OP)*

## Table of Contents

<b>PBDE Congeners Updated</b>	<b>1-3</b>
<b>Tech Grade PBDEs</b>	<b>4</b>
<b>PBDE Mixtures (including EPA Method 527)</b>	<b>4</b>
<b>ISO/DIS 22032 Calibration Curve Set</b>	<b>4</b>
<b>EPA Method 1614</b>	<b>5</b>
<b>PBDE Metabolites</b>	<b>6</b>
<b>Fluorinated PBDE Congeners</b>	<b>7</b>
<b>PBCDE Metabolites New</b>	<b>8</b>
<b>Bromobiphenyl Congeners</b>	<b>9</b>
<b>Bromophenols</b>	<b>9</b>
<b>Bromoanisoles</b>	<b>9</b>
<b>HBCD Isomers</b>	<b>9</b>
<b>Industrial Flame Retardants</b>	<b>10-13</b>
<b>Bromine Containing FRs</b>	<b>10-11</b>
<b>More Commercial Grade &amp; Pure BFRs</b>	<b>12</b>
<b>Organophosphate FRs New</b>	<b>13</b>
<b>Chlorine Containing FRs</b>	<b>13</b>

\* Some of the Industrial Flame Retardants were specially selected by Governmental Authorities for their significance with regards to ecotoxicity, bioconcentration and bioaccumulation.

# Polybromodiphenyl Ether (PBDEs) Congeners

Solutions in 1 mL

Compound	CAS No.	Conc.	Solvent	Cat. No.
2-Bromodiphenyl ether	7025-06-1	50 µg/mL	Isooctane	BDE-001S
3-Bromodiphenyl ether	6876-00-2	50 µg/mL	Isooctane	BDE-002S
4-Bromodiphenyl ether	101-55-3	50 µg/mL	Isooctane	BDE-003S
2,2'-Dibromodiphenyl ether	51452-87-0	50 µg/mL	Isooctane	BDE-004S
2,3-Dibromodiphenyl ether	446254-14-4	50 µg/mL	Isooctane	BDE-005S
2,3'-Dibromodiphenyl ether	147217-72-9	50 µg/mL	Isooctane	BDE-006S
2,4-Dibromodiphenyl ether	171977-44-9	50 µg/mL	Isooctane	BDE-007S
2,4'-Dibromodiphenyl ether	147217-71-8	50 µg/mL	Isooctane	BDE-008S
2,5-Dibromodiphenyl ether	33513-66-3	50 µg/mL	Isooctane	BDE-009S
2,6-Dibromodiphenyl ether	51930-04-2	50 µg/mL	Isooctane	BDE-010S
3,3'-Dibromodiphenyl ether	6903-63-5	50 µg/mL	Isooctane	BDE-011S
3,4-Dibromodiphenyl ether	189084-59-1	50 µg/mL	Isooctane	BDE-012S
3,4'-Dibromodiphenyl ether	83694-71-7	50 µg/mL	Isooctane	BDE-013S
3,5-Dibromodiphenyl ether	46438-88-4	50 µg/mL	Isooctane	BDE-014S
4,4'-Dibromodiphenyl ether	2050-47-7	50 µg/mL	Isooctane	BDE-015S
2,2',3-Tribromodiphenyl ether	147217-74-1	50 µg/mL	Isooctane	BDE-016S
2,2',4-Tribromodiphenyl ether	147217-75-2	50 µg/mL	Isooctane	BDE-017S
2,2',5-Tribromodiphenyl ether	407606-55-7	50 µg/mL	Isooctane	BDE-018S
2,2',6-Tribromodiphenyl ether	147217-73-0	50 µg/mL	Isooctane	BDE-019S
2,3,3'-Tribromodiphenyl ether	147217-76-3	50 µg/mL	Isooctane	BDE-020S
2,3,4-Tribromodiphenyl ether	337513-67-4	50 µg/mL	Isooctane	BDE-021S
2,3,4'-Tribromodiphenyl ether	446254-15-5	50 µg/mL	Isooctane	BDE-022S
2,3,5-Tribromodiphenyl ether	446254-16-6	50 µg/mL	Isooctane	BDE-023S
2,3,6-Tribromodiphenyl ether <b>New</b>		50 µg/mL	Isooctane	BDE-024S
2,3',4-Tribromodiphenyl ether	147217-77-4	50 µg/mL	Isooctane	BDE-025S
2,3',5-Tribromodiphenyl ether	337513-75-4	50 µg/mL	Isooctane	BDE-026S
2,3',6-Tribromodiphenyl ether	337513-53-8	50 µg/mL	Isooctane	BDE-027S
2,4,4'-Tribromodiphenyl ether	41318-75-6	50 µg/mL	Isooctane	BDE-028S
2,4,5-Tribromodiphenyl ether	337513-56-1	50 µg/mL	Isooctane	BDE-029S
2,4,6-Tribromodiphenyl ether	155999-95-4	50 µg/mL	Isooctane	BDE-030S
2,4',5-Tribromodiphenyl ether	65075-08-3	50 µg/mL	Isooctane	BDE-031S
2,4',6-Tribromodiphenyl ether	189084-60-4	50 µg/mL	Isooctane	BDE-032S
2',3,4-Tribromodiphenyl ether	147217-78-5	50 µg/mL	Isooctane	BDE-033S
2',3,5-Tribromodiphenyl ether	446254-17-7	50 µg/mL	Isooctane	BDE-034S
3,3',4-Tribromodiphenyl ether	147217-80-9	50 µg/mL	Isooctane	BDE-035S
3,3',5-Tribromodiphenyl ether	147217-79-6	50 µg/mL	Isooctane	BDE-036S
3,4,4'-Tribromodiphenyl ether	147217-81-0	50 µg/mL	Isooctane	BDE-037S
3,4,5-Tribromodiphenyl ether	337513-54-9	50 µg/mL	Isooctane	BDE-038S
3,4',5-Tribromodiphenyl ether		50 µg/mL	Isooctane	BDE-039S
2,2',3,3'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-040S
2,2',3,4-Tetrabromodiphenyl ether	337513-68-5	50 µg/mL	Isooctane	BDE-041S
2,2',3,4'-Tetrabromodiphenyl ether	446254-18-8	50 µg/mL	Isooctane	BDE-042S
2,2',3,5-Tetrabromodiphenyl ether	446254-19-9	50 µg/mL	Isooctane	BDE-043S
2,2',3,5'-Tetrabromodiphenyl ether	446254-20-2	50 µg/mL	Isooctane	BDE-044S
2,2',3,6-Tetrabromodiphenyl ether <b>New</b>		50 µg/mL	Isooctane	BDE-045S
2,2',3,6'-Tetrabromodiphenyl ether	446254-22-4	50 µg/mL	Isooctane	BDE-046S
2,2',4,4'-Tetrabromodiphenyl ether	5436-43-1	50 µg/mL	Isooctane	BDE-047S
2,2',4,5-Tetrabromodiphenyl ether	337513-55-0	50 µg/mL	Isooctane	BDE-048S
2,2',4,5'-Tetrabromodiphenyl ether	243982-82-3	50 µg/mL	Isooctane	BDE-049S
2,2',4,6-Tetrabromodiphenyl ether	446254-23-5	50 µg/mL	Isooctane	BDE-050S
2,2',4,6'-Tetrabromodiphenyl ether	189084-57-9	50 µg/mL	Isooctane	BDE-051S
2,2',5,5'-Tetrabromodiphenyl ether	446254-24-6	50 µg/mL	Isooctane	BDE-052S
2,2',5,6-Tetrabromodiphenyl ether	446254-25-7	50 µg/mL	Isooctane	BDE-053S
2,2',6,6'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-054S
2,3,3',4-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-055S
2,3,3',4'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-056S
2,3,3',5-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-057S
2,3,3',5'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-058S
2,3,3',6-Tetrabromodiphenyl ether <b>New</b>		50 µg/mL	Isooctane	BDE-059S
2,3,4,4'-Tetrabromodiphenyl ether	446254-31-5	50 µg/mL	Isooctane	BDE-060S
2,3,4,5-Tetrabromodiphenyl ether	446254-32-6	50 µg/mL	Isooctane	BDE-061S
2,3,4,6-Tetrabromodiphenyl ether	446254-33-7	50 µg/mL	Isooctane	BDE-062S
2,3,4',5-Tetrabromodiphenyl ether	446254-34-8	50 µg/mL	Isooctane	BDE-063S
2,3,4',6-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-064S
2,3,5,6-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-065S
2,3',4,4'-Tetrabromodiphenyl ether	189084-61-5	50 µg/mL	Isooctane	BDE-066S
2,3',4,5-Tetrabromodiphenyl ether	446254-37-1	50 µg/mL	Isooctane	BDE-067S
2,3',4,5'-Tetrabromodiphenyl ether	446254-38-2	50 µg/mL	Isooctane	BDE-068S
2,3',4,6-Tetrabromodiphenyl ether	327185-09-1	50 µg/mL	Isooctane	BDE-069S
2,3',4',5-Tetrabromodiphenyl ether	446254-39-3	50 µg/mL	Isooctane	BDE-070S
2,3',4',6-Tetrabromodiphenyl ether	189084-62-6	50 µg/mL	Isooctane	BDE-071S
2,3',5,5'-Tetrabromodiphenyl ether	446254-40-6	50 µg/mL	Isooctane	BDE-072S
2,3',5',6-Tetrabromodiphenyl ether	446254-41-7	50 µg/mL	Isooctane	BDE-073S
2,4,4',5-Tetrabromodiphenyl ether	446254-42-8	50 µg/mL	Isooctane	BDE-074S
2,4,4',6-Tetrabromodiphenyl ether	189084-63-7	50 µg/mL	Isooctane	BDE-075S
2',3,4,5-Tetrabromodiphenyl ether	446254-43-9	50 µg/mL	Isooctane	BDE-076S
3,3',4,4'-Tetrabromodiphenyl ether	93703-48-1	50 µg/mL	Isooctane	BDE-077S
3,3',4,5-Tetrabromodiphenyl ether	446254-45-1	50 µg/mL	Isooctane	BDE-078S

Continued on next page

# Polybromodiphenyl Ether (PBDEs) Congeners

Solutions in 1 mL

Compound	CAS No.	Conc.	Solvent	Cat. No.
3,3',4,5'-Tetrabromodiphenyl ether	446254-48-4	50 µg/mL	Isooctane	BDE-079S
3,3',5,5'-Tetrabromodiphenyl ether	103173-66-6	50 µg/mL	Isooctane	BDE-080S
3,4,4',5'-Tetrabromodiphenyl ether	446254-50-8	50 µg/mL	Isooctane	BDE-081S
2,2',3,3',4-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-082S
2,2',3,3',5-Pentabromodiphenyl ether	446254-51-9	50 µg/mL	Isooctane	BDE-083S
2,2',3,3',6-Pentabromodiphenyl ether <b>New</b>		50 µg/mL	Isooctane	BDE-084S
2,2',3,4,4'-Pentabromodiphenyl ether	182346-21-0	50 µg/mL	Isooctane	BDE-085S
2,2',3,4,5-Pentabromodiphenyl ether	446254-53-1	50 µg/mL	Isooctane	BDE-086S
2,2',3,4,5'-Pentabromodiphenyl ether	446254-54-2	50 µg/mL	Isooctane	BDE-087S
2,2',3,4,6-Pentabromodiphenyl ether	446254-55-3	50 µg/mL	Isooctane	BDE-088S
2,2',3,4,6'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-089S
2,2',3,4',5-Pentabromodiphenyl ether	446254-57-5	50 µg/mL	Isooctane	BDE-090S
2,2',3,4',6-Pentabromodiphenyl ether <b>New</b>		50 µg/mL	Isooctane	BDE-091S
2,2',3,5,5'-Pentabromodiphenyl ether	446254-59-7	50 µg/mL	Isooctane	BDE-092S
2,2',3,5,6-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-093S
2,2',3,5,6'-Pentabromodiphenyl ether	446254-61-1	50 µg/mL	Isooctane	BDE-094S
2,2',3,5',6-Pentabromodiphenyl ether <b>New</b>		50 µg/mL	Isooctane	BDE-095S
2,2',3,6,6'-Pentabromodiphenyl ether <b>New</b>		50 µg/mL	Isooctane	BDE-096S
2,2',3',4,5-Pentabromodiphenyl ether	446254-64-4	50 µg/mL	Isooctane	BDE-097S
2,2',3',4,6-Pentabromodiphenyl ether	38463-82-0	50 µg/mL	Isooctane	BDE-098S
2,2',4,4',5-Pentabromodiphenyl ether	60348-60-9	50 µg/mL	Isooctane	BDE-099S
2,2',4,4',6-Pentabromodiphenyl ether	189084-64-8	50 µg/mL	Isooctane	BDE-100S
2,2',4,5,5'-Pentabromodiphenyl ether	446254-65-5	50 µg/mL	Isooctane	BDE-101S
2,2',4,5,6'-Pentabromodiphenyl ether	446254-66-6	50 µg/mL	Isooctane	BDE-102S
2,2',4,5',6-Pentabromodiphenyl ether	446254-67-7	50 µg/mL	Isooctane	BDE-103S
2,2',4,6,6'-Pentabromodiphenyl ether	446254-68-8	50 µg/mL	Isooctane	BDE-104S
2,3,3',4,4'-Pentabromodiphenyl ether	373594-78-6	50 µg/mL	Isooctane	BDE-105S
2,3,3',4,5-Pentabromodiphenyl ether	446254-69-9	50 µg/mL	Isooctane	BDE-106S
2,3,3',4',5-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-107S
2,3,3',4,5'-Pentabromodiphenyl ether	446254-71-3	50 µg/mL	Isooctane	BDE-108S
2,3,3',4,6-Pentabromodiphenyl ether	446254-72-4	50 µg/mL	Isooctane	BDE-109S
2,3,3',4',6-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-110S
2,3,3',5,5'-Pentabromodiphenyl ether	446254-74-6	50 µg/mL	Isooctane	BDE-111S
2,3,3',5,6-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-112S
2,3,3',5',6-Pentabromodiphenyl ether <b>New</b>		50 µg/mL	Isooctane	BDE-113S
2,3,4,4',5-Pentabromodiphenyl ether	446254-77-9	50 µg/mL	Isooctane	BDE-114S
2,3,4,4',6-Pentabromodiphenyl ether	446254-78-0	50 µg/mL	Isooctane	BDE-115S
2,3,4,5,6-Pentabromodiphenyl ether	189084-65-9	50 µg/mL	Isooctane	BDE-116S
2,3,4',5,6-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-117S
2,3',4,4',5-Pentabromodiphenyl ether	446254-80-4	50 µg/mL	Isooctane	BDE-118S
2,3',4,4',6-Pentabromodiphenyl ether	189084-66-0	50 µg/mL	Isooctane	BDE-119S
2,3',4,5,5'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-120S
2,3',4,5',6-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-121S
2',3,3',4,5-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-122S
2',3,4,4',5-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-123S
2',3,4,5,5'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-124S
2',3,4,5,6'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-125S
3,3',4,4',5-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-126S
3,3',4,5,5'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-127S
2,2',3,3',4,4'-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-128S
2,2',3,3',4,5-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-129S
2,2',3,3',4,5'-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-130S
2,2',3,3',4,6-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-131S
2,2',3,3',4,6'-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-132S
2,2',3,3',5,5'-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-133S
2,2',3,3',5,6-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-134S
2,2',3,3',5,6'-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-135S
2,2',3,3',6,6'-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-136S
2,2',3,4,4',5-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-137S
2,2',3,4,4',5'-Hexabromodiphenyl ether	182677-30-1	50 µg/mL	Isooctane	BDE-138S
2,2',3,4,4',6-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-139S
2,2',3,4,4',6'-Hexabromodiphenyl ether	243982-83-4	50 µg/mL	Isooctane	BDE-140S
2,2',3,4,5,5'-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-141S
2,2',3,4,5,6-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-142S
2,2',3,4,5,6'-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-143S
2,2',3,4,5',6-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-144S
2,2',3,4,6,6'-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-145S
2,2',3,4',5,5'-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-146S
2,2',3,4',5,6-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-147S
2,2',3,4',5,6'-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-148S
2,2',3,4',5',6-Hexabromodiphenyl ether <b>New</b>		50 µg/mL	Isooctane	BDE-149S
2,2',3,4',6,6'-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-150S
2,2',3,5,5',6-Hexabromodiphenyl ether <b>New</b>		50 µg/mL	Isooctane	BDE-151S
2,2',3,5,6,6'-Hexabromodiphenyl ether <b>New</b>		50 µg/mL	Isooctane	BDE-152S
2,2',4,4',5,5'-Hexabromodiphenyl ether	68631-49-2	50 µg/mL	Isooctane	BDE-153S
2,2',4,4',5,6'-Hexabromodiphenyl ether	207122-15-4	50 µg/mL	Isooctane	BDE-154S
2,2',4,4',6,6'-Hexabromodiphenyl ether	35854-94-5	50 µg/mL	Isooctane	BDE-155S

# Polybromodiphenyl Ether (PBDEs) Congeners

Solutions in 1 mL

Compound	CAS No.	Conc.	Solvent	Cat. No.
2,3,3',4,4',5-Hexabromodiphenyl ether	35854-94-5	50 µg/mL	Isooctane	BDE-156S
2,3,3',4,4',5'-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-157S
2,3,3',4,4',6-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-158S
2,3,3',4,5,5'-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-159S
2,3,3',4,5,6-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-160S
2,3,3',4,5',6-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-161S
2,3,3',4',5,5'-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-162S
2,3,3',4',5,6-Hexabromodiphenyl ether <b>New</b>		50 µg/mL	Isooctane	BDE-163S
2,3,3',4',5',6-Hexabromodiphenyl ether <b>New</b>		50 µg/mL	Isooctane	BDE-164S
2,3,3',5,5',6-Hexabromodiphenyl ether <b>New</b>		50 µg/mL	Isooctane	BDE-165S
2,3,4,4',5,6-Hexabromodiphenyl ether	189084-58-0	50 µg/mL	Isooctane	BDE-166S
2,3',4,4',5,5'-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-167S
2,3',4,4',5',6-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-168S
3,3',4,4',5,5'-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-169S
2,2',3,3',4,4',5-Heptabromodiphenyl ether		50 µg/mL	Isooctane	BDE-170S
2,2',3,3',4,4',6-Heptabromodiphenyl ether		50 µg/mL	Isooctane	BDE-171S
2,2',3,3',4,5,5'-Heptabromodiphenyl ether		50 µg/mL	Isooctane	BDE-172S
2,2',3,3',4,5,6-Heptabromodiphenyl ether		50 µg/mL	Isooctane	BDE-173S
2,2',3,3',4,5',6-Heptabromodiphenyl ether		50 µg/mL	Isooctane	BDE-175S
2,2',3,3',4',6,6'-Heptabromodiphenyl ether		50 µg/mL	Isooctane	BDE-176S
2,2',3,3',4',5,6-Heptabromodiphenyl ether		50 µg/mL	Isooctane	BDE-177S
2,2',3,3',5,5',6-Heptabromodiphenyl ether		50 µg/mL	Isooctane	BDE-178S
2,2',3,4,4',5,5'-Heptabromodiphenyl ether		50 µg/mL	Isooctane	BDE-180S
2,2',3,4,4',5,6-Heptabromodiphenyl ether	189084-67-1	50 µg/mL	Isooctane	BDE-181S
2,2',3,4,4',5,6'-Heptabromodiphenyl ether		50 µg/mL	Isooctane	BDE-182S
2,2',3,4,4',5',6-Heptabromodiphenyl ether	207122-16-5	50 µg/mL	Isooctane	BDE-183S
2,2',3,4,4',6,6'-Heptabromodiphenyl ether		50 µg/mL	Isooctane	BDE-184S
2,2',3,4,5,5',6-Heptabromodiphenyl ether		50 µg/mL	Isooctane	BDE-185S
2,2',3,4,5,6,6'-Heptabromodiphenyl ether		50 µg/mL	Isooctane	BDE-186S
2,2',3,4',5,5',6-Heptabromodiphenyl ether <b>New</b>		50 µg/mL	Isooctane	BDE-187S
2,2',3',4',5,6,6'-Heptabromodiphenyl ether		50 µg/mL	Isooctane	BDE-188S
2,3,3',4,4',5,5'-Heptabromodiphenyl ether		50 µg/mL	Isooctane	BDE-189S
2,3,3',4,4',5,6-Heptabromodiphenyl ether	189084-68-2	50 µg/mL	Isooctane	BDE-190S
2,3,3',4,4',5',6-Heptabromodiphenyl ether		50 µg/mL	Isooctane	BDE-191S
2,3,3',4,5,5',6-Heptabromodiphenyl ether		50 µg/mL	Isooctane	BDE-192S
2,3,3',4',5,5',6-Heptabromodiphenyl ether		50 µg/mL	Isooctane	BDE-193S
2,2',3,3',4,4',5,5'-Octabromodiphenyl ether		50 µg/mL	Isooctane	BDE-194S
2,2',3,3',4,4',5,6-Octabromodiphenyl ether		50 µg/mL	Isooctane	BDE-195S
2,2',3,3',4,4',5,6'-Octabromodiphenyl ether		50 µg/mL	Isooctane	BDE-196S
2,2',3,3',4,4',6,6'-Octabromodiphenyl ether		50 µg/mL	Isooctane	BDE-197S
2,2',3,3',4,5,5',6-Octabromodiphenyl ether		50 µg/mL	Isooctane	BDE-198S
2,2',3,3',4,5',6,6'-Octabromodiphenyl ether		50 µg/mL	Isooctane	BDE-201S
2,2',3,3',5,5',6,6'-Octabromodiphenyl ether		50 µg/mL	Isooctane	BDE-202S
2,2',3,4,4',5,5',6-Octabromodiphenyl ether		50 µg/mL	Isooctane	BDE-203S
2,2',3,4,4',5,6,6'-Octabromodiphenyl ether		50 µg/mL	Isooctane	BDE-204S
2,3,3',4,4',5,5',6-Octabromodiphenyl ether		50 µg/mL	Isooctane	BDE-205S
2,2',3,3',4,4',5,5',6-Nonabromodiphenyl ether		50 µg/mL	Isooctane	BDE-206S
2,2',3,3',4,4',5,6,6'-Nonabromodiphenyl ether		10 µg/mL	Nonane	BDE-207S-R1-0.2X
		50 µg/mL	Isooctane	BDE-207S-R1
2,2',3,3',4,5,5',6,6'-Nonabromodiphenyl ether		50 µg/mL	Isooctane	BDE-208S
Decabromodiphenyl ether	1163-19-5	50 µg/mL	Isooctane: Toluene 9:1	BDE-209S



# Tech Grade PBDEs, Specific Mixtures and Calibration Curve Set

## Technical Grade PBDEs

### PBDE Technical Grade

50 µg/mL in Isooctane	Cat. No.	Unit
Bromkal DE-70-5 (Pentas)	BDE-705	1 mL
Bromkal DE-71 (Pentas)	BDE-710	1 mL
Bromkal DE-73-6 (Hexas)	BDE-736	1 mL
Bromkal DE-79-8 (Octas)	BDE-798	1 mL
FR-300BA (Deca)	FRS-009N	10 mg
	FRS-009S *	1 mL

\* 100 µg/mL in Toluene

™ Bromkal is a registered Trade Mark of Chemische Fabrik Kalk

### PBDE Congeners common to Technical Mixtures (Bromkal™)

BDE-BROMKAL	1 x 1 mL
10 µg/mL each in Isooctane	6 comps.
2,4,4'-Tribromodiphenyl ether (#28)	
2,2',4,4'-Tetrabromodiphenyl ether (#47)	
2,2',4,4',5-Pentabromodiphenyl ether (#99)	
2,2',4,4',6-Pentabromodiphenyl ether (#100)	
2,2',4,4',5,5'-Hexabromodiphenyl ether (#153)	
2,2',4,4',5,6'-Hexabromodiphenyl ether (#154)	

### DE-71 (Pentas) Great Lakes Study

BDE-710-GL	1 x 1 mL
50 µg/mL each in Isooctane	
Bromkal DE-71	

### DE-79 (Octas) Great Lakes Study

BDE-798-GL	1 x 1 mL
50 µg/mL each in Isooctane	
Bromkal DE-79	

## Specific Mixtures

### PBDEs Most Common in the Environment

BDE-USE	1 x 1 mL
10 µg/mL each in Isooctane	5 comps.
2,2',4,4'-Tetrabromodiphenyl ether (#47)	
2,2',4,4',5-Pentabromodiphenyl ether (#99)	
2,2',4,4',6-Pentabromodiphenyl ether (#100)	
2,2',4,4',5,5'-Hexabromodiphenyl ether (#153)	
2,2',4,4',5,6'-Hexabromodiphenyl ether (#154)	

### PBDEs - Columbia River Study

BDE-CR	1 x 1 mL
10 µg/mL each in Isooctane	12 comps.
4,4'-Dibromodiphenyl ether (#15)	
2,4,4'-Tribromodiphenyl ether (#28)	
2',3,4-Tribromodiphenyl ether (#33)	
2,2',4,4'-Tetrabromodiphenyl ether (#47)	
2,2',4,5'-Tetrabromodiphenyl ether (#49)	
2,3',4,4'-Tetrabromodiphenyl ether (#66)	
2,4,4',6-Tetrabromodiphenyl ether (#75)	
2,2',4,4',5-Pentabromodiphenyl ether (#99)	
2,2',4,4',6-Pentabromodiphenyl ether (#100)	
2,2',4,4',5,5'-Hexabromodiphenyl ether (#153)	
2,2',4,4',5,6'-Hexabromodiphenyl ether (#154)	
2,2',4,4',6,6'-Hexabromodiphenyl ether (#155)	

### PBDEs Common to California Environment

BDE-CAE-1	1 x 1 mL
10 µg/mL each in Isooctane	7 comps.
2,4,4'-Tribromodiphenyl ether (#28)	
2',3,4-Tribromodiphenyl ether (#33)	
2,2',4,4'-Tetrabromodiphenyl ether (#47)	
2,2',4,4',5-Pentabromodiphenyl ether (#99)	
2,2',4,4',6-Pentabromodiphenyl ether (#100)	
2,2',4,4',5,5'-Hexabromodiphenyl ether (#153)	
2,2',4,4',5,6'-Hexabromodiphenyl ether (#154)	

### PBDEs - Lake Michigan Study

BDE-LMS	1 x 1 mL
10 µg/mL each in Isooctane	9 comps.
2,4,4'-Tribromodiphenyl ether (#28)	
2,2',4,4'-Tetrabromodiphenyl ether (#47)	
2,3',4,4'-Tetrabromodiphenyl ether (#66)	
2,2',3,4,4'-Pentabromodiphenyl ether (#85)	
2,2',4,4',5-Pentabromodiphenyl ether (#99)	
2,2',4,4',6-Pentabromodiphenyl ether (#100)	
2,2',3,4,4',5'-Hexabromodiphenyl ether (#138)	
2,2',4,4',5,5'-Hexabromodiphenyl ether (#153)	
2,2',4,4',5,6'-Hexabromodiphenyl ether (#154)	

### California Method 750-M Standard

BDE-CALEWS	1 x 1 mL
10 µg/mL each in Isooctane	13 comps.
2,2',4-Tribromodiphenyl ether (#17)	
2,4,4'-Tribromodiphenyl ether (#28)	
2,2',4,4'-Tetrabromodiphenyl ether (#47)	
2,3',4,4'-Tetrabromodiphenyl ether (#66)	
2,3',4',6-Tetrabromodiphenyl ether (#71)	
2,2',4,4',5-Pentabromodiphenyl ether (#99)	
2,2',4,4',6-Pentabromodiphenyl ether (#100)	
2,2',3,4,4',5'-Hexabromodiphenyl ether (#138)	
2,2',4,4',5,5'-Hexabromodiphenyl ether (#153)	
2,2',4,4',5,6'-Hexabromodiphenyl ether (#154)	
2,2',3,4,4',5',6-Heptabromodiphenyl ether (#183)	
2,2',3,3',4,4',5,5',6,6'-Decabromodiphenyl ether (#209)	
2,2',6,6'-Tetrabromobisphenol A	

### Method 527 - PBDE Standard

M-527-BDE	1 x 1 mL
50 µg/mL each in Isooctane:Ethyl Acetate (8:2)	5 comps.
2,2',4,4'-Tetrabromodiphenyl ether	
2,2',4,4',6-Pentabromodiphenyl ether	
2,2',4,4',5-Pentabromodiphenyl ether	
2,2',4,4',5,5'-Hexabromodiphenyl ether	
2,2',4,4',5,5'-Hexabromobiphenyl	

## Calibration Curve Set

### ISO/DIS 22032

#### Calibration Curve Set

#### ISO/DIS-22032-SET

At stated conc. (ng/mL) in Isooctane

ISO/DIS-22032	7 x 1 mL						
	01	02	03	04	05	06	07
2,2',4,4'-Tetrabromodiphenyl ether (#47)	5	12.5	25	50	100	150	250
2,2',4,4',5-Pentabromodiphenyl ether (#99)	5	12.5	25	50	100	150	250
2,2',4,4',6-Pentabromodiphenyl ether (#100)	5	12.5	25	50	100	150	250
2,2',4,4',5,5'-Hexabromodiphenyl ether (#153)	5	12.5	25	50	100	150	250
2,2',4,4',5,6'-Hexabromodiphenyl ether (#154)	5	12.5	25	50	100	150	250
2,2',3,4,4',5',6-Heptabromodiphenyl ether (#183)	5	12.5	25	50	100	150	250
2,3,3',4,4',5,5',6-Octabromodiphenyl ether (#205)	5	12.5	25	50	100	150	250
2,2',3,3',4,4',5,5',6,6'-Decabromodiphenyl ether (#209)	25	50	100	200	500	700	1000

### ISO/DIS 22032

#### Internal Standard

#### BDE-47, 99 & 100

ISO22032-IS-1-5ML	1 x 5 mL
ISO22032-IS-1-10ML	1 x 10 mL
100 ng/mL each in Isooctane	
3,3',4,4'-Tetrabromodiphenyl ether	

### Internal Standard

#### BDE-153, 154 & 183

ISO22032-IS-2-5ML	1 x 5 mL
ISO22032-IS-2-10ML	1 x 10 mL
100 ng/mL each in Isooctane	
2,2',3,4,4',5,6-Heptabromodiphenyl ether	

## Mixtures of PBDEs Standard Solution for Accuracy & Precision

<b>BDE-AAP-A</b> <i>At stated conc. in Isooctane</i>	<b>1 x 1 mL</b> 39 comps. ng/mL	<b>BDE-AAP-A-15X</b> <i>At stated conc. in Isooctane</i>	<b>1 x 1 mL</b> 39 comps. µg/mL
2-Bromodiphenyl ether (#1)	100	2-Bromodiphenyl ether (#1)	1.5
3-Bromodiphenyl ether (#2)	100	3-Bromodiphenyl ether (#2)	1.5
4-Bromodiphenyl ether (#3)	100	4-Bromodiphenyl ether (#3)	1.5
2,4-Dibromodiphenyl ether (#7)	100	2,4-Dibromodiphenyl ether (#7)	1.5
2,4'-Dibromodiphenyl ether (#8)	100	2,4'-Dibromodiphenyl ether (#8)	1.5
2,6-Dibromodiphenyl ether (#10)	100	2,6-Dibromodiphenyl ether (#10)	1.5
3,3'-Dibromodiphenyl ether (#11)	100	3,3'-Dibromodiphenyl ether (#11)	1.5
3,4-Dibromodiphenyl ether (#12)	100	3,4-Dibromodiphenyl ether (#12)	1.5
3,4'-Dibromodiphenyl ether (#13)	100	3,4'-Dibromodiphenyl ether (#13)	1.5
4,4'-Dibromodiphenyl ether (#15)	100	4,4'-Dibromodiphenyl ether (#15)	1.5
2,2',4,-Tribromodiphenyl ether (#17)	100	2,2',4-Tribromodiphenyl ether (#17)	1.5
2,3',4-Tribromodiphenyl ether (#25)	100	2,3',4-Tribromodiphenyl ether (#25)	1.5
2,4,4'-Tribromodiphenyl ether (#28)	100	2,4,4'-Tribromodiphenyl ether (#28)	1.5
2,4,6-Tribromodiphenyl ether (#30)	100	2,4,6-Tribromodiphenyl ether (#30)	1.5
2,4',6-Tribromodiphenyl ether (#32)	100	2,4',6-Tribromodiphenyl ether (#32)	1.5
2',3,4-Tribromodiphenyl ether (#33)	100	2',3,4-Tribromodiphenyl ether (#33)	1.5
3,3',4-Tribromodiphenyl ether (#35)	100	3,3',4-Tribromodiphenyl ether (#35)	1.5
3,4,4'-Tribromodiphenyl ether (#37)	100	3,4,4'-Tribromodiphenyl ether (#37)	1.5
2,2',4,4'-Tetrabromodiphenyl ether (#47)	100	2,2',4,4'-Tetrabromodiphenyl ether (#47)	1.5
2,2',4,5'-Tetrabromodiphenyl ether (#49)	100	2,2',4,5'-Tetrabromodiphenyl ether (#49)	1.5
2,3',4,4'-Tetrabromodiphenyl ether (#66)	100	2,3',4,4'-Tetrabromodiphenyl ether (#66)	1.5
2,3',4',6-Tetrabromodiphenyl ether (#71)	100	2,3',4',6-Tetrabromodiphenyl ether (#71)	1.5
2,4,4',6-Tetrabromodiphenyl ether (#75)	100	2,4,4',6-Tetrabromodiphenyl ether (#75)	1.5
3,3',4,4'-Tetrabromodiphenyl ether (#77)	100	3,3',4,4'-Tetrabromodiphenyl ether (#77)	1.5
2,2',3,4,4'-Pentabromodiphenyl ether (#85)	150	2,2',3,4,4'-Pentabromodiphenyl ether (#85)	2.25
2,2',4,4',5-Pentabromodiphenyl ether (#99)	150	2,2',4,4',5-Pentabromodiphenyl ether (#99)	2.25
2,2',4,4',6-Pentabromodiphenyl ether (#100)	150	2,2',4,4',6-Pentabromodiphenyl ether (#100)	2.25
2,3,4,5,6-Pentabromodiphenyl ether (#116)	150	2,3,4,5,6-Pentabromodiphenyl ether (#116)	2.25
2,3',4,4',5-Pentabromodiphenyl ether (#118)	150	2,3',4,4',5-Pentabromodiphenyl ether (#118)	2.25
2,3',4,4',6-Pentabromodiphenyl ether (#119)	150	2,3',4,4',6-Pentabromodiphenyl ether (#119)	2.25
3,3',4,4',5-Pentabromodiphenyl ether (#126)	150	3,3',4,4',5-Pentabromodiphenyl ether (#126)	2.25
2,2',3,4,4',5'-Hexabromodiphenyl ether (#138)	200	2,2',3,4,4',5'-Hexabromodiphenyl ether (#138)	3.0
2,2',4,4',5,5'-Hexabromodiphenyl ether (#153)	200	2,2',4,4',5,5'-Hexabromodiphenyl ether (#153)	3.0
2,2',4,4',5,6'-Hexabromodiphenyl ether (#154)	200	2,2',4,4',5,6'-Hexabromodiphenyl ether (#154)	3.0
2,2',4,4',6,6'-Hexabromodiphenyl ether (#155)	200	2,2',4,4',6,6'-Hexabromodiphenyl ether (#155)	3.0
2,3,4,4',5,6-Hexabromodiphenyl ether (#166)	200	2,3,4,4',5,6-Hexabromodiphenyl ether (#166)	3.0
2,2',3,4,4',5,6-Heptabromodiphenyl ether (#181)	250	2,2',3,4,4',5,6-Heptabromodiphenyl ether (#181)	3.75
2,2',3,4,4',5',6-Heptabromodiphenyl ether (#183)	250	2,2',3,4,4',5',6-Heptabromodiphenyl ether (#183)	3.75
2,3,3',4,4',5,6-Heptabromodiphenyl ether (#190)	250	2,3,3',4,4',5,6-Heptabromodiphenyl ether (#190)	3.75

### Technical Note

Responding to the need for the analysis of polybrominated diphenyl ether (PBDE) congeners, the EPA has developed Method 1614. Method 1614 is recommended for analysis of aqueous, solid, tissue, and multi-phase environmental samples. Each formulation is prepared using PBDEs which are synthesized and analyzed by AccuStandard.

## Mixture of Commonly Occurring PBDE Congeners for Precision and Recovery

<b>BDE-COC</b> <i>At stated conc. in Isooctane</i>	<b>1 x 1 mL</b> 14 comps. µg/mL
2,2',4,-Tribromodiphenyl ether (#17)	5
2,4,4'-Tribromodiphenyl ether (#28)	5
2,2',4,4'-Tetrabromodiphenyl ether (#47)	5
2,3',4,4'-Tetrabromodiphenyl ether (#66)	5
2,3',4',6-Tetrabromodiphenyl ether (#71)	5
2,2',3,4,4'-Pentabromodiphenyl ether (#85)	5
2,2',4,4',5-Pentabromodiphenyl ether (#99)	5
2,2',4,4',6-Pentabromodiphenyl ether (#100)	5
2,2',3,4,4',5'-Hexabromodiphenyl ether (#138)	5
2,2',4,4',5,5'-Hexabromodiphenyl ether (#153)	5
2,2',4,4',5,6'-Hexabromodiphenyl ether (#154)	5
2,2',3,4,4',5',6-Heptabromodiphenyl ether (#183)	5
2,3,3',4,4',5,6-Heptabromodiphenyl ether (#190)	5
Decabromodiphenyl ether (#209)	25

## PBDE Congeners of Primary Interest

<b>BDE-CSM</b> <i>At stated conc. in Isooctane</i>	<b>1 x 1 mL</b> 8 comps. µg/mL
2,4,4'-Tribromodiphenyl ether (#28)	20
2,2',4,4'-Tetrabromodiphenyl ether (#47)	20
2,2',4,4',5-Pentabromodiphenyl ether (#99)	20
2,2',4,4',6-Pentabromodiphenyl ether (#100)	20
2,2',4,4',5,5'-Hexabromodiphenyl ether (#153)	20
2,2',4,4',5,6'-Hexabromodiphenyl ether (#154)	20
2,2',3,4,4',5,6-Heptabromodiphenyl ether (#183)	20
Decabromodiphenyl ether (#209)	200

## PBDE Congeners of Primary Interest

### Calibration Mix

<b>BDE-CM</b> <i>At stated conc. in Isooctane</i>	<b>1 x 1 mL</b> 8 comps. µg/mL
2,4,4'-Tribromodiphenyl ether (#28)	2.5
2,2',4,4'-Tetrabromodiphenyl ether (#47)	2.5
2,2',4,4',5-Pentabromodiphenyl ether (#99)	2.5
2,2',4,4',6-Pentabromodiphenyl ether (#100)	2.5
2,2',4,4',5,5'-Hexabromodiphenyl ether (#153)	2.5
2,2',4,4',5,6'-Hexabromodiphenyl ether (#154)	2.5
2,2',3,4,4',5',6-Heptabromodiphenyl ether (#183)	2.5
Decabromodiphenyl ether (#209)	25

### Matrix Spiking Solution

<b>BDE-MS</b> <i>At stated conc. in Isooctane</i>	<b>1 x 1 mL</b> 8 comps. ng/mL
2,4,4'-Tribromodiphenyl ether (#28)	1
2,2',4,4'-Tetrabromodiphenyl ether (#47)	1
2,2',4,4',5-Pentabromodiphenyl ether (#99)	1
2,2',4,4',6-Pentabromodiphenyl ether (#100)	1
2,2',4,4',5,5'-Hexabromodiphenyl ether (#153)	1
2,2',4,4',5,6'-Hexabromodiphenyl ether (#154)	1
2,2',3,4,4',5',6-Heptabromodiphenyl ether (#183)	1
Decabromodiphenyl ether (#209)	10

### PBDEs in Method 1614 Set

<b>BDE-EPA-SET</b> <i>50 µg/mL each in Isooctane</i>	<b>8 x 1 mL</b> 8 comps.
2,4,4'-Tribromodiphenyl ether (#28)	
2,2',4,4'-Tetrabromodiphenyl ether (#47)	
2,2',4,4',5-Pentabromodiphenyl ether (#99)	
2,2',4,4',6-Pentabromodiphenyl ether (#100)	
2,2',4,4',5,5'-Hexabromodiphenyl ether (#153)	
2,2',4,4',5,6'-Hexabromodiphenyl ether (#154)	
2,2',3,4,4',5',6-Heptabromodiphenyl ether (#183)	
Decabromodiphenyl ether (#209)	

## Hydroxy & Methoxy Polybromodiphenyl Ether Congeners

Hydroxylated and methoxylated PBDEs may be formed as metabolites of the widely used PBDE flame retardants. AccuStandard's aim is to synthesize authentic OH-and MeO-PBDE reference standards for analytical and toxicological studies. Since this is an ongoing project, please check the website for the latest update of this list or request specific congeners to be synthesized.

Solutions in 1 mL

Compound (Short Form)	Conc.	Solvent	Cat. No.
<b>Hydroxy</b>			
2'-Hydroxy-4-monobromodiphenyl ether (2'-OH-BDE-003)	50 µg/mL	AcCN	HBDE-1001S-CN
3'-Hydroxy-2,4-dibromodiphenyl ether (3'-OH-BDE-007)	50 µg/mL	AcCN	HBDE-2001S-CN
2'-Hydroxy-2,4-dibromodiphenyl ether (2'-OH-BDE-007)	10 µg/mL	AcCN	HBDE-2002S-CN-0.2X
4'-Hydroxy-2,2',4-tribromodiphenyl ether (4'-OH-BDE-017)	50 µg/mL	AcCN	HBDE-3001S-CN
3'-Hydroxy-2,4,4'-tribromodiphenyl ether (3'-OH-BDE-028)	50 µg/mL	AcCN	HBDE-3002S-CN
2'-Hydroxy-2,4,4'-tribromodiphenyl ether (2'-OH-BDE-028)	50 µg/mL	AcCN	HBDE-3003S-CN
5'-Hydroxy-2,3',4-tribromodiphenyl ether (5'-OH-BDE-025) <b>NEW</b>	50 µg/mL	AcCN	HBDE-3004S-CN
4-Hydroxy-2,2',3,4'-tetrabromodiphenyl ether (4-OH-BDE-042)	10 µg/mL	AcCN	HBDE-4001S-CN-0.2X
4'-Hydroxy-2,2',4,5'-tetrabromodiphenyl ether (4'-OH-BDE-049)	10 µg/mL	AcCN	HBDE-4002S-CN-0.2X
3-Hydroxy-2,2',4,4'-tetrabromodiphenyl ether (3-OH-BDE-047)	50 µg/mL	AcCN	HBDE-4003S-CN
5-Hydroxy-2,2',4,4'-tetrabromodiphenyl ether (5-OH-BDE-047)	50 µg/mL	AcCN	HBDE-4004S-CN
6-Hydroxy-2,2',4,4'-tetrabromodiphenyl ether (6-OH-BDE-047)	10 µg/mL	AcCN	HBDE-4005S-CN-0.2X
	10 µg/mL	Toluene	HBDE-4005S-T-0.2X
2'-Hydroxy-2,3',4,5'-tetrabromodiphenyl ether (2'-OH-BDE-068)	10 µg/mL	AcCN	HBDE-4006S-CN-0.2X
	10 µg/mL	Toluene	HBDE-4006S-T-0.2X
	50 µg/mL	AcCN	HBDE-4006S-CN
	50 µg/mL	Toluene	HBDE-4006S-T
2'-Hydroxy-2,4,4',6-tetrabromodiphenyl ether (2'-OH-BDE-075) Discontinued	10 µg/mL	AcCN	HBDE-4007S-CN-0.2X
4-Hydroxy-2,2',3,4',5-pentabromodiphenyl ether (4-OH-BDE-090)	10 µg/mL	AcCN	HBDE-5001S-CN-0.2X
6-Hydroxy-2,2',3,4,4'-pentabromodiphenyl ether (6-OH-BDE-085)	10 µg/mL	AcCN	HBDE-5002S-CN-0.2X
6-Hydroxy-2,2',3,4,5'-pentabromodiphenyl ether (6-OH-BDE-087)	10 µg/mL	AcCN	HBDE-5003S-CN-0.2X
6-Hydroxy-2,2',3,3',4-pentabromodiphenyl ether (6-OH-BDE-082)	10 µg/mL	AcCN	HBDE-5005S-CN-0.2X
6-Hydroxy-2,2',4,4',5-pentabromodiphenyl ether (6'-OH-BDE-099)	10 µg/mL	AcCN	HBDE-5006S-CN-0.2X
5'-Hydroxy-2,2',4,4',5-pentabromodiphenyl ether (5'-OH-BDE-099)	10 µg/mL	AcCN	HBDE-5007S-CN-0.2X
3-Hydroxy-2,2',4,4',6-pentabromodiphenyl ether (3-OH-BDE-100)	50 µg/mL	AcCN	HBDE-5008S-CN
4'-Hydroxy-2,2',4,5,5'-pentabromodiphenyl ether (4'-OH-BDE-101)	50 µg/mL	AcCN	HBDE-5009S-CN
6-Hydroxy-2,3,3',4,4',5'-hexabromodiphenyl ether (6-OH-BDE-157)	10 µg/mL	AcCN	HBDE-6001S-CN-0.2X
6-Hydroxy-2,2',3,4,4',6'-hexabromodiphenyl ether (6-OH-BDE-140)	10 µg/mL	AcCN	HBDE-6002S-CN-0.2X
3'-Hydroxy-2,2',4,4',5,6'-hexabromodiphenyl ether (3'-OH-BDE-154)	10 µg/mL	AcCN	HBDE-6003S-CN-0.2X
6-Hydroxy-2,2',3,4,4',5'-hexabromodiphenyl ether (6-OH-BDE-137)	10 µg/mL	AcCN	HBDE-6004S-CN-0.2X
4-Hydroxy-2,2',3,4',5,5',6'-heptabromodiphenyl ether (4-OH-BDE-187)	50 µg/mL	AcCN	HBDE-7001S-CN
6-Hydroxy-2,2',3,4,4',5,5'-heptabromodiphenyl ether (6-OH-BDE-180)	50 µg/mL	AcCN	HBDE-7002S-CN
4-Hydroxy-2,2',3,4',5,6,6'-heptabromodiphenyl ether (4-OH-BDE-188)	50 µg/mL	AcCN	HBDE-7003S-CN
6-Hydroxy-2,2',3,4,4',5,6'-heptabromodiphenyl ether (6-OH-BDE-182)	10 µg/mL	AcCN	HBDE-7004S-CN-0.2X
4'-Hydroxy-2,2',3,3',4,5',6,6'-octabromodiphenyl ether (4'-OH-BDE-201)	50 µg/mL	AcCN	HBDE-8001S-CN
<b>Methoxy</b>			
2'-Methoxy-4-monobromodiphenyl ether (2'-MeO-BDE-003)	50 µg/mL	MeOH	MOBDE-1001S
3'-Methoxy-2,4-dibromodiphenyl ether (3'-MeO-BDE-007)	50 µg/mL	MeOH	MOBDE-2001S
2'-Methoxy-2,4-dibromodiphenyl ether (2'-MeO-BDE-007)	10 µg/mL	MeOH	MOBDE-2002S-0.2X
4'-Methoxy-2,2',4-tribromodiphenyl ether (4'-MeO-BDE-017)	50 µg/mL	MeOH	MOBDE-3001S
3'-Methoxy-2,4,4'-tribromodiphenyl ether (3'-MeO-BDE-028)	50 µg/mL	MeOH	MOBDE-3002S
2'-Methoxy-2,4,4'-tribromodiphenyl ether (2'-MeO-BDE-028)	50 µg/mL	MeOH	MOBDE-3003S
5'-Methoxy-2,3',4-tribromodiphenyl ether (5'-MeO-BDE-025) <b>NEW</b>	50 µg/mL	MeOH	MOBDE-3004S
4-Methoxy-2,2',3,4'-tetrabromodiphenyl ether (4-MeO-BDE-042)	10 µg/mL	MeOH	MOBDE-4001S-0.2X
4-Methoxy-2,2',4,5'-tetrabromodiphenyl ether (4'-MeO-BDE-049)	10 µg/mL	MeOH	MOBDE-4002S-0.2X
3-Methoxy-2,2',4,4'-tetrabromodiphenyl ether (3-MeO-BDE-047)	50 µg/mL	MeOH	MOBDE-4003S
5-Methoxy-2,2',4,4'-tetrabromodiphenyl ether (5-MeO-BDE-047)	50 µg/mL	MeOH	MOBDE-4004S
6-Methoxy-2,2',4,4'-tetrabromodiphenyl ether (6-MeO-BDE-047)	10 µg/mL	MeOH	MOBDE-4005S-0.2X
2'-Methoxy-2,3',4,5'-tetrabromodiphenyl ether (2'-MeO-BDE-068)	10 µg/mL	MeOH	MOBDE-4006S-0.2X
2'-Methoxy-2,4,4',6-tetrabromodiphenyl ether (2'-MeO-BDE-075)	50 µg/mL	MeOH	MOBDE-4007S
4-Methoxy-2,2',3,4',5-pentabromodiphenyl ether (4-MeO-BDE-090)	10 µg/mL	MeOH	MOBDE-5001S-0.2X
6-Methoxy-2,2',3,4,4'-pentabromodiphenyl ether (6-MeO-BDE-085)	10 µg/mL	MeOH	MOBDE-5002S-0.2X
6-Methoxy-2,2',3,4,5'-pentabromodiphenyl ether (6-MeO-BDE-087)	10 µg/mL	MeOH	MOBDE-5003S-0.2X
6-Methoxy-2,2',3,3',4-pentabromodiphenyl ether (6-MeO-BDE-082)	10 µg/mL	MeOH	MOBDE-5005S-0.2X
6-Methoxy-2,2',4,4',5-pentabromodiphenyl ether (6'-MeO-BDE-099)	10 µg/mL	MeOH	MOBDE-5006S-0.2X
5'-Methoxy-2,2',4,4',5-pentabromodiphenyl ether (5'-MeO-BDE-099)	10 µg/mL	MeOH	MOBDE-5007S-0.2X
3-Methoxy-2,2',4,4',6-pentabromodiphenyl ether (3-MeO-BDE-100)	50 µg/mL	MeOH	MOBDE-5008S
4'-Methoxy-2,2',4,5,5'-pentabromodiphenyl ether (4'-MeO-BDE-101)	50 µg/mL	MeOH	MOBDE-5009S
6-Methoxy-2,3,3',4,4',5'-hexabromodiphenyl ether (6-MeO-BDE-157)	10 µg/mL	MeOH	MOBDE-6001S-0.2X
6-Methoxy-2,2',3,4,4',6'-hexabromodiphenyl ether (6-MeO-BDE-140)	10 µg/mL	MeOH	MOBDE-6002S-0.2X
3'-Methoxy-2,2',4,4',5,6'-hexabromodiphenyl ether (3'-MeO-BDE-154)	10 µg/mL	MeOH	MOBDE-6003S-0.2X
6-Methoxy-2,2',3,4,4',5'-hexabromodiphenyl ether (6-MeO-BDE-137)	10 µg/mL	MeOH	MOBDE-6004S-0.2X
4-Methoxy-2,2',3,4',5,5',6'-heptabromodiphenyl ether (4-MeO-BDE-187)	50 µg/mL	MeOH	MOBDE-7001S
6-Methoxy-2,2',3,4,4',5,5'-heptabromodiphenyl ether (6-MeO-BDE-180)	50 µg/mL	MeOH	MOBDE-7002S
4-Methoxy-2,2',3,4',5,6,6'-heptabromodiphenyl ether (4-MeO-BDE-188)	50 µg/mL	MeOH	MOBDE-7003S
6-Methoxy-2,2',3,4,4',5,6'-heptabromodiphenyl ether (6-MeO-BDE-182)	10 µg/mL	MeOH	MOBDE-7004S-0.2X
4'-Methoxy-2,2',3,3',4,5',6,6'-octabromodiphenyl ether (4'-MeO-BDE-201)	50 µg/mL	MeOH	MOBDE-8001S

# Fluorinated PBDE Congeners

## Internal Standards for PBDE Analysis

Some research suggests that a fluorine derivative of the PBDE parent compound can be used as a less costly replacement than the <sup>13</sup>C labeled PBDEs currently used. In addition, FBDEs can be used for ECD (Electron Capture Detection) analysis where the more expensive <sup>13</sup>C labeled PBDEs cannot. Experimental testing also suggests that the use of FBDEs as internal standards show improved precision in PBDE analysis. AccuStandard has synthesized the following FBDEs for use as internal standards and has committed to adding to this list based on requests from analytical chemists:

Solutions in 1 mL

Compound (Short Form)	Conc.	Solvent	Cat. No.
4'-Fluoro-4-bromodiphenyl ether (F-BDE-003) <b>NEW</b>	25 µg/mL	Isooctane	FBDE-1001S-0.5X
	50 µg/mL	Isooctane	FBDE-1001S
3'-Fluoro-2,4-dibromodiphenyl ether (F-BDE-007)	25 µg/mL	Isooctane	FBDE-2001S-0.5X
	50 µg/mL	Isooctane	FBDE-2001S
3'-Fluoro-3,4-dibromodiphenyl ether (F-BDE-012)	25 µg/mL	Isooctane	FBDE-2002S-0.5X
	50 µg/mL	Isooctane	FBDE-2002S
2-Fluoro-4,4'-dibromodiphenyl ether (F-BDE-015) <b>NEW</b>	25 µg/mL	Isooctane	FBDE-2003S-0.5X
	50 µg/mL	Isooctane	FBDE-2003S
4'-Fluoro-2,3',4-tribromodiphenyl ether (F-BDE-025)	25 µg/mL	Isooctane	FBDE-3001S-0.5X
	50 µg/mL	Isooctane	FBDE-3001S
4'-Fluoro-2,3',6-tribromodiphenyl ether (F-BDE-027)	25 µg/mL	Isooctane	FBDE-3002S-0.5X
	50 µg/mL	Isooctane	FBDE-3002S
2'-Fluoro-2,4,4'-tribromodiphenyl ether (F-BDE-028)	25 µg/mL	Isooctane	FBDE-3003S-0.5X
	50 µg/mL	Isooctane	FBDE-3003S
3'-Fluoro-2,4,4'-tribromodiphenyl ether (F-BDE-028)	25 µg/mL	Isooctane	FBDE-3004S-0.5X
	50 µg/mL	Isooctane	FBDE-3004S
4'-Fluoro-2,3',4,6-tetrabromodiphenyl ether (F-BDE-069)	25 µg/mL	Isooctane	FBDE-4001S-0.5X
	50 µg/mL	Isooctane	FBDE-4001S
4'-Fluoro-2,3',4,5-tetrabromodiphenyl ether (F-BDE-067)	25 µg/mL	Isooctane	FBDE-4002S-0.5X
	50 µg/mL	Isooctane	FBDE-4002S
6-Fluoro-2,2',4,4'-tetrabromodiphenyl ether (F-BDE-047)	25 µg/mL	Isooctane	FBDE-4003S-0.5X
	50 µg/mL	Isooctane	FBDE-4003S
6-Fluoro-2,3',4,4'-tetrabromodiphenyl ether (F-BDE-066)	25 µg/mL	Isooctane	FBDE-4004S-0.5X
	50 µg/mL	Isooctane	FBDE-4004S
5,5'-Difluoro-2,2',4,4'-tetrabromodiphenyl ether (2F-BDE-047)	25 µg/mL	Isooctane	FBDE-4005S-0.5X
	50 µg/mL	Isooctane	FBDE-4005S
3-Fluoro-2,3',4,5-tetrabromodiphenyl ether (F-BDE-070) <b>NEW</b>	25 µg/mL	Isooctane	FBDE-4006S-0.5X
	50 µg/mL	Isooctane	FBDE-4006S
5-Fluoro-3,3',4,4'-tetrabromodiphenyl ether (F-BDE-077) <b>NEW</b>	25 µg/mL	Isooctane	FBDE-4007S-0.5X
	50 µg/mL	Isooctane	FBDE-4007S
6'-Fluoro-2,2',4,4',5-pentabromodiphenyl ether (F-BDE-099) <b>NEW</b>	25 µg/mL	Isooctane	FBDE-5001S-0.5X
	50 µg/mL	Isooctane	FBDE-5001S
3-Fluoro-2,2',4,4',6-pentabromodiphenyl ether (F-BDE-100)	25 µg/mL	Isooctane	FBDE-5002S-0.5X
	50 µg/mL	Isooctane	FBDE-5002S
3,6-Difluoro-2,2',4,4',5-pentabromodiphenyl ether (2F-BDE-099)	25 µg/mL	Isooctane	FBDE-5003S-0.5X
	50 µg/mL	Isooctane	FBDE-5003S
5,6-Difluoro-2,2',3,4,4'-pentabromodiphenyl ether (2F-BDE-085)	25 µg/mL	Isooctane	FBDE-5004S-0.5X
	50 µg/mL	Isooctane	FBDE-5004S
3,5-Difluoro-2,3',4,4',6-pentabromodiphenyl ether (2F-BDE-119)	25 µg/mL	Isooctane	FBDE-5005S-0.5X
	50 µg/mL	Isooctane	FBDE-5005S
3'-Fluoro-2',3,4,5,5'-pentabromodiphenyl ether (F-BDE-124) <b>NEW</b>	25 µg/mL	Isooctane	FBDE-5006S-0.5X
	50 µg/mL	Isooctane	FBDE-5006S
5'-Fluoro-2,3',4,4',5-pentabromodiphenyl ether (F-BDE-118) <b>NEW</b>	25 µg/mL	Isooctane	FBDE-5007S-0.5X
	50 µg/mL	Isooctane	FBDE-5007S
5'-Fluoro-3,3',4,4',5-pentabromodiphenyl ether (F-BDE-126) <b>NEW</b>	25 µg/mL	Isooctane	FBDE-5008S-0.5X
	50 µg/mL	Isooctane	FBDE-5008S
4'-Fluoro-2,3,3',4,5,6-hexabromodiphenyl ether (F-BDE-160)	25 µg/mL	Isooctane	FBDE-6001S-0.5X
	50 µg/mL	Isooctane	FBDE-6001S
3-Fluoro-2,2',4,4',5,6-hexabromodiphenyl ether (F-BDE-139)	25 µg/mL	Isooctane	FBDE-6002S-0.5X
	50 µg/mL	Isooctane	FBDE-6002S
3-Fluoro-2,2',4,4',5,5'-hexabromodiphenyl ether (F-BDE-153) <b>NEW</b>	25 µg/mL	Isooctane	FBDE-6003S-0.5X
	50 µg/mL	Isooctane	FBDE-6003S
3'-Fluoro-2,2',4,4',5,6'-hexabromodiphenyl ether (F-BDE-154) <b>NEW</b>	25 µg/mL	Isooctane	FBDE-6004S-0.5X
	50 µg/mL	Isooctane	FBDE-6004S
3-Fluoro-2,2',4,4',5,5',6-heptabromodiphenyl ether (F-BDE-183) <b>NEW</b>	25 µg/mL	Isooctane	FBDE-7001S-0.5X
	50 µg/mL	Isooctane	FBDE-7001S
4',6-Difluoro-2,2',3,3',4,5,5',6'-octabromodiphenyl ether (2F-BDE-201)	25 µg/mL	Isooctane	FBDE-8001S-0.5X
	50 µg/mL	Isooctane	FBDE-8001S
4'-Fluoro-2,2',3,3',4,5,5',6,6'-nonabromodiphenyl ether (F-BDE-208)	25 µg/mL	Isooctane	FBDE-9001S-0.5X
	50 µg/mL	Isooctane	FBDE-9001S



## Mixed Bromo/Chloro Hydroxylated Diphenyl Ethers

The abundance of PBDEs in the environment led to the increased detection of hydroxylated PBDEs (OH-PBDEs) as well as their chlorinated derivatives (OH-PBCDEs) especially in aquatic environments. Several pathways of their formation have been described in the literature. In saltwater systems, some of the OH-PBDEs are being produced naturally; while in freshwater systems, atmospheric and wastewater treatment oxidation seems to be the major source of these compounds. Furthermore, disinfection with chlorine of wastewater may lead to the chlorination of OH-PBDEs. These mixed bromo/chloro hydroxy diphenyl ethers (OH-PBCDEs) can then undergo photochemical cyclization in the presence of sunlight to form the potentially even more harmful brominated/chlorinated dibenzo-p-dioxins (Br/Cl-DDs). There is growing concern that both naturally and anthropogenically produced PBDDs and Br/Cl-DDs are an emerging environmental problem.

At AccuStandard, following the lead of environmental chemists, we recognize the emerging problem of the presence of OH-PBCDEs. We have synthesized three OH-PBCDEs and their methylated counterparts to provide reference standards for this new group of compounds. All three chlorinated OH-PBDEs are based on the structure of BDE-47, the most common BDE congener found in environmental samples.

AccuStandard, Inc. will synthesize more derivatives as demand for these compounds develops.

Solutions in 1 mL

Compound (Short Form)	Conc.	Solvent	Cat. No.
<b>Hydroxy</b>			
3-Chloro-6-hydroxy-2,2',4,4'-tetrabromodiphenyl ether (3-Cl-6-OH-BDE-047)	25 µg/mL	Acetonitrile	HCBDE-4001S-0.5X
	50 µg/mL	Acetonitrile	HCBDE-4001S
3,5-Dichloro-6-hydroxy-2,2',4,4'-tetrabromodiphenyl ether (3,5-Cl <sub>2</sub> -6-OH-BDE-047)	25 µg/mL	Acetonitrile	HCBDE-4002S-0.5X
	50 µg/mL	Acetonitrile	HCBDE-4002S
5-Chloro-6-hydroxy-2,2',4,4'-tetrabromodiphenyl ether (5-Cl-6-OH-BDE-047)	25 µg/mL	Acetonitrile	HCBDE-4003S-0.5X
	50 µg/mL	Acetonitrile	HCBDE-4003S
<b>Methoxy</b>			
3-Chloro-6-methoxy-2,2',4,4'-tetrabromodiphenyl ether (3-Cl-6-MeO-BDE-047)	25 µg/mL	Methanol	MOCBDE-4001S-0.5X
	50 µg/mL	Methanol	MOCBDE-4001S
3,5-Dichloro-6-methoxy-2,2',4,4'-tetrabromodiphenyl ether (3,5-Cl <sub>2</sub> -6-MeO-BDE-047)	25 µg/mL	Methanol	MOCBDE-4002S-0.5X
	50 µg/mL	Methanol	MOCBDE-4002S
5-Chloro-6-methoxy-2,2',4,4'-tetrabromodiphenyl ether (5-Cl-6-MeO-BDE-047)	25 µg/mL	Methanol	MOCBDE-4003S-0.5X
	50 µg/mL	Methanol	MOCBDE-4003S

# HBCD Isomers, Bromobiphenyls, Bromophenols, Bromoanisoles

## Hexabromocyclododecane (HBCD) Isomers

Solutions in 1 mL

Compound	CAS No.	Conc.	Matrix	Cat. No.
$\alpha$ -Hexabromocyclododecane		100 $\mu\text{g/mL}$	Toluene	HXBCD-01
$\beta$ -Hexabromocyclododecane		100 $\mu\text{g/mL}$	Toluene	HXBCD-02
$\gamma$ -Hexabromocyclododecane		100 $\mu\text{g/mL}$	Toluene	HXBCD-03

## Bromobiphenyl Congeners

Compound	CAS No.	Conc.	Matrix	Cat. No.
2-Bromobiphenyl	2052-07-5	50 mg	NEAT	B-001N
		35 $\mu\text{g/mL}$	Isooctane	B-001S
		1 mg/mL	Acetone	M-8081-SS-X
3-Bromobiphenyl	2113-57-7	50 mg	NEAT	B-002N
		35 $\mu\text{g/mL}$	Isooctane	B-002S
4-Bromobiphenyl	92-66-0	50 mg	NEAT	B-003N
		35 $\mu\text{g/mL}$	Isooctane	B-003S
2,2'-Dibromobiphenyl	13029-09-9	10 mg	NEAT	B-004N
		35 $\mu\text{g/mL}$	Isooctane	B-004S
2,4-Dibromobiphenyl	53592-10-2	10 mg	NEAT	B-007N-10MG
		35 $\mu\text{g/mL}$	Isooctane	B-007S
2,5-Dibromobiphenyl	57422-77-2	25 mg	NEAT	B-009N
		35 $\mu\text{g/mL}$	Isooctane	B-009S
2,6-Dibromobiphenyl	59080-32-9	5 mg	NEAT	B-010N-5MG
		35 $\mu\text{g/mL}$	Isooctane	B-010S
4,4'-Dibromobiphenyl	92-86-4	10 mg	NEAT	B-015N
		35 $\mu\text{g/mL}$	Isooctane	B-015S
2,2',5-Tribromobiphenyl	59080-34-1	10 mg	NEAT	B-018N
		35 $\mu\text{g/mL}$	Isooctane	B-018S
2,3',5-Tribromobiphenyl	59080-35-2	10 mg	NEAT	B-026N
		35 $\mu\text{g/mL}$	Isooctane	B-026S
2,4,5-Tribromobiphenyl	115245-07-3	35 $\mu\text{g/mL}$	Isooctane	B-029S
2,4,6-Tribromobiphenyl	59080-33-0	25 mg	NEAT	B-030N
		35 $\mu\text{g/mL}$	Isooctane	B-030S
2,4',5-Tribromobiphenyl	59080-35-3	10 mg	NEAT	B-031N
		35 $\mu\text{g/mL}$	Isooctane	B-031S
2,2',4,5'-Tetrabromobiphenyl	60044-24-8	5 mg	NEAT	B-049N-5MG
		35 $\mu\text{g/mL}$	Isooctane	B-049S
2,2',5,5'-Tetrabromobiphenyl	59080-37-4	10 mg	NEAT	B-052N
		35 $\mu\text{g/mL}$	Isooctane	B-052S
2,2',5,6'-Tetrabromobiphenyl	60044-25-9	5 mg	NEAT	B-053N-5MG
		35 $\mu\text{g/mL}$	Isooctane	B-053S
3,3',4,4'-Tetrabromobiphenyl	77102-82-0	35 $\mu\text{g/mL}$	Isooctane	B-077S
3,3',5,5'-Tetrabromobiphenyl	16400-50-3	35 $\mu\text{g/mL}$	Isooctane	B-080S
2,2',4,5,5'-Pentabromobiphenyl	67888-96-4	5 mg	NEAT	B-101N
		35 $\mu\text{g/mL}$	Isooctane	B-101S
2,2',4,5',6-Pentabromobiphenyl	59080-39-6	5 mg	NEAT	B-103N
		35 $\mu\text{g/mL}$	Isooctane	B-103S
2,2',4,4',5,5'-Hexabromobiphenyl	59080-40-9	35 $\mu\text{g/mL}$	Isooctane	B-153S
2,2',4,4',6,6'-Hexabromobiphenyl	59261-08-4	5 mg	NEAT	B-155N
		35 $\mu\text{g/mL}$	Isooctane	B-155S
3,3',4,4',5,5'-Hexabromobiphenyl	77607-09-1	35 $\mu\text{g/mL}$	Isooctane	B-169S
2,2',3,3',4,5',6,6'-Octabromobiphenyl	119264-60-7	35 $\mu\text{g/mL}$	Isooctane	B-200S
Decabromobiphenyl	13654-09-6	25 mg	NEAT	B-209N
		35 $\mu\text{g/mL}$	Isooctane:Acetone (98:2)	B-209S

## Bromophenols

1 mL each at 100  $\mu\text{g/mL}$  in Toluene

Compound	CAS No.	Cat. No.
3-Bromophenol	591-20-8	BP-003S
4-Bromophenol	106-41-2	BP-004S
2,3-Dibromophenol	57383-80-9	BP-023S
2,4-Dibromophenol	615-58-7	BP-024S
2,5-Dibromophenol	28165-52-8	BP-025S
2,6-Dibromophenol	608-33-3	BP-026S
3,5-Dibromophenol	626-41-5	BP-035S
2,3,4-Tribromophenol		BP-234S
2,3,6-Tribromophenol		BP-236S
2,4,5-Tribromophenol		BP-245S
2,4,6-Tribromophenol	118-79-6	BP-246S
3,4,5-Tribromophenol		BP-345S
2,3,4,5-Tetrabromophenol		BP-2345S
2,3,4,6-Tetrabromophenol	14400-94-3	BP-2346S
2,3,5,6-Tetrabromophenol		BP-2356S
Pentabromophenol	608-71-9	BP-23456S

## Bromoanisoles (Bromophenyl Methyl Ethers)

1 mL each at 50  $\mu\text{g/mL}$  in Methanol

Compound	CAS No.	Cat. No.
2-Bromoanisole	578-57-4	BAN-01
3-Bromoanisole	2398-37-0	BAN-02
4-Bromoanisole	104-92-7	BAN-03
2,3-Dibromoanisole		BAN-04
2,4-Dibromoanisole	21702-84-1	BAN-05
2,5-Dibromoanisole		BAN-06
2,6-Dibromoanisole	38603-09-7	BAN-07
3,5-Dibromoanisole	74137-36-3	BAN-08
2,4,5-Tribromoanisole		BAN-09
2,4,6-Tribromoanisole	607-99-8	BAN-10

## Bromine Containing Industrial Flame Retardants (BFRs)

### Priority Pollutants According to the Norwegian Pollution Control Authority (SFT)

Brominated Flame Retardants (BFRs) are a group of chemicals that inhibit combustion. They are extensively used in electrical and electronic equipment, transport equipment, building materials, paint and insulation foams. However, these show up in the environment and cause adverse health effects. Thus, it is an international target to substantially reduce the release of five prioritized BFRs before the year 2010 and completely eliminate the discharge of those five substances before the year 2020.

To review and assess the current state of knowledge on emerging "new" BFRs, the selected substances are monitored for their environmental levels including, data on toxicity and ecotoxicity, potential to bioconcentrate and bioaccumulate in the food web, possible analytical methods, their persistence in the environment and other data. This information is used to select compounds that, based on the current state of knowledge, can be relevant for further monitoring.

For this purpose, the Norwegian Pollution Control Authority (SFT) has commissioned the Environmental Research Institute of Norway (NILU), Swerea IVF (Sweden) and WECC Wania Environmental Chemist Corp. (Canada) to perform this study.

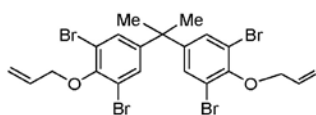
AccuStandard, Inc. has either synthesized or collected these 21 new BFR Standards and offers them to the environmental chemist for the first time in this (nearly) complete form.

**Note: If you want any of these compounds in a different solvent, please request a custom quotation.**

Neats at 10 mg. Solutions at 100 µg/mL in 1 mL.

### Tetrabromobisphenol A diallyl ether

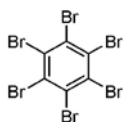
[25327-89-3] C<sub>21</sub>H<sub>20</sub>Br<sub>4</sub>O<sub>2</sub> FW 624.0



Matrix	Cat. No.
NEAT	FRS-045N
Toluene	FRS-045S

### Hexabromobenzene

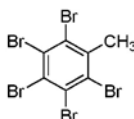
[87-82-1] C<sub>6</sub>H<sub>6</sub> FW 551.49



Matrix	Cat. No.
NEAT	FRS-012N
Toluene	FRS-012S

### Pentabromotoluene

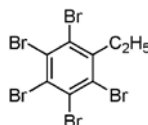
[87-83-2] C<sub>7</sub>H<sub>3</sub>Br<sub>5</sub> FW 486.62



Matrix	Cat. No.
NEAT	FRS-018N
Toluene	FRS-018S

### Pentabromoethylbenzene

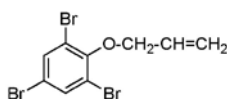
[85-22-3] C<sub>8</sub>H<sub>5</sub>Br<sub>5</sub> FW 500.65



Matrix	Cat. No.
Toluene	FRS-048S

### 2,4,6-Tribromophenyl allyl ether

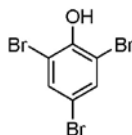
[3278-89-5] C<sub>9</sub>H<sub>7</sub>Br<sub>3</sub>O FW 370.86



Matrix	Cat. No.
NEAT	FRS-043N
Toluene	FRS-043S

### 2,4,6-Tribromophenol

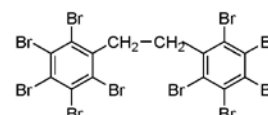
[118-79-6] C<sub>6</sub>H<sub>3</sub>Br<sub>3</sub>O FW 330.80



Matrix	Cat. No.
NEAT	BP-246N
Toluene	BP-246S

### Decabromodiphenylethane

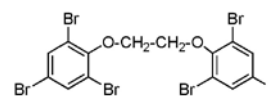
[84852-53-9] C<sub>14</sub>H<sub>4</sub>Br<sub>10</sub> FW 971.22



Matrix	Cat. No.
NEAT	FRS-036N
Toluene	FRS-036S

### 1,2-bis(2,4,6-Tribromophenoxy)ethane

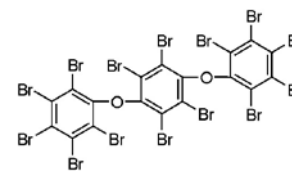
[37853-59-1] C<sub>14</sub>H<sub>8</sub>Br<sub>6</sub>O<sub>2</sub> FW 687.64



Matrix	Cat. No.
NEAT	FRS-037N
Toluene	FRS-037S

### 1,4-bis(Pentabromophenoxy)tetrabromobenzene

[58965-66-5] C<sub>18</sub>Br<sub>14</sub>O<sub>2</sub> FW 1366.85



Matrix	Cat. No.
NEAT	FRS-052N
Toluene	FRS-052S

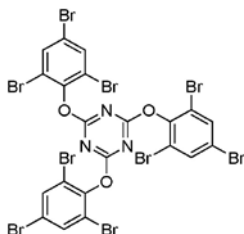
# Industrial Flame Retardants

## Bromine Containing Industrial Flame Retardants (BFRs) continued

Neats at 10 mg. Solutions at 100 µg/mL in 1 mL.

### 2,4,6-tris(2,4,6-Tribromophenoxy)-1,3,5-triazine

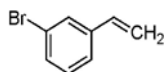
[25713-60-4] C<sub>21</sub>H<sub>9</sub>Br<sub>9</sub>N<sub>3</sub>O<sub>3</sub> FW 1067.43



Matrix	Cat. No.
Toluene	FRS-049S

### 3-Bromostyrene

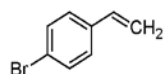
[2039-86-3] C<sub>8</sub>H<sub>7</sub>Br FW 183.04



Matrix	Cat. No.
NEAT	FRS-050N
Toluene	FRS-050S

### 4-Bromostyrene

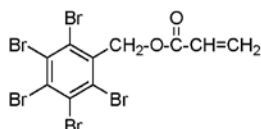
[2039-82-9] C<sub>8</sub>H<sub>7</sub>Br FW 183.04



Matrix	Cat. No.
NEAT	FRS-051N
Toluene	FRS-051S

### Pentabromobenzyl acrylate

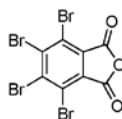
[59447-55-1] C<sub>10</sub>H<sub>5</sub>Br<sub>5</sub>O<sub>2</sub> FW 556.67



Matrix	Cat. No.
NEAT	FRS-035N
Toluene	FRS-035S

### Tetrabromophthalic anhydride

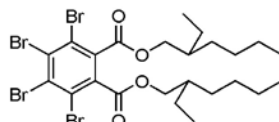
[632-79-1] C<sub>8</sub>Br<sub>4</sub>O<sub>3</sub> FW 463.7



Matrix	Cat. No.
NEAT	FRS-007N
Toluene	FRS-007S

### Di(2-ethylhexyl)tetrabromophthalate

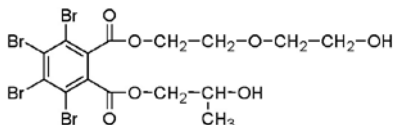
[26040-51-7] C<sub>24</sub>H<sub>34</sub>Br<sub>4</sub>O<sub>3</sub> FW 706.14



Matrix	Cat. No.
NEAT	FRS-040N
Toluene	FRS-040S

### 1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-2-(2-hydroxyethyl)-2-hydroxypropyl ester

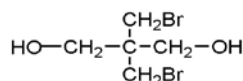
[20566-35-2] C<sub>15</sub>H<sub>16</sub>Br<sub>4</sub>O<sub>7</sub> FW 627.9



Matrix	Cat. No.
Toluene	FRS-054S

### Dibromoneopentyl glycol

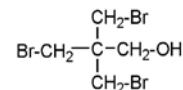
[3296-90-0] C<sub>5</sub>H<sub>10</sub>Br<sub>2</sub>O<sub>2</sub> FW 261.94



Matrix	Cat. No.
NEAT	FRS-011N
Toluene	FRS-011S

### Tetrabromophthalic anhydride

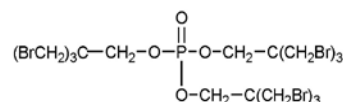
[1522-92-5 / 36483-57-5] C<sub>5</sub>H<sub>9</sub>Br<sub>3</sub>O



Matrix	Cat. No.
NEAT	FRS-046N
Toluene	FRS-046S

### tris(Tribromoneopentyl)phosphate

[19186-97-1] C<sub>15</sub>H<sub>24</sub>Br<sub>9</sub>O<sub>4</sub>P FW 1018.46



Matrix	Cat. No.
NEAT	FRS-047N
Toluene	FRS-047S

### Ammonium bromide

[12124-97-9] BrH<sub>4</sub>N FW 97.94



Matrix	Cat. No.
NEAT	FRS-055N
Methanol	FRS-055S-M

Industrial Flame Retardants continued on next page

# Industrial Flame Retardants

## Bromine Containing Industrial Flame Retardants (BFRs) Commercial Grade BFRs

Neats at 10 mg  
Solutions at 1 mL

Compound	CAS No.	Active Ingredient	Conc.	Matrix	Cat. No.
Bromkal™ DE-70-5		Penta BDEs	50 µg/mL	Isooctane	BDE-705
Bromkal™ DE-71		Penta BDEs	50 µg/mL	Isooctane	BDE-710
Bromkal™ DE-73-6		Hexa BDEs	50 µg/mL	Isooctane	BDE-736
Bromkal™ DE-79-8		Octa BDEs	50 µg/mL	Isooctane	BDE-798
Dow FR-250	27858-07-7	Mix of Octa and Nonabromobiphenyl	35 µg/mL	Isooctane	B-250S-0.35X
			100 µg/mL	Isooctane	B-250S
Firemaster™ BP4A	79-94-7	Tetrabromobisphenol A	10 mg	NEAT	FRS-006N
			100 µg/mL	Toluene	FRS-006S
Firemaster™ BP-6	59536-65-1	Hexabromobiphenyl	10 mg	NEAT	B-600N
			35 µg/mL	Isooctane	B-600S-0.35X
			100 µg/mL	Isooctane	B-600S
Firemaster™ PHT4	632-79-1	Tetrabromophthalic anhydride	10 mg	NEAT	FRS-007N
			100 µg/mL	Toluene	FRS-007S
Firemaster™ T23P (Michigan Chemical)	126-72-7	Tris(2,3-dibromopropyl)phosphate	10 mg	NEAT	FRS-008N
			100 µg/mL	Toluene	FRS-008S
Firemaster™ 680 (Great Lakes)	37853-59-1	1,2-Bis(2,4,6-tribromophenoxy)ethane	50 mg	NEAT	FRS-037N
			100 µg/mL	Toluene	FRS-037S
Firemaster™ 2100 (Great Lakes)		Decabromodiphenylethane	50 mg	NEAT	FRS-036N
FR-300BA	1163-19-5	Decabromodiphenyl ether 85.5%	10 mg	NEAT	FRS-009N
			100 µg/mL	Toluene	FRS-009S
FR-651A (Dow)	87-84-3	Pentabromochlorocyclohexane	10 mg	NEAT	FRS-010N
			100 µg/mL	Toluene	FRS-010S
FR-1138 (Dow)	3296-90-0	Dibromoneopentyl glycol 85.0%	10 mg	NEAT	FRS-011N
			100 µg/mL	Toluene	FRS-011S
HBCD SP-75C (Great Lakes)	3194-55-6-GL	1,2,5,6,9,10-Hexabromocyclododecane	10 mg	NEAT	FRS-028N
			100 µg/mL	Toluene	FRS-028S
Hexabromobenzene (Michigan Chemical)	87-82-1	Hexabromobenzene	10 mg	NEAT	FRS-012N
			100 µg/mL	Toluene	FRS-012S
Hexabromobenzene (White Chemical)	87-82-1	Hexabromobenzene	10 mg	NEAT	FRS-013N
			100 µg/mL	Toluene	FRS-013S
Pentabromotoluene (White Chemical)	87-83-2	Pentabromotoluene	10 mg	NEAT	FRS-018N
			100 µg/mL	Toluene	FRS-018S
Tetrabromo-o-chlorotoluene (White Chemical)		Tetrabromo-o-chlorotoluene (98%)	10 mg	NEAT	FRS-021N
			100 µg/mL	Toluene	FRS-021S
TP-69 (Great Lakes)	126-72-7	Tris(2,3-dibromopropyl)phosphate	10 mg	NEAT	FRS-023N
			100 µg/mL	Toluene	FRS-023S

## Bromine Containing Industrial Flame Retardants (BFRs) Other BFRs (Pure)

Compound	CAS No.	Conc.	Matrix	Cat. No.
di(2-Ethylhexyl)tetrabromophthalate	26040-51-7	10 mg	NEAT	FRS-040N
		100 µg/mL	Toluene	FRS-040S
2-Ethylhexyl 2,3,4,5-tetrabromobenzoate	183658-27-7	10 mg	NEAT	FRS-041N
		100 µg/mL	Toluene	FRS-041S
Hexachlorocyclopentadienyl-dibromocyclooctane	51939-55-1	10 mg	NEAT	FRS-039N
		100 µg/mL	Toluene	FRS-039S
Pentabromobenzylacrylate	59447-55-1	10 mg	NEAT	FRS-035N
		100 µg/mL	Toluene	FRS-035S
Pentabromobenzylbromide	1163-19-5	10 mg	NEAT	FRS-030N
		100 µg/mL	Toluene	FRS-030S
1,2-Dibromo-4-(1,2-dibromoethyl)cyclohexane	3322-93-8	10 mg	NEAT	FRS-038N
		100 µg/mL	MeOH	FRS-038S
(2,3-Dibromopropyl)(2,4,6-tribromophenyl) ether (DPTE)	35109-60-5	10 mg	NEAT	FRS-044N
		100 µg/mL	Toluene	FRS-044S
tris(2,3-Dibromopropyl) isocyanurate	52434-90-9	10 mg	NEAT	FRS-042N
		100 µg/mL	Toluene	FRS-042S
Tetrabromobisphenol A bis(hydroxyethyl ether)	4162-45-2	50 mg	NEAT	FRS-032N
		100 µg/mL	Toluene	FRS-032S

# Industrial Flame Retardants

## Organophosphate Flame Retardants (OP-FRs)

Organophosphate compounds (OPs) are high production volume chemicals. They are utilized as flame retardants and plasticizers, antifoaming agents and additives not only in plastics, but in paints, lubricants and hydraulic fluids as well. The chlorinated OP compounds like tris(2-chloroethyl) phosphate and tris(1,3-dichloro-2-propyl) phosphate are flame retardants used in both flexible and rigid polyurethane foam (e.g. furniture foam, thermal insulation), rubber, textile coatings, and home electronics. OPs have been detected in indoor air and house dust, surface, ground, and even drinking water. Ongoing toxicological studies have shown several toxic effects of these compounds, prompting the recognition of potential ecological and human health concerns of neurotoxin and carcinogenic nature.

AccuStandard, Inc. is now providing some of the more widely used OP-FRs as reference standards.

Compound	CAS No.	Conc.	Matrix	Cat. No.
tris(2-Chloropropyl)phosphate	6145-73-9	10 mg	NEAT	FRS-056N
		50 µg/mL	Toluene	FRS-056S
tris(2,3-Dibromopropyl)phosphate	126-72-7	10 mg	NEAT	FRS-057N
		50 µg/mL	Toluene	FRS-057S
tris(2-Chloroethyl)phosphate	115-96-8	10 mg	NEAT	FRS-058N
		50 µg/mL	Toluene	FRS-058S
tris(1,3-Dichloro-2-propyl)phosphate	13674-87-8	10 mg	NEAT	FRS-059N
		50 µg/mL	Toluene	FRS-059S
tris(1-Chloro-2-propyl)phosphate	13674-84-5	50 µg/mL	Toluene	FRS-060S

Neats at 10 mg  
Solutions at 1 mL

## Chlorine Containing Industrial Flame Retardants (CFRs)

Compound	CAS No.	Active Ingredient	Conc.	Matrix	Cat. No.
Chlorafin™ 40	63449-39-8	Chlorinated Paraffin	10 mg	NEAT	FRS-002N
			100 µg/mL	Toluene	FRS-002S
Chlorendic anhydride	115-27-5	Chlorendic anhydride	10 mg	NEAT	FRS-001N
			100 µg/mL	Toluene	FRS-001S
bis(2-Chloroethyl)ether	111-44-4	bis(2-Chloroethyl)ether	100 µg/mL	MeOH	APP-9-027
			5 mg/mL	MeOH	AS-E0016
4-Chlorophenyl phenyl ether	7005-72-3	4-Chlorophenyl phenyl ether	100 µg/mL	MeOH	APP-9-047
			5 mg/mL	MeOH	AS-E0038
Chlorowax™ 500C	63449-39-8	Chlorinated Hydrocarbons 59.0%	10 mg	NEAT	FRS-004N
			100 µg/mL	Toluene	FRS-004S
Diable 700X		Chlorinated Hydrocarbons 70.0%	10 mg	NEAT	FRS-005N
			100 µg/mL	Toluene	FRS-005S
Dechlorane Plus	13560-89-9	Dechlorane Plus	10 mg	NEAT	FRS-033N
Hexachlorobutadiene	87-68-3	Hexachlorobutadiene	10 mg	NEAT	FRS-017N
			100 µg/mL	Toluene	FRS-017S
Paroil™ 179-HV	63449-39-8	Chlorinated Paraffin	10 mg	NEAT	FRS-015N
			100 µg/mL	Toluene	FRS-015S
Paroil™ 170-8	63449-39-8	Chlorinated Paraffin	10 mg	NEAT	FRS-016N
			100 µg/mL	Toluene	FRS-016S
Phosgard™ C 22-R	4351-70-6	Halogenated organic phosphate ester	10 mg	NEAT	FRS-019N
			100 µg/mL	Toluene	FRS-019S
Phosgard™ 2XC-20		Halogenated organic phosphate ester	10 mg	NEAT	FRS-020N
			100 µg/mL	Toluene	FRS-020S
Tetrachlorobisphenol A	79-95-8	Tetrachlorobisphenol A	10 mg	NEAT	FRS-022N
			100 µg/mL	Toluene	FRS-022S
Unichlor™ 40-90	63449-39-8	Chlorinated Hydrocarbons 38.5%	10 mg	NEAT	FRS-024N
			100 µg/mL	Toluene	FRS-024S
Unichlor™ 502-50	63449-39-8	Chlorinated Hydrocarbons 52.0%	10 mg	NEAT	FRS-025N
			100 µg/mL	Toluene	FRS-025S
Unichlor™ 70AX	63449-39-8	Chlorinated Hydrocarbons 70.0%	10 mg	NEAT	FRS-026N
			100 µg/mL	Toluene	FRS-026S

### Reference Trade Marks

**Chlorafin** Hercules Powder Company Corp.  
**Chlorowax** Dover Chemical Corp.

**Firemaster** Great Lakes Chemical Corp.  
**Paroil** Dover Chemical Corp.

**Phosgard** Solutia Inc.  
**Unichlor** Neville Chemical Co.

**Bromkal** Chemische Fabrik Kalk



**AccuStandard<sup>®</sup>**



Phone: 203-786-5290  
Toll Free: 800-442-5290

Fax: 203-786-5287  
Fax Toll Free: 877-786-5287

Email: [usa@accustandard.com](mailto:usa@accustandard.com)  
Website: [AccuStandard.com](http://AccuStandard.com)