



CIL

Cambridge Isotope Laboratories, Inc.
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ENVIRONMENTAL STANDARDS

Polybrominated Dibenzo-p-dioxins and Dibenzofurans

New Calibration Set and Spiking Mixtures with
Hepta and Octa congeners included

All homologue groups represented

PBDD/PBDF Calibration Solution

EDF-5381 enables PBDD/F analysis of OBDD, HpBDF, and OBDF at higher concentrations.

EDF-5381 PBDD/F Calibration Solutions (unlabeled/¹³C₁₂, 99%) (all concentrations are in ng/mL)

7 X 0.2 mL in Nonane

Native Analytes	CS1	CS2	CS3	CS4	CS5	CS6	CS7
2,3,7,8-TeBDD	0.1	0.4	2	10	20	40	—
1,2,3,7,8-PeBDD	0.2	0.8	4	20	40	80	—
1,2,3,4,7,8-HxBDD	0.75	3	15	75	150	300	—
1,2,3,6,7,8-HxBDD	0.75	3	15	75	150	300	—
1,2,3,7,8,9-HxBDD	0.75	3	15	75	150	300	—
OBDD	1	4	20	100	200	400	800
2,3,7,8-TeBDF	0.5	2	10	50	100	200	—
2,4,6,8-TeBDF	0.5	2	10	50	100	200	—
1,2,3,7,8-PeBDF	0.5	2	10	50	100	200	—
2,3,4,7,8-PeBDF	0.5	2	10	50	100	200	—
1,2,3,4,7,8-HxBDF	0.75	3	15	75	150	300	—
1,2,3,4,6,7,8-HpBDF	0.75	3	15	75	150	300	600
OBDF	1	4	20	100	200	400	800
Cleanup Standards							
2,3,7,8-TeBDD (¹³ C ₁₂ , 99%)	10	10	10	10	10	10	—
1,2,3,7,8-PeBDD (¹³ C ₁₂ , 99%)	20	20	20	20	20	20	—
1,2,3,4,7,8-HxBDD (¹³ C ₁₂ , 99%)	75	75	75	75	75	75	—
1,2,3,6,7,8-HxBDD (¹³ C ₁₂ , 99%)	75	75	75	75	75	75	—
1,2,3,4,6,7,8-HpBDD (¹³ C ₁₂ , 99%)	100	100	100	100	100		
OBDD (¹³ C ₁₂ , 99%)	225	225	225	225	225	225	225
2,3,7,8-TeBDF (¹³ C ₁₂ , 99%)	40	40	40	40	40	40	—
2,3,4,7,8-PeBDF (¹³ C ₁₂ , 99%)	40	40	40	40	40	40	—
1,2,3,4,7,8-HxBDF (¹³ C ₁₂ , 99%)	40	40	40	40	40	40	—
1,2,3,4,6,7,8-HpBDF (¹³ C ₁₂ , 99%)	100	100	100	100	100	100	—
OBDF (¹³ C ₁₂ , 99%)	225	225	225	225	225	225	225
Syringe Standards							
1,2,3,7,8,9-HxBDD (¹³ C ₁₂ , 99%)	100	100	100	100	100	100	—
1,2,3,7,8-PeBDF (¹³ C ₁₂ , 99%)	40	40	40	40	40	40	—
Sampling Standards							
2,4,6,8-TeBDF (¹³ C ₁₂ , 99%)	40	40	40	40	40	40	—

Polybrominated Dibenzo-p-dioxins (PBDDs) and Dibenzofurans (PBDFs)

PBDDs AND PBDFs can be found at trace levels in technical brominated flame retardant products. They are also formed during combustion of these chemicals, or incineration of other organic compounds in the presence of bromine, e.g., in municipal and industrial incinerators.

The biological effects of PBDDs and PBDFs are similar to those of PCDDs and PCDFs, which have been regulated for many years.

Polybrominated Dibenzo-p-dioxins			
	ED-2532	2,3,7-TriBDD (¹³ C ₁₂ , 99%) 50 µg/mL	1.2 mL
	ED-1763	2,3,7-TriBDD Unlabeled 50 µg/mL	1.2 mL
	ED-1440	2,3,7,8-TetraBDD (¹³ C ₁₂ , 99%)	4 X 1.2 mL
NEW	ED-1440-1.2	2,3,7,8-TetraBDD (¹³ C ₁₂ , 99%)	1.2 mL
	ED-1441	2,3,7,8-TetraBDD Unlabeled	8 X 1.2 mL
NEW	ED-1441-1.2	2,3,7,8-TetraBDD Unlabeled	1.2 mL
	ED-1450	1,2,3,7,8-PentaBDD (¹³ C ₁₂ , 99%)	4 X 1.2 mL
NEW	ED-1450-1.2	1,2,3,7,8-PentaBDD (¹³ C ₁₂ , 99%)	1.2 mL
	ED-1451	1,2,3,7,8-PentaBDD Unlabeled	8 X 1.2 mL
NEW	ED-1451-1.2	1,2,3,7,8-PentaBDD Unlabeled	1.2 mL
	ED-2534	1,2,3,4,7,8-HexaBDD (¹³ C ₁₂ , 99%)	4 X 1.2 mL
NEW	ED-2534-1.2	1,2,3,4,7,8-HexaBDD (¹³ C ₁₂ , 99%)	1.2 mL
	ED-1462	1,2,3,4,7,8-HexaBDD Unlabeled	8 X 1.2 mL
NEW	ED-1462-1.2	1,2,3,4,7,8-HexaBDD Unlabeled	1.2 mL
	ED-5237	1,2,3,6,7,8-HexaBDD (¹³ C ₁₂ , 99%) 70:30	4 X 1.2 mL
NEW	ED-5237-1.2	1,2,3,6,7,8-HexaBDD (¹³ C ₁₂ , 99%) 70:30	1.2 mL
	ED-1465	1,2,3,4,7,8-HexaBDD Unlabeled 70:30	8 X 1.2 mL
NEW	ED-1465-1.2	1,2,3,6,7,8-HexaBDD Unlabeled 70:30	1.2 mL
	ED-5238	1,2,3,7,8,9-HexaBDD (¹³ C ₁₂ , 99%)	4 X 1.2 mL
NEW	ED-5238-1.2	1,2,3,7,8,9-HexaBDD (¹³ C ₁₂ , 99%)	1.2 mL
	ED-1466	1,2,3,7,8,9-HexaBDD Unlabeled	8 X 1.2 mL
NEW	ED-1466-1.2	1,2,3,7,8,9-HexaBDD Unlabeled	1.2 mL
NEW	ED-5357	1,2,3,4,6,7,8-HeptaBDD (¹³ C ₁₂ , 99%) 70:30	4 X 1.2 mL
	ED-5357-1.2	1,2,3,4,6,7,8-HeptaBDD (¹³ C ₁₂ , 99%) 70:30	1.2 mL
NEW	ED-5356	1,2,3,4,6,7,8-HeptaBDD Unlabeled 70:30	8 X 1.2 mL
NEW	ED-5356-1.2	1,2,3,4,6,7,8-HeptaBDD Unlabeled 70:30	1.2 mL
	ED-5089	OBDD (¹³ C ₁₂ , 99%) 70:30	4 X 1.2 mL
	ED-5089-1.2	OBDD (¹³ C ₁₂ , 99%) 70:30	1.2 mL
	ED-1481	OBDD Unlabeled in Toluene	8 X 1.2 mL
	ED-1481-1.2	OBDD Unlabeled in Toluene	1.2 mL

NEW PBDD and PBDF Standard mixtures are Now Available

- The most comprehensive PBDD and PBDF calibration series, including 13 of the 17 2,3,7,8-containing congeners.
- The first and only mixtures to include Hepta BDD congener.
- Calibration sets with corresponding Sampling, Cleanup, and Syringe spiking solutions.
- All homologue groups with at least one congener.

Polybrominated Dibenzofurans			
5 µg/mL in Nonane (unless otherwise noted)			
70:30=70% n-Nonane/30% Toluene, 93:7=93% n-Nonane/7% Toluene			
NEW	EF-5076	2-MonoBDF (¹³ C ₁₂ , 99%)	4 X 1.2 mL
NEW	EF-5075	2-MonoBDF Unlabeled	8 X 1.2 mL
	EF-5078	2,8-DiBDF (¹³ C ₁₂ , 99%)	4 X 1.2 mL
	EF-5077	2,8-DiBDF Unlabeled	8 X 1.2 mL
NEW	EF-5080	2,4,8-TriBDF (¹³ C ₁₂ , 99%)	4 X 1.2 mL
NEW	EF-5079	2,4,8-TriBDF Unlabeled	8 X 1.2 mL
	EF-1442	2,3,7,8-TetraBDF (¹³ C ₁₂ , 99%)	4 X 1.2 mL
	EF-1442-1.2	2,3,7,8-TetraBDF (¹³ C ₁₂ , 99%)	1.2 mL
	EF-1443	2,3,7,8-TetraBDF Unlabeled	8 X 1.2 mL
NEW	EF-1443-1.2	2,3,7,8-TetraBDF Unlabeled	1.2 mL
NEW	EF-5082	2,4,6,8-TetraBDF (¹³ C ₁₂ , 99%)	4 X 1.2 mL
NEW	EF-5082-1.2	2,4,6,8-TetraBDF (¹³ C ₁₂ , 99%)	1.2 mL
	EF-5081	2,4,6,8-TetraBDF Unlabeled	8 X 1.2 mL
	EF-1452	1,2,3,7,8-PentaBDF (¹³ C ₁₂ , 99%)	4 X 1.2 mL
	EF-1452-1.2	1,2,3,7,8-PentaBDF (¹³ C ₁₂ , 99%)	1.2 mL
	EF-1453	1,2,3,7,8-PentaBDF Unlabeled	8 X 1.2 mL
NEW	EF-1453-1.2	1,2,3,7,8-PentaBDF Unlabeled	1.2 mL
	EF-1454	2,3,4,7,8-PentaBDF (¹³ C ₁₂ , 99%)	4 X 1.2 mL
NEW	EF-1454-1.2	2,3,4,7,8-PentaBDF (¹³ C ₁₂ , 99%)	1.2 mL
	EF-1455	2,3,4,7,8-PentaBDF Unlabeled	8 X 1.2 mL
NEW	EF-1455-1.2	2,3,4,7,8-PentaBDF Unlabeled	1.2 mL
	EF-1463	1,2,3,4,7,8-HexaBDF (¹³ C ₁₂ , 99%)	4 X 1.2 mL
	EF-1463-1.2	1,2,3,4,7,8-HexaBDF (¹³ C ₁₂ , 99%)	1.2 mL
	EF-1464	1,2,3,4,7,8-HexaBDF Unlabeled 70:30	8 X 1.2 mL
NEW	EF-1464-1.2	1,2,3,4,7,8-HexaBDF Unlabeled 70:30	1.2 mL
	EF-5259	1,2,3,4,6,7,8-HeptaBDF (¹³ C ₁₂ , 99%) 70:30	4 X 1.2 mL
NEW	EF-5259-1.2	1,2,3,4,6,7,8-HeptaBDF (¹³ C ₁₂ , 99%) 70:30	1.2 mL
	EF-1486	1,2,3,4,6,7,8-HeptaBDF Unlabeled 93:7	8 X 1.2 mL
	EF-1486-1.2	1,2,3,4,6,7,8-HeptaBDF Unlabeled 93:7	1.2 mL
NEW	EF-5266	OBDF (¹³ C ₁₂ , 99%) 70:30	4 X 1.2 mL
NEW	EF-5266-1.2	OBDF (¹³ C ₁₂ , 99%) 70:30	1.2 mL
	EF-5263	OBDF Unlabeled 70:30	8 X 1.2 mL
NEW	EF-5263-1.2	OBDF Unlabeled 70:30	1.2 mL

For a complete listing of Environmental Standards, visit isotope.com

Isotope Labeled PBDD/PBDF Spikes

CIL has prepared isotope-labeled spikes to be used with the calibration solutions on the following pages.

EDF-5408 contains at least one congener from each homologue group, and can be used in conjunction with EDF-5407.

EDF-5382 enables analysis of congeners at higher concentrations and can be used in conjunction with EDF-5381.

Bromodioxin/Furan Cleanup Spikes

¹³ C-Labeled Component Concentration (ng/mL)	NEW EDF-5408	EDF-5382
	0.5 mL in Nonane	0.55 mL in Nonane
2,3,7,8-TeBDD (¹³ C ₁₂ , 99%)	100	50
1,2,3,7,8-PeBDD (¹³ C ₁₂ , 99%)	100	100
1,2,3,4,7,8-HxBDD (¹³ C ₁₂ , 99%)	250	375
1,2,3,6,7,8-HxBDD (¹³ C ₁₂ , 99%)	250	375
1,2,3,4,6,7,8-HpBDD (¹³ C ₁₂ , 99%)	500	-
OBDD (¹³ C ₁₂ , 99%)	750	1125
2,3,7,8-TeBDF (¹³ C ₁₂ , 99%)	100	200
2,3,4,7,8-PeBDF (¹³ C ₁₂ , 99%)	100	200
1,2,3,4,7,8-HxBDF (¹³ C ₁₂ , 99%)	250	375
1,2,3,4,6,7,8-HpBDF (¹³ C ₁₂ , 99%)	500	500
OBDF (¹³ C ₁₂ , 99%)	750	1125

Bromodioxin/Furan Syringe Spike (¹³C₁₂, 99%)

¹³ C-Labeled Component Concentration (ng/mL)	NEW EDF-5409	EDF-5383	EDF-5383-4x
	1.2 mL in Nonane	1.2 mL in Nonane	1.2 mL in Nonane
1,2,3,7,8,9-HxBDD (¹³ C ₁₂ , 99%)	500	500	2000
1,2,3,7,8-PeBDF (¹³ C ₁₂ , 99%)	200	200	800

Bromodioxin/Furan Sampling Spike (¹³C₁₂, 99%)

¹³ C-Labeled Component Concentration (ng/mL)	NEW EF-5410	EF-5384	EF-5384-4x
	1.2 mL in Nonane	1.2 mL in Nonane	1.2 mL in Nonane
2,4,6,8-TeBDD (¹³ C ₁₂ , 99%)	200	200	800

NEW PBDD/PBDF Calibration Solution

EDF-5407 contains congeners from all homologue groups representing the 2,3,7,8-containing analytes believed to have similar toxicity to the 2,3,7,8-containing PCDDs and PCDFs.

NEW EDF-5407 Bromodioxin/Furan Calibration Standards Solutions (unlabeled/¹³C₁₂,99%) 5 X 0.2 mL in Nonane (all concentrations are in ng/mL)

Native Analytes 5 X 0.2 mL in Nonane	CS1	CS2	CS3	CS4	CS5
2,3,7,8-TeBDD	0.1	0.4	2.0	10	50
1,2,3,7,8-PeBDD	0.2	0.8	4.0	20	100
1,2,3,4,7,8-HxBDD	0.6	2.4	12.0	60	300
1,2,3,6,7,8-HxBDD	0.6	2.4	12.0	60	300
1,2,3,7,8,9-HxBDD	0.6	2.4	12.0	60	300
1,2,3,4,6,7,8-HpBDD	0.75	3.0	15.0	75	375
OBDD	1.0	4.0	20.0	100	500
2,3,7,8-TeBDF	0.2	0.8	4.0	20	100
2,4,6,8-TeBDF	0.2	0.8	4.0	20	100
1,2,3,7,8-PeBDF	0.4	1.6	8.0	40	200
2,3,4,7,8-PeBDF	0.4	1.6	8.0	40	200
1,2,3,4,7,8-HxBDF	0.6	2.4	12.0	60	300
1,2,3,4,6,7,8-HpBDF	0.75	3.0	15.0	75	375
OBDF	1.0	4.0	20.0	100	500
Cleanup Standards					
2,3,7,8-TeBDD (¹³ C ₁₂ ,99%)	20	20	20	20	20
1,2,3,7,8-PeBDD (¹³ C ₁₂ ,99%)	20	20	20	20	20
1,2,3,4,7,8-HxBDD (¹³ C ₁₂ ,99%)	50	50	50	50	50
1,2,3,6,7,8-HxBDD (¹³ C ₁₂ ,99%)	50	50	50	50	50
1,2,3,4,6,7,8-HpBDD (¹³ C ₁₂ ,99%)	100	100	100	100	100
OBDD (¹³ C ₁₂ ,99%)	150	150	150	150	150
2,3,7,8-TeBDF (¹³ C ₁₂ ,99%)	20	20	20	20	20
2,3,4,7,8-PeBDF (¹³ C ₁₂ ,99%)	20	20	20	20	20
1,2,3,4,7,8-HxBDF (¹³ C ₁₂ ,99%)	50	50	50	50	50
1,2,3,4,6,7,8-HpBDF (¹³ C ₁₂ ,99%)	100	100	100	100	100
OBDF (¹³ C ₁₂ ,99%)	150	150	150	150	150
Syringe Standards					
1,2,3,7,8,9-HxBDD (¹³ C ₁₂ ,99%)	50	50	50	50	50
1,2,3,7,8-PeBDF (¹³ C ₁₂ ,99%)	20	20	20	20	20
Sampling Standards					
2,4,6,8-TeBDF (¹³ C ₁₂ ,99%)	20	20	20	20	20