



December 5 2005

BFR-CVS

CALIBRATION SET AND SUPPORT SOLUTIONS FOR THE ANALYSIS OF BROMINATED FLAME RETARDANTS

The analysis of Brominated Flame Retardants (BFRs) has attracted much interest in recent years due to their increasing global usage in a variety of industrial and domestic products. The concern has grown that some of these BFRs are finding their way into the environment. Therefore, many laboratories have conducted, and continue to conduct, research to determine the extent of this contamination in the environment. As the number of BFRs detected in the environment increases so too does the complexity of the analyses and the standards required to properly identify and quantify these contaminants. The availability of one calibration set permitting the analysis of many different types of BFRs would be beneficial in terms of both time and cost.

WELLINGTON is introducing a new BFR calibration set that will permit the analysis of a more complete array of BFRs in environmental samples utilizing a single calibration set.

The **BFR-CVS** calibration set incorporates 46 Native Target Analytes including:

Polybrominated Diphenyl Ethers (PBDEs)
Pentabromoethylbenzene (PBEB)
Hexabromobenzene (HBB)
2,2',4,4',5,5'-Hexabromobiphenyl (BB-153)
1,2-bis(tribromophenoxy)ethane (BTBPE)
Decabromodiphenylethane (DBDPE)

and

In recent years, the most widely used class of BFRs, in terms of global production, has been the PBDEs. **WELLINGTON** has incorporated 41 of the most relevant native PBDEs into this calibration set including a majority of the congeners identified in the 3 commercial formulations. By our calculations, the native PBDEs in **BFR-CVS** account for;

- 98.5% of the Pentabromodiphenyl ether commercial mixture, and,
- 99.2% of the Octabromodiphenyl ether commercial mixture, and,
- 100% of the Decabromodiphenyl ether commercial mixture.

Also included are mono- and dibromodiphenyl ethers which have not been detected in the commercial products but may be degradation products. We have also included BDE-77, BDE-126 and BDE-169. Again, these have not been detected in the commercial formulations but could be degradation products and are potentially *dioxin-like* in their toxicological effects.

To permit a more precise quantification for BFRs in environmental samples, **BFR-CVS** contains an extensive collection of mass-labelled surrogate, internal/injection and sampling/cleanup standards. The composition of **BFR-CVS** and its' support solutions can be seen on the following pages.

Please contact your local distributor or info@well-labs.com for pricing and delivery information.

**AND...Please continue to visit our website (www.well-labs.com) for
a complete listing of new product releases.**

ISO 9001:2000



0008388:1039334

BFR-CVS

Catalogue Number	Product (toluene solution)	Qty/Conc				
BFR-CVS	Polybrominated Diphenyl Ethers/Brominated Flame Retardants	1 kit				
	Calibration Solutions CS1-CS5	(5 ampoules)				
BFR-CS1, BFR-CS2, BFR-CS3, BFR-CS4, BFR-CS5	Individual Calibration Solutions	200 µl each				
		BFR-CS1	BFR-CS2	BFR-CS3	BFR-CS4	BFR-CS5
		(ng/ml)	(ng/ml)	(ng/ml)	(ng/ml)	(ng/ml)
NATIVE PBDEs/BFRs						
2-Bromodiphenyl ether	<i>BDE-1</i>	0.25	1.0	5.0	20	100
3-Bromodiphenyl ether	<i>BDE-2</i>	0.25	1.0	5.0	20	100
4-Bromodiphenyl ether	<i>BDE-3</i>	0.25	1.0	5.0	20	100
2,4-Dibromodiphenyl ether	<i>BDE-7</i>	0.25	1.0	5.0	20	100
2,6-Dibromodiphenyl ether	<i>BDE-10</i>	0.25	1.0	5.0	20	100
4,4'-Dibromodiphenyl ether	<i>BDE-15</i>	0.25	1.0	5.0	20	100
2,2',4-Tribromodiphenyl ether	<i>BDE-17</i>	0.25	1.0	5.0	20	100
2,4,4'-Tribromodiphenyl ether	<i>BDE-28</i>	0.25	1.0	5.0	20	100
2,4,6-Tribromodiphenyl ether	<i>BDE-30</i>	0.25	1.0	5.0	20	100
<i>Pentabromoethylbenzene</i>	<i>PBEB</i>	0.25	1.0	5.0	20	100
<i>Hexabromobenzene</i>	<i>HBB</i>	0.25	1.0	5.0	20	100
2,2',4,4'-Tetrabromodiphenyl ether	<i>BDE-47</i>	0.5	2.0	10	40	200
2,2',4,5'-Tetrabromodiphenyl ether	<i>BDE-49</i>	0.5	2.0	10	40	200
2,3',4,4'-Tetrabromodiphenyl ether	<i>BDE-66</i>	0.5	2.0	10	40	200
2,3',4',6-Tetrabromodiphenyl ether	<i>BDE-71</i>	0.5	2.0	10	40	200
3,3',4,4'-Tetrabromodiphenyl ether	<i>BDE-77</i>	0.5	2.0	10	40	200
2,2',3,4,4'-Pentabromodiphenyl ether	<i>BDE-85</i>	0.5	2.0	10	40	200
2,2',4,4',5-Pentabromodiphenyl ether	<i>BDE-99</i>	0.5	2.0	10	40	200
2,2',4,4',6-Pentabromodiphenyl ether	<i>BDE-100</i>	0.5	2.0	10	40	200
2,3',4,4',6-Pentabromodiphenyl ether	<i>BDE-119</i>	0.5	2.0	10	40	200
3,3',4,4',5-Pentabromodiphenyl ether	<i>BDE-126</i>	0.5	2.0	10	40	200
2,2',3,4,4',5'-Hexabromodiphenyl ether	<i>BDE-138</i>	0.5	2.0	10	40	200
2,2',3,4,4',6-Hexabromodiphenyl ether	<i>BDE-139</i>	0.5	2.0	10	40	200
2,2',3,4,4',6'-Hexabromodiphenyl ether	<i>BDE-140</i>	0.5	2.0	10	40	200
2,2',4,4',5,5'-Hexabromodiphenyl ether	<i>BDE-153</i>	0.5	2.0	10	40	200
2,2',4,4',5,6'-Hexabromodiphenyl ether	<i>BDE-154</i>	0.5	2.0	10	40	200
2,3,3',4,4',5-Hexabromodiphenyl ether	<i>BDE-156</i>	0.5	2.0	10	40	200
3,3',4,4',5,5'-Hexabromodiphenyl ether	<i>BDE-169</i>	0.5	2.0	10	40	200
2,2',4,4',5,5'-Hexabromodiphenyl ether	<i>BB-153</i>	0.5	2.0	10	40	200
1,2-Bis(2,4,6-tribromophenoxy)ethane	<i>BTBPE</i>	0.5	2.0	10	40	200
2,2',3,3',4,4',6-Heptabromodiphenyl ether	<i>BDE-171</i>	1.0	4.0	20	80	400
2,2',3,4,4',5,5'-Heptabromodiphenyl ether	<i>BDE-180</i>	1.0	4.0	20	80	400
2,2',3,4,4',5',6-Heptabromodiphenyl ether	<i>BDE-183</i>	1.0	4.0	20	80	400
2,2',3,4,4',6,6'-Heptabromodiphenyl ether	<i>BDE-184</i>	1.0	4.0	20	80	400
2,3,3',4,4',5',6-Heptabromodiphenyl ether	<i>BDE-191</i>	1.0	4.0	20	80	400
2,2',3,3',4,4',5,6'-Octabromodiphenyl ether	<i>BDE-196</i>	1.0	4.0	20	80	400
2,2',3,3',4,4',6,6'-Octabromodiphenyl ether	<i>BDE-197</i>	1.0	4.0	20	80	400
2,2',3,3',4,5',6,6'-Octabromodiphenyl ether	<i>BDE-201</i>	1.0	4.0	20	80	400
2,2',3,4,4',5,5',6-Octabromodiphenyl ether	<i>BDE-203</i>	1.0	4.0	20	80	400
2,2',3,4,4',5,6,6'-Octabromodiphenyl ether	<i>BDE-204</i>	1.0	4.0	20	80	400
2,3,3',4,4',5,5',6-Octabromodiphenyl ether	<i>BDE-205</i>	1.0	4.0	20	80	400
2,2',3,3',4,4',5,5',6-Nonabromodiphenyl ether	<i>BDE-206</i>	2.5	10	50	200	1000
2,2',3,3',4,4',5,6,6'-Nonabromodiphenyl ether	<i>BDE-207</i>	2.5	10	50	200	1000
2,2',3,3',4,5,5',6,6'-Nonabromodiphenyl ether	<i>BDE-208</i>	2.5	10	50	200	1000
Decabromodiphenyl ether	<i>BDE-209</i>	2.5	10	50	200	1000
<i>Decabromodiphenylethane</i>	<i>DBDPE</i>	5.0	20	100	400	2000
BFR-LCS						
4-Bromo[¹³ C ₁₂]diphenyl ether	<i>MBDE-3</i>	25	25	25	25	25
4,4'-Dibromo[¹³ C ₁₂]diphenyl ether	<i>MBDE-15</i>	25	25	25	25	25
2,4,4'-Tribromo[¹³ C ₁₂]diphenyl ether	<i>MBDE-28</i>	25	25	25	25	25
<i>Hexabromo[¹³C₁₂]benzene</i>	<i>MHBB</i>	25	25	25	25	25
2,2',4,4'-Tetrabromo[¹³ C ₁₂]diphenyl ether	<i>MBDE-47</i>	50	50	50	50	50
3,3',4,4'-Tetrabromo[¹³ C ₁₂]diphenyl ether	<i>MBDE-77</i>	50	50	50	50	50
2,2',4,4',5-Pentabromo[¹³ C ₁₂]diphenyl ether	<i>MBDE-99</i>	50	50	50	50	50
2,2',4,4',6-Pentabromo[¹³ C ₁₂]diphenyl ether	<i>MBDE-100</i>	50	50	50	50	50
3,3',4,4',5-Pentabromo[¹³ C ₁₂]diphenyl ether	<i>MBDE-126</i>	50	50	50	50	50
2,2',4,4',5,5'-Hexabromo[¹³ C ₁₂]diphenyl ether	<i>MBDE-153</i>	50	50	50	50	50
2,2',4,4',5,6'-Hexabromo[¹³ C ₁₂]diphenyl ether	<i>MBDE-154</i>	50	50	50	50	50
3,3',4,4',5,5'-Hexabromo[¹³ C ₁₂]diphenyl ether	<i>MBDE-169</i>	50	50	50	50	50
2,2',4,4',5,5'-Hexabromo[¹³ C ₁₂]biphenyl	<i>MBB-153</i>	50	50	50	50	50
1,2-Bis(2,4,6-tribromo[¹³ C ₁₂]phenoxy)ethane	<i>MBTPE</i>	50	50	50	50	50
2,2',3,4,4',5',6-Heptabromo[¹³ C ₁₂]diphenyl ether	<i>MBDE-183</i>	100	100	100	100	100
2,2',3,3',4,4',6,6'-Octabromo[¹³ C ₁₂]diphenyl ether	<i>MBDE-197</i>	100	100	100	100	100
2,3,3',4,4',5,5',6-Octabromo[¹³ C ₁₂]diphenyl ether	<i>MBDE-205</i>	100	100	100	100	100
2,2',3,3',4,4',5,6,6'-Nonabromo[¹³ C ₁₂]diphenyl ether	<i>MBDE-207</i>	250	250	250	250	250
Decabromo[¹³ C ₁₂]diphenyl ether	<i>MBDE-209</i>	250	250	250	250	250
<i>Decabromo[¹³C₁₂]diphenylethane</i>	<i>MDBDPE</i>	500	500	500	500	500
BFR-ISS						
3,3',4,5'-Tetrabromo[¹³ C ₁₂]diphenyl ether	<i>MBDE-79</i>	50	50	50	50	50
2,2',3,4,4',6-Hexabromo[¹³ C ₁₂]diphenyl ether	<i>MBDE-139</i>	50	50	50	50	50
2,2',3,4,4',5,5'-Heptabromo[¹³ C ₁₂]diphenyl ether	<i>MBDE-180</i>	100	100	100	100	100
2,2',3,3',4,4',5,5',6-Nonabromo[¹³ C ₁₂]diphenyl ether	<i>MBDE-206</i>	250	250	250	250	250
BFR-SCS						
2,2',3,4,4',5'-Hexabromo[¹³ C ₁₂]diphenyl ether	<i>MBDE-138</i>	50	50	50	50	50



BFR-CVS

Catalogue Number	Product (toluene solution)	Qty/Conc			
BFR-LCS	Labelled Compounds Stock Solution	1.2 ml			
BFR-ISS	Internal/Injection Standards	1.2 ml			
BFR-SCS	Sampling/Cleanup Standard	1.2 ml			
BFR-PAR	Native Compounds Stock Solution (nonane/toluene solution)	1.2 ml			
		BFR-LCS (ng/ml)	BFR-ISS (ng/ml)	BFR-SCS (ng/ml)	BFR-PAR (ng/ml)
NATIVE PBDEs/BFRs					
2-Bromodiphenyl ether	BDE-1	—	—	—	200
3-Bromodiphenyl ether	BDE-2	—	—	—	200
4-Bromodiphenyl ether	BDE-3	—	—	—	200
2,4-Dibromodiphenyl ether	BDE-7	—	—	—	200
2,6-Dibromodiphenyl ether	BDE-10	—	—	—	200
4,4'-Dibromodiphenyl ether	BDE-15	—	—	—	200
2,2',4-Tribromodiphenyl ether	BDE-17	—	—	—	200
2,4,4'-Tribromodiphenyl ether	BDE-28	—	—	—	200
2,4,6-Tribromodiphenyl ether	BDE-30	—	—	—	200
Pentabromoethylbenzene	PBEB	—	—	—	200
Hexabromobenzene	HBB	—	—	—	200
2,2',4,4'-Tetrabromodiphenyl ether	BDE-47	—	—	—	400
2,2',4,5'-Tetrabromodiphenyl ether	BDE-49	—	—	—	400
2,3',4,4'-Tetrabromodiphenyl ether	BDE-66	—	—	—	400
2,3',4',6-Tetrabromodiphenyl ether	BDE-71	—	—	—	400
3,3',4,4'-Tetrabromodiphenyl ether	BDE-77	—	—	—	400
2,2',3,4,4'-Pentabromodiphenyl ether	BDE-85	—	—	—	400
2,2',4,4',5-Pentabromodiphenyl ether	BDE-99	—	—	—	400
2,2',4,4',6-Pentabromodiphenyl ether	BDE-100	—	—	—	400
2,3',4,4',6-Pentabromodiphenyl ether	BDE-119	—	—	—	400
3,3',4,4',5-Pentabromodiphenyl ether	BDE-126	—	—	—	400
2,2',3,4,4',5'-Hexabromodiphenyl ether	BDE-138	—	—	—	400
2,2',3,4,4',6-Hexabromodiphenyl ether	BDE-139	—	—	—	400
2,2',3,4,4',6'-Hexabromodiphenyl ether	BDE-140	—	—	—	400
2,2',4,4',5,5'-Hexabromodiphenyl ether	BDE-153	—	—	—	400
2,2',4,4',5,6'-Hexabromodiphenyl ether	BDE-154	—	—	—	400
2,3,3',4,4',5-Hexabromodiphenyl ether	BDE-156	—	—	—	400
3,3',4,4',5,5'-Hexabromodiphenyl ether	BDE-169	—	—	—	400
2,2',4,4',5,5'-Hexabromobiphenyl	BB-153	—	—	—	400
1,2-Bis(2,4,6-tribromophenoxy)ethane	BTBPE	—	—	—	400
2,2',3,3',4,4',6-Heptabromodiphenyl ether	BDE-171	—	—	—	800
2,2',3,4,4',5,5'-Heptabromodiphenyl ether	BDE-180	—	—	—	800
2,2',3,4,4',5',6-Heptabromodiphenyl ether	BDE-183	—	—	—	800
2,2',3,4,4',6,6'-Heptabromodiphenyl ether	BDE-184	—	—	—	800
2,3,3',4,4',5',6-Heptabromodiphenyl ether	BDE-191	—	—	—	800
2,2',3,3',4,4',5,6'-Octabromodiphenyl ether	BDE-196	—	—	—	800
2,2',3,3',4,4',6,6'-Octabromodiphenyl ether	BDE-197	—	—	—	800
2,2',3,3',4,5',6,6'-Octabromodiphenyl ether	BDE-201	—	—	—	800
2,2',3,4,4',5,5',6-Octabromodiphenyl ether	BDE-203	—	—	—	800
2,2',3,4,4',5,6,6'-Octabromodiphenyl ether	BDE-204	—	—	—	800
2,3,3',4,4',5,5',6-Octabromodiphenyl ether	BDE-205	—	—	—	800
2,2',3,3',4,4',5,5',6-Nonabromodiphenyl ether	BDE-206	—	—	—	2000
2,2',3,3',4,4',5,6,6'-Nonabromodiphenyl ether	BDE-207	—	—	—	2000
2,2',3,3',4,5,5',6,6'-Nonabromodiphenyl ether	BDE-208	—	—	—	2000
Decabromodiphenyl ether	BDE-209	—	—	—	2000
Decabromodiphenylethane	DBDPE	—	—	—	4000
BFR-LCS					
4-Bromo[¹³ C ₁₂]diphenyl ether	MBDE-3	100	—	—	—
4,4'-Dibromo[¹³ C ₁₂]diphenyl ether	MBDE-15	100	—	—	—
2,4,4'-Tribromo[¹³ C ₁₂]diphenyl ether	MBDE-28	100	—	—	—
Hexabromo[¹³ C ₁₂]benzene	MHBB	100	—	—	—
2,2',4,4'-Tetrabromo[¹³ C ₁₂]diphenyl ether	MBDE-47	200	—	—	—
3,3',4,4'-Tetrabromo[¹³ C ₁₂]diphenyl ether	MBDE-77	200	—	—	—
2,2',4,4',5-Pentabromo[¹³ C ₁₂]diphenyl ether	MBDE-99	200	—	—	—
2,2',4,4',6-Pentabromo[¹³ C ₁₂]diphenyl ether	MBDE-100	200	—	—	—
3,3',4,4',5-Pentabromo[¹³ C ₁₂]diphenyl ether	MBDE-126	200	—	—	—
2,2',4,4',5,5'-Hexabromo[¹³ C ₁₂]diphenyl ether	MBDE-153	200	—	—	—
2,2',4,4',5,6'-Hexabromo[¹³ C ₁₂]diphenyl ether	MBDE-154	200	—	—	—
3,3',4,4',5,5'-Hexabromo[¹³ C ₁₂]diphenyl ether	MBDE-169	200	—	—	—
2,2',4,4',5,5'-Hexabromo[¹³ C ₁₂]biphenyl	MBB-153	200	—	—	—
1,2-Bis(2,4,6-tribromo[¹³ C ₁₂]phenoxy)ethane	MBTBPE	200	—	—	—
2,2',3,4,4',5',6-Heptabromo[¹³ C ₁₂]diphenyl ether	MBDE-183	400	—	—	—
2,2',3,3',4,4',6,6'-Octabromo[¹³ C ₁₂]diphenyl ether	MBDE-197	400	—	—	—
2,3,3',4,4',5,5',6-Octabromo[¹³ C ₁₂]diphenyl ether	MBDE-205	400	—	—	—
2,2',3,3',4,4',5,6,6'-Nonabromo[¹³ C ₁₂]diphenyl ether	MBDE-207	1000	—	—	—
Decabromo[¹³ C ₁₂]diphenyl ether	MBDE-209	1000	—	—	—
Decabromo[¹³ C ₁₂]diphenylethane	MDBDPE	2000	—	—	—
BFR-ISS					
3,3',4,5'-Tetrabromo[¹³ C ₁₂]diphenyl ether	MBDE-79	—	200	—	—
2,2',3,4,4',6-Hexabromo[¹³ C ₁₂]diphenyl ether	MBDE-139	—	200	—	—
2,2',3,4,4',5,5'-Heptabromo[¹³ C ₁₂]diphenyl ether	MBDE-180	—	400	—	—
2,2',3,3',4,4',5,5',6-Nonabromo[¹³ C ₁₂]diphenyl ether	MBDE-206	—	1000	—	—
BFR-SCS					
2,2',3,4,4',5'-Hexabromo[¹³ C ₁₂]diphenyl ether	MBDE-138	—	—	400	—

