

# Polybrominated Diphenyl Ether (PBDE)

## Tech Grade PBDEs, Specific Mixes & Calibration Curve



### Technical Grade PBDEs

#### PBDE Technical Grade

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

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#### 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

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

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

BDE-798-GL	1 x 1 mL
50 µg/mL each in Isooctane	
DE-79 (Great Lakes)	

### Specific Mixtures

#### PBDEs 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'-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 (80:20)	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',5,6'-Hexabromodiphenyl ether	

### Calibration Curve

#### ISO/DIS 22032 Calibration Curve Set

##### ISO/DIS-22032-SET

At stated conc. (ng/mL) in Isooctane

ISO/DIS-22032	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 for 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

#### ISO/DIS 22032 Internal Standard for 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



# EPA Method 1614

Method 1614

## Mixtures of PBDEs Standard Solution for Accuracy & Precision

<b>BDE-AAP-A</b> At stated conc. in Isooctane	<b>1 x 1 mL</b> 39 comps. ng/mL	<b>BDE-AAP-A-15X</b> At stated conc. in Isooctane	<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 an analytical method for 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.

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

<b>BDE-COC</b> At stated conc. in Isooctane	<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> At stated conc. in Isooctane	<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> At stated conc. in Isooctane	<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> At stated conc. in Isooctane	<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

<b>BDE-EPA-SET</b> 50 µg/mL each in Isooctane	<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)	