

Flame Retardants

There are 209 congeners of the PBDEs (Polybrominated Diphenyl Ethers) many of which are contained in the technical mixtures that are used as flame-retardants. The congeners that are the major constituents of commercial flame-retardants are PBDE congener numbers 28, 47, 99, 100, 153, 154, 183 and 209. There are however minor congener constituents that are even more toxic.

PBDEs attract the same kind of attention as PCBs (Polychlorinated Biphenyls) being ubiquitous in the environment and similarly persistent.

AccuStandard is the only company in the world to synthesize all 209 PCB congeners, and is well on the way to accomplishing similar success for the PBDEs. Currently, AccuStandard has synthesized over 150 PBDE congeners. New congeners, as well as selected metabolites are currently under development. See how we can meet your specific analytical needs, contact us by phone or e-mail at techservice@accustandard.com.

Flame Retardant Standards are listed as follows:

- Individual Polybrominated Diphenyl Ethers (PBDEs)
- PBDE Metabolites (Hydroxy and Methoxy Derivatives)
- Bromobiphenyl Congeners
- Other Flame Retardants
- PBDEs Selected Mixtures



Polybrominated Diphenyl Ethers (PBDEs)

Individual PBDEs Standards (in 1 mL of solvent, unless otherwise noted)

PBDEs	CAS NO.	QTY/CONC.	MATRIX	CAT. NO.
2-Bromodiphenyl ether		50 µg/mL	Isooctane	BDE-001S
3-Bromodiphenyl ether		50 µg/mL	Isooctane	BDE-002S
4-Bromodiphenyl ether	101-55-3	50 µg/mL	Isooctane	BDE-003S
2,2'-Dibromodiphenyl ether		50 µg/mL	Isooctane	BDE-004S
2,3-Dibromodiphenyl ether		50 µg/mL	Isooctane	BDE-005S
2,3'-Dibromodiphenyl ether		50 µg/mL	Isooctane	BDE-006S
2,4-Dibromodiphenyl ether		50 µg/mL	Isooctane	BDE-007S
2,4'-Dibromodiphenyl ether		50 µg/mL	Isooctane	BDE-008S
2,5-Dibromodiphenyl ether		50 µg/mL	Isooctane	BDE-009S
2,6-Dibromodiphenyl ether		50 µg/mL	Isooctane	BDE-010S
3,3'-Dibromodiphenyl ether		50 µg/mL	Isooctane	BDE-011S
3,4-Dibromodiphenyl ether		50 µg/mL	Isooctane	BDE-012S
3,4'-Dibromodiphenyl ether		50 µg/mL	Isooctane	BDE-013S
3,5-Dibromodiphenyl ether		50 µg/mL	Isooctane	BDE-014S
4,4'-Dibromodiphenyl ether	2050-47-7	50 µg/mL	Isooctane	BDE-015S
2,2',3-Tribromodiphenyl ether		50 µg/mL	Isooctane	BDE-016S
2,2',4,-Tribromodiphenyl ether		50 µg/mL	Isooctane	BDE-017S
2,2',5-Tribromodiphenyl ether		50 µg/mL	Isooctane	BDE-018S
2,2',6-Tribromodiphenyl ether		50 µg/mL	Isooctane	BDE-019S
2,3,3'-Tribromodiphenyl ether		50 µg/mL	Isooctane	BDE-020S
2,3,4-Tribromodiphenyl ether		50 µg/mL	Isooctane	BDE-021S
2,3,4'-Tribromodiphenyl ether		50 µg/mL	Isooctane	BDE-022S
2,3,5-Tribromodiphenyl ether		50 µg/mL	Isooctane	BDE-023S
2,3',4-Tribromodiphenyl ether		50 µg/mL	Isooctane	BDE-025S
2,3',5-Tribromodiphenyl ether		50 µg/mL	Isooctane	BDE-026S
2,3',6-Tribromodiphenyl ether		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		50 µg/mL	Isooctane	BDE-029S
2,4,6-Tribromodiphenyl ether		50 µg/mL	Isooctane	BDE-030S
2,4',5-Tribromodiphenyl ether		50 µg/mL	Isooctane	BDE-031S
2,4',6-Tribromodiphenyl ether		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		50 µg/mL	Isooctane	BDE-034S
3,3',4-Tribromodiphenyl ether		50 µg/mL	Isooctane	BDE-035S
3,3',5-Tribromodiphenyl ether		50 µg/mL	Isooctane	BDE-036S
3,4,4'-Tribromodiphenyl ether		50 µg/mL	Isooctane	BDE-037S
3,4,5-Tribromodiphenyl ether		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		50 µg/mL	Isooctane	BDE-041S
2,2',3,4'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-042S
2,2',3,5-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-043S
2,2',3,6-Tetrabromodiphenyl ether		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		50 µg/mL	Isooctane	BDE-048S
2,2',4,5'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-049S
2,2',4,6-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-050S
2,2',4,6'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-051S
2,2',5,6'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-053S
2,3,3',4-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-055S
2,3,3',5-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-057S
2,3,3',5'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-058S
2,3,4,4'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-060S
2,3,4,5-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-061S
2,3,4,6-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-062S
2,3,4',5-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-063S

Flame Retardants

Individual PBDEs Standards (in 1 mL of solvent, unless otherwise noted)

PBDEs	CAS NO.	QTY./CONC.	MATRIX	CAT. NO.
2,3',4,4'-Tetrabromodiphenyl ether	189084-61-5	50 µg/mL	Isooctane	BDE-066S
2,3',4,5'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-067S
2,3',4,5'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-068S
2,3',4,6'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-069S
2,3',4',6'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-071S
2,3',5,5'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-072S
2,3',5',6'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-073S
2,4,4',5'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-074S
2,4,4',6'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-075S
2',3,4,5'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-076S
3,3',4,4'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-077S
3,3',4,5'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-078S
3,3',4,5'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-079S
3,3',5,5'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-080S
3,4,4',5'-Tetrabromodiphenyl ether		50 µg/mL	Isooctane	BDE-081S
2,2',3,3',5'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-083S
2,2',3,4,4'-Pentabromodiphenyl ether	182346-21-0	50 µg/mL	Isooctane	BDE-085S
2,2',3,4,5'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-086S
2,2',3,4,5'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-087S
2,2',3,4,6'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-088S
2,2',3,4',5'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-090S
2,2',3,5,5'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-092S
2,2',3,5,6'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-094S
2,2',3',4,5'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-097S
2,2',3',4,6'-Pentabromodiphenyl ether		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		50 µg/mL	Isooctane	BDE-101S
2,2',4,5,6'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-102S
2,2',4,5',6'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-103S
2,2',4,6,6'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-104S
2,3,3',4,4'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-105S
2,3,3',4,5'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-106S
2,3,3',4,5'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-108S
2,3,3',4,6'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-109S
2,3,3',5,5'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-111S
2,3,4,4',5'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-114S
2,3,4,4',6'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-115S
2,3,4,5,6'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-116S
2,3',4,4',5'-Pentabromodiphenyl ether		50 µg/mL	Isooctane	BDE-118S
2,3',4,4',6'-Pentabromodiphenyl ether		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-130S
2,2',3,3',4,6'-Hexabromodiphenyl ether		50 µg/mL	Isooctane	BDE-131S
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		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-144S
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-148S
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		50 µg/mL	Isooctane	BDE-155S
2,3,3',4,4',5'-Hexabromodiphenyl ether		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
2,3,4,4',5,6'-Hexabromodiphenyl ether		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
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',3,4,4',5,5'-Heptabromodiphenyl ether		50 µg/mL	Isooctane	BDE-180S
2,2',3,4,4',5,6'-Heptabromodiphenyl ether		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

Individual PBDEs

Flame Retardants

Individual PBDEs Standards (in 1 mL of solvent, unless otherwise noted)

PBDEs	CAS NO.	QTY./CONC.	MATRIX	CAT. NO.
2,3,3',4,4',5,6-Heptabromodiphenyl ether		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
2,2',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',3,4,4',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-0.2X
2,2',3,3',4,5,5',6,6'-Nonabromodiphenyl ether		10 µg/mL	Nonane	BDE-208S-0.2X
Decabromodiphenyl ether	1163-19-5	50 µg/mL	Isooctane	BDE-209S

Polybrominated Diphenyl Ether Mixtures

Bromodiphenyl Ethers Lake Michigan Study

BDE-LMS 1 x 1 mL
 10 µg/mL each in Isooctane 9 comps.

(BZ#)
 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)

PBDEs in Columbia River

BDE-CR 1 x 1 mL
 10 µg/mL each in Isooctane 12 comps.

(BZ#)
 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)

Common PBDEs in US Environment

BDE-USE 1 x 1 mL
 10 µg/mL each in Isooctane 5 comps.

(BZ#)
 2,2',4,4'-Tetrabromodiphenyl ether (#28)
 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)

Common PBDE Congeners in California Environment

BDE-CAE-1 1 x 1 mL
 10 µg/mL each in Isooctane 7 comps.

(BZ#)
 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)

Bromodiphenyl ethers in proposed US EPA Method

BDE-EPA-SET 1 x 1 mL
 50 µg/mL each in Isooctane 8 comps.

(BZ#)
 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)

California Method 750-M Standard

BDE-CALEWS 1 x 1 mL
 10 µg/mL each in Isooctane 13 comps.

(BZ#)
 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

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Flame Retardants

Method 1614 Polybrominated Diphenyl Ether Mixtures

Mixture of PBDEs Standard Solution for Accuracy & Precision

At stated conc. in Isooctane

39 comps.

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

Mixture of Commonly Occurring PBDE Congeners for Precision and Recovery

At stated conc. in Isooctane

14 comps.

(BZ#)	1 x 1 mL (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 Mixtures

PBDE Congeners of Primary Interest

Calibration Mix

BDE-CM 1 x 1 mL
 At stated conc. in Isooctane 8 comps.

(BZ#)	(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

PBDE Congeners of Primary Interest

BDE-CSM 1 x 1 mL
 At stated conc. in Isooctane 8 comps.

(BZ#)	(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

Matrix Spiking Solution

BDE-MS 1 x 1 mL
 At stated conc. in Isooctane 8 comps.

(BZ#)	(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

Flame Retardants

PBDE Metabolites: Hydroxy and Methoxy Polybromo Diphenyl Ether congeners

These metabolites can be found wherever there are PBDEs, and they present their own toxicological hazard. This effect is well known with PCBs where the Hydroxylated species is often more toxic than the parent compounds. AccuStandard's Synthesis Department has prepared the following congeners listed below as a start. We are continuously expanding this list. Please inquire for updates or any specific compound you need. Contact us by phone or e-mail at techservice@accustandard.com

PBDE Metabolites

PBDE Metabolites (in 1 mL of solvent, unless otherwise noted)

PBDE METABOLITES	CAS NO.	QTY./CONC.	MATRIX	CAT. NO.
3'-Hydroxy-2,4-dibromodiphenyl ether		50 µg/mL	AcCN	HBDE-2001S-CN
4'-Hydroxy-2,2',4-tribromodiphenyl ether		50 µg/mL	AcCN	HBDE-3001S-CN
3'-Hydroxy-2,4,4'-tribromodiphenyl ether		50 µg/mL	AcCN	HBDE-3002S-CN
4-Hydroxy-2,2',3,4'-tetrabromodiphenyl ether		50 µg/mL	AcCN	HBDE-4001S-CN
4'-Hydroxy-2,2',4,5'-tetrabromodiphenyl ether		50 µg/mL	AcCN	HBDE-4002S-CN
3-Hydroxy-2,2',4,4'-tetrabromodiphenyl ether		50 µg/mL	AcCN	HBDE-4003S-CN
5-Hydroxy-2,2',4,4'-tetrabromodiphenyl ether		50 µg/mL	AcCN	HBDE-4004S-CN
4-Hydroxy-2,2',3,4',5-pentabromodiphenyl ether		50 µg/mL	AcCN	HBDE-5001S-CN
3'-Methoxy-2,4-dibromodiphenyl ether		50 µg/mL	MeOH	MOBDE-2001S
4'-Methoxy-2,2',4-tribromodiphenyl ether		50 µg/mL	MeOH	MOBDE-3001S
3'-Methoxy-2,4,4'-tribromodiphenyl ether		50 µg/mL	MeOH	MOBDE-3002S
2'-Methoxy-2,4,4'-tribromodiphenyl ether		50 µg/mL	MeOH	MOBDE-3003S
4-Methoxy-2,2',3,4'-tetrabromodiphenyl ether		50 µg/mL	MeOH	MOBDE-4001S
4'-Methoxy-2,2',4,5'-tetrabromodiphenyl ether		50 µg/mL	MeOH	MOBDE-4002S
3-Methoxy-2,2',4,4'-tetrabromodiphenyl ether		50 µg/mL	MeOH	MOBDE-4003S
5-Methoxy-2,2',4,4'-tetrabromodiphenyl ether		50 µg/mL	MeOH	MOBDE-4004S
4-Methoxy-2,2',3,4',5-pentabromodiphenyl ether		50 µg/mL	MeOH	MOBDE-5001S

Bromobiphenyl Congeners

Individual Bromobiphenyl Congeners (in 1 mL of solvent, unless otherwise noted)

BROMOBIPHENYL CONGENERS	CAS NO.	QTY./CONC.	MATRIX	CAT. NO.
2-Bromobiphenyl	2052-07-5	50 mg	Neat	B-001N
		35 µg/mL	Isooctane	B-001S
		1 mg/mL	Acetone	M-8081-SS-X
3-Bromobiphenyl	2113-57-7	50 mg	Neat	B-002N
		35 µg/mL	Isooctane	B-002S
4-Bromobiphenyl	92-66-0	50 mg	Neat	B-003N
		35 µg/mL	Isooctane	B-003S
2,2'-Dibromobiphenyl	13099-09-9	10 mg	Neat	B-004N
		35 µg/mL	Isooctane	B-004S
2,4-Dibromobiphenyl	53592-10-2	25 mg	Neat	B-007N
		35 µg/mL	Isooctane	B-007S
2,5-Dibromobiphenyl	57422-77-2	25 mg	Neat	B-009N
		35 µg/mL	Isooctane	B-009S
2,6-Dibromobiphenyl	59080-32-9	10 mg	Neat	B-010N
		35 µg/mL	Isooctane	B-010S
4,4'-Dibromobiphenyl	92-86-4	10 mg	Neat	B-015N
		35 µg/mL	Isooctane	B-015S
2,2',4,4',5,5'-Hexabromobiphenyl	59080-40-9	10 mg	Neat	B-153N
		35 µg/mL	Isooctane	B-153S
2,2',4,4',6,6'-Hexabromobiphenyl	59261-08-4	5 mg	Neat	B-155N
		35 µg/mL	Isooctane	B-155S
3,3',4,4',5,5'-Hexabromobiphenyl	77607-09-1	35 µg/mL	Isooctane	B-169S
2,2',4,5,5'-Pentabromobiphenyl	67888-96-4	35 µg/mL	Isooctane	B-101S
2,2',4,5'-Tetrabromobiphenyl	60044-24-8	10 mg	Neat	B-049N
		35 µg/mL	Isooctane	B-049S
2,2',5,5'-Tetrabromobiphenyl	59080-37-4	10 mg	Neat	B-052N
		35 µg/mL	Isooctane	B-052S
2,2',5,6'-Tetrabromobiphenyl	60044-25-9	10 mg	Neat	B-053N
		35 µg/mL	Isooctane	B-053S
3,3',4,4'-Tetrabromobiphenyl	77102-82-0	35 µg/mL	Isooctane	B-077S
3,3',5,5'-Tetrabromobiphenyl	16400-50-3	35 µg/mL	Isooctane	B-080S
2,2',5-Tribromobiphenyl	59080-34-1	10 mg	Neat	B-018N
		35 µg/mL	Isooctane	B-018S
2,3',5-Tribromobiphenyl	59080-35-2	10 mg	Neat	B-026N
		35 µg/mL	Isooctane	B-026S
2,4,6-Tribromobiphenyl	59080-33-0	25 mg	Neat	B-030N
		35 µg/mL	Isooctane	B-030S
2,4',5-Tribromobiphenyl	59080-35-3	10 mg	Neat	B-031N
		35 µg/mL	Isooctane	B-031S

Flame Retardants

Other Flame Retardants

Individual Flame Retardants (in 1 mL of solvent, unless otherwise noted)

FLAME RETARDANTS	CAS NO.	QTY./CONC.	MATRIX	CAT. NO.
4-Bromophenyl phenyl ether	101-55-3	100 µg/mL 5 mg/mL	MeOH MeOH	APP-9-033 AS-E0039
Chlorafin™ 40	63449-39-8	10 mg 100 µg/mL	Neat Toluene	FRS-002N FRS-002S
Chlorendic anhydride	115-27-5	10 mg 100 µg/mL	Neat Toluene	FRS-001N FRS-001S
bis(2-Chloroethyl)ether	111-44-4	100 µg/mL 5 mg/mL	MeOH MeOH	APP-9-027 AS-E0016
4-Chlorophenyl phenyl ether	7005-72-3	100 µg/mL 5 mg/mL	MeOH MeOH	APP-9-047 AS-E0038
Chlorowax™ 500C	63449-39-8	10 mg 100 µg/mL	Neat Toluene	FRS-004N FRS-004S
Diable 700X		10 mg 100 µg/mL	Neat Toluene	FRS-005N FRS-005S
Dow FR-250 (Octabromobiphenyl)	27858-07-7	10 mg 100 µg/mL 35 µg/mL	Neat Isooctane Isooctane	B-250N B-250S B-250S-0.35X
Firemaster™ BP4A	79-94-7	10 mg 100 µg/mL	Neat Toluene	FRS-006N FRS-006S
Firemaster BP-6	59536-65-1	10 mg 35 µg/mL 100 µg/mL	Neat Isooctane Isooctane	B-600N B-600S-0.35X B-600S
Firemaster PHT4	632-79-1	10 mg 100 µg/mL	Neat Toluene	FRS-007N FRS-007S
Firemaster T23P		10 mg 100 µg/mL	Neat Toluene	FRS-008N FRS-008S
FR-300BA	1163-19-5	10 mg 100 µg/mL	Neat Toluene	FRS-009N FRS-009S
FR-651A	87-84-3	10 mg 100 µg/mL	Neat Toluene	FRS-010N FRS-010S
FR-1138	3296-90-0	10 mg 100 µg/mL	Neat Toluene	FRS-011N FRS-011S
Hexabromobenzene (mich)	87-82-1	10 mg 100 µg/mL	Neat Toluene	FRS-012N FRS-012S
Hexabromobenzene (white)	87-82-1	10 mg 100 µg/mL	Neat Toluene	FRS-013N FRS-013S
Hexachlorobutadiene	87-68-3	10 mg 100 µg/mL	Neat Toluene	FRS-017N FRS-017S
Paroil™ 179-HV	63449-39-8	10 mg 100 µg/mL	Neat Toluene	FRS-015N FRS-015S
Paroil 170-8	63449-39-8	10 mg 100 µg/mL	Neat Toluene	FRS-016N FRS-016S
Pentabromotoluene	87-83-2	10 mg 100 µg/mL	Neat Toluene	FRS-018N FRS-018S
Phosgard™ C 22-R	4351-70-6	10 mg 100 µg/mL	Neat Toluene	FRS-019N FRS-019S
Phosgard 2XC-20		10 mg 100 µg/mL	Neat Toluene	FRS-020N FRS-020S
Tetrabromo-o-chlorotoluene		10 mg 100 µg/mL	Neat Toluene	FRS-021N FRS-021S
Tetrachlorobisphenol A	79-95-8	10 mg 100 µg/mL	Neat Toluene	FRS-022N FRS-022S
TP-69		10 mg 100 µg/mL	Neat Toluene	FRS-023N FRS-023S
Unichlor™ 40-90	63449-39-8	10 mg 100 µg/mL	Neat Toluene	FRS-024N FRS-024S
Unichlor 502-50	63449-39-8	10 mg 100 µg/mL	Neat Toluene	FRS-025N FRS-025S
Unichlor 70AX	63449-39-8	10 mg 100 µg/mL	Neat Toluene	FRS-026N FRS-026S

Registered Trademarks

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.

101-55-3:24, 29	B-030N:28	BDE-060S:24	BDE-167S:25	FRS-022N:29
111-44-4:29	B-030S:28	BDE-061S:24	BDE-168S:25	FRS-022S:29
115-27-5:29	B-031N:28	BDE-062S:24	BDE-172S:25	FRS-023N:29
1163-19-5:26, 29	B-031S:28	BDE-063S:24	BDE-173S:25	FRS-023S:29
13099-09-9:28	B-049N:28	BDE-066S:25	BDE-175S:25	FRS-024N:29
147217-78-5:24	B-049S:28	BDE-067S:25	BDE-180S:25	FRS-024S:29
16400-50-3:28	B-052N:28	BDE-068S:25	BDE-181S:25	FRS-025N:29
182346-21-0:25	B-052S:28	BDE-069S:25	BDE-182S:25	FRS-025S:29
182677-30-1:25	B-053N:28	BDE-071S:25	BDE-183S:25	FRS-026N:29
189084-61-5:25	B-053S:28	BDE-072S:25	BDE-184S:25	FRS-026S:29
189084-64-8:25	B-077S:28	BDE-073S:25	BDE-185S:26	HBDE-2001S-CN:28
2050-47-7:24	B-080S:28	BDE-074S:25	BDE-190S:26	HBDE-3001S-CN:28
2052-07-5:28	B-153N:28	BDE-075S:25	BDE-191S:26	HBDE-3002S-CN:28
207122-15-4:25	B-153S:28	BDE-076S:25	BDE-192S:26	HBDE-4001S-CN:28
207122-16-5:25	B-155N:28	BDE-077S:25	BDE-196S:26	HBDE-4002S-CN:28
2113-57-7:28	B-155S:28	BDE-078S:25	BDE-197S:26	HBDE-4003S-CN:28
27858-07-7:29	B-169S:28	BDE-079S:25	BDE-198S:26	HBDE-4004S-CN:28
3296-90-0:29	B-250N:29	BDE-080S:25	BDE-203S:26	HBDE-5001S-CN:28
41318-75-6:24	B-250S:29	BDE-081S:25	BDE-204S:26	M-8081-SS-X:28
4351-70-6:29	B-250S-0.35X:29	BDE-085S:25	BDE-205S:26	MOBDE-2001S:28
53592-10-2:28	B-600N:29	BDE-086S:25	BDE-206S:26	MOBDE-3001S:28
5436-43-1:24	B-600S:29	BDE-087S:25	BDE-207S-0.2X:26	MOBDE-3002S:28
57422-77-2:28	B-600S-0.35X:29	BDE-088S:25	BDE-208S:26	MOBDE-4001S:28
59080-32-9:28	BDE-001S:24	BDE-092S:25	BDE-209S:26	MOBDE-4002S:28
59080-33-0:28	BDE-002S:24	BDE-092S:25	BDE-AAP-A:27	MOBDE-4003S:28
59080-34-1:28	BDE-003S:24	BDE-094S:25	BDE-AAP-A15X:27	MOBDE-4004S:28
59080-35-2:28	BDE-004S:24	BDE-097S:25	BDE-CAE-1:26	MOBDE-5001S:28
59080-35-3:28	BDE-005S:24	BDE-098S:25	BDE-CALEWS:26	
59080-37-4:28	BDE-006S:24	BDE-099S:25	BDE-CM:27	
59080-40-9:28	BDE-007S:24	BDE-100S:25	BDE-COC:27	
59261-08-4:28	BDE-008S:24	BDE-101S:25	BDE-CR:26	
59536-65-1:29	BDE-009S:24	BDE-102S:25	BDE-CS-SET:27	
60044-24-8:28	BDE-010S:24	BDE-103S:25	BDE-CSM:27	
60044-25-9:28	BDE-011S:24	BDE-104S:25	BDE-EPA-SET:26	
60348-60-9:25	BDE-012S:24	BDE-105S:25	BDE-LMS:26	
632-79-1:29	BDE-013S:24	BDE-106S:25	BDE-MS:27	
63449-39-8:29	BDE-014S:24	BDE-108S:25	BDE-USE:26	
68631-49-2:25	BDE-015S:24	BDE-109S:25	FRS-001N:29	
7005-72-3:29	BDE-016S:24	BDE-111S:25	FRS-001S:29	
77102-82-0:28	BDE-017S:24	BDE-114S:25	FRS-002N:29	
77607-09-1:28	BDE-018S:24	BDE-115S:25	FRS-002S:29	
79-94-7:29	BDE-019S:24	BDE-116S:25	FRS-004N:29	
79-95-8:29	BDE-020S:24	BDE-118S:25	FRS-004S:29	
87-68-3:29	BDE-021S:24	BDE-119S:25	FRS-005N:29	
87-82-1:29	BDE-022S:24	BDE-120S:25	FRS-005S:29	
87-83-2:29	BDE-023S:24	BDE-121S:25	FRS-006N:29	
87-84-3:29	BDE-025S:24	BDE-123S:25	FRS-006S:29	
92-66-0:28	BDE-026S:24	BDE-124S:25	FRS-007N:29	
92-86-4:28	BDE-027S:24	BDE-125S:25	FRS-007S:29	
APP-9-027:29	BDE-028S:24	BDE-126S:25	FRS-008N:29	
APP-9-033:29	BDE-029S:24	BDE-127S:25	FRS-008S:29	
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AS-E0038:29	BDE-032S:24	BDE-131S:25	FRS-010N:29	
AS-E0039:29	BDE-033S:24	BDE-136S:25	FRS-010S:29	
B-001N:28	BDE-034S:24	BDE-137S:25	FRS-011N:29	
B-001S:28	BDE-035S:24	BDE-138S:25	FRS-011S:29	
B-002N:28	BDE-036S:24	BDE-139S:25	FRS-012N:29	
B-002S:28	BDE-037S:24	BDE-140S:25	FRS-012S:29	
B-003N:28	BDE-038S:24	BDE-141S:25	FRS-013N:29	
B-003S:28	BDE-039S:24	BDE-142S:25	FRS-013S:29	
B-004N:28	BDE-040S:24	BDE-144S:25	FRS-015N:29	
B-004S:28	BDE-041S:24	BDE-146S:25	FRS-015S:29	
B-007N:28	BDE-042S:24	BDE-148S:25	FRS-016N:29	
B-007S:28	BDE-043S:24	BDE-153S:25	FRS-016S:29	
B-009N:28	BDE-046S:24	BDE-154S:25	FRS-017N:29	
B-009S:28	BDE-047S:24	BDE-155S:25	FRS-017S:29	
B-010N:28	BDE-048S:24	BDE-156S:25	FRS-018N:29	
B-010S:28	BDE-049S:24	BDE-157S:25	FRS-018S:29	
B-015N:28	BDE-050S:24	BDE-158S:25	FRS-019N:29	
B-015S:28	BDE-051S:24	BDE-159S:25	FRS-019S:29	
B-018N:28	BDE-053S:24	BDE-160S:25	FRS-020N:29	
B-018S:28	BDE-055S:24	BDE-161S:25	FRS-020S:29	
B-026N:28	BDE-057S:24	BDE-162S:25	FRS-021N:29	
B-026S:28	BDE-058S:24	BDE-166S:25	FRS-021S:29	