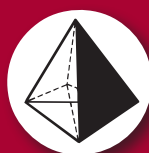


# Chlorinated/Brominated Dioxins and Furans



**AccuStandard<sup>®</sup>**



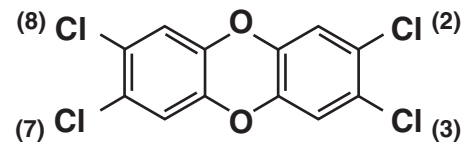
## Dioxins and Furans

Unlike most pollutants, dioxins are not intentionally manufactured; rather, they are the bi-product of several industrial processes. They can be formed during bleaching of paper pulp, smelting, and manufacturing of some herbicides and pesticides. They are also formed from incomplete burning both in nature, such as forest fires, or by humans from uncontrolled waste incineration.

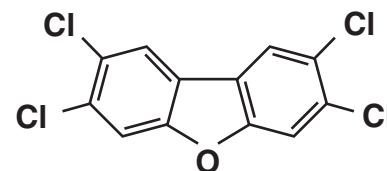
These compounds are in the Persistent Organic Pollutant (POP) category because they do not easily break down in the environment and tend to bioaccumulate in the food chain. Since they are fat soluble, they tend to be stored in the body, and can remain there for many years.

The most toxic configuration of these compounds is when the chlorines are in the 2,3,7, and 8 positions. The 2,3,7,8-tetrachlorodibenzo para dioxin (TCDD) is most commonly referred to as "dioxin" and is the one that has been most carefully studied.

Dioxins are toxic, carcinogenic, have fetal developmental risks, and are endocrine disruptors. They are found all around the world and are regulated by many different agencies.



**2,3,7,8-TCDD**



**2,3,7,8-TCDF**

Minimum purity 98%

### Dibenzo-p-dioxin Congeners

Compound	CAS No.	NEAT		SOLUTION			
		Cat. No.	Unit	Cat. No.	Conc.	Matrix	Unit
Dibenzo- <i>p</i> -dioxin	262-12-4	D-100N	10 mg	D-100S	50 µg/mL	Isooctane	1 mL
1-Chlorodibenzo- <i>p</i> -dioxin	39227-53-7	D-101N	25 mg	D-101S	50 µg/mL	Isooctane	1 mL
2-Chlorodibenzo- <i>p</i> -dioxin	39227-54-8	D-102N	50 mg	D-102S	50 µg/mL	Isooctane	1 mL
1,6-Dichlorodibenzo- <i>p</i> -dioxin	38178-38-0	D-201N	5 mg	D-201S	50 µg/mL	Isooctane	1 mL
2,3-Dichlorodibenzo- <i>p</i> -dioxin	29446-15-9	D-202N	5 mg	D-202S	50 µg/mL	Isooctane	1 mL
2,7-Dichlorodibenzo- <i>p</i> -dioxin	33857-26-0	D-203N	25 mg	D-203S	50 µg/mL	Isooctane	1 mL
2,8-Dichlorodibenzo- <i>p</i> -dioxin	38964-22-6	-----	-----	D-204S	50 µg/mL	Isooctane	1 mL
1,3-Dichlorodibenzo- <i>p</i> -dioxin	50585-39-2	D-205N	10 mg	D-205S	50 µg/mL	Isooctane	1 mL
1,4-Dichlorodibenzo- <i>p</i> -dioxin	54536-14-5	D-206N	10 mg	D-206S	50 µg/mL	Isooctane	1 mL
1,2-Dichlorodibenzo- <i>p</i> -dioxin	54536-18-4	-----	-----	D-207S	50 µg/mL	Isooctane	1 mL
1,2,3-Trichlorodibenzo- <i>p</i> -dioxin	54536-17-3	D-301N	5 mg	D-301S	50 µg/mL	Isooctane	1 mL
1,2,4-Trichlorodibenzo- <i>p</i> -dioxin	39227-58-2	D-302N	10 mg	D-302S	50 µg/mL	Isooctane	1 mL
1,7,8-Trichlorodibenzo- <i>p</i> -dioxin	82306-65-8	D-303N	5 mg	D-303S	50 µg/mL	Isooctane	1 mL
2,3,7-Trichlorodibenzo- <i>p</i> -dioxin	33857-28-2	D-304N	5 mg	D-304S	50 µg/mL	Isooctane	1 mL
1,2,3,4-Tetrachlorodibenzo- <i>p</i> -dioxin	30746-58-8	D-401N	50 mg	D-401S	50 µg/mL	Toluene	1 mL
1,2,7,8-Tetrachlorodibenzo- <i>p</i> -dioxin	34816-53-0	D-402N	5 mg	D-402S	50 µg/mL	Toluene	1 mL
1,3,7,8-Tetrachlorodibenzo- <i>p</i> -dioxin	50585-46-1	D-403N	5 mg	D-403S	50 µg/mL	Toluene	1 mL
2,3,7,8-Tetrachlorodibenzo- <i>p</i> -dioxin	1746-01-6	D-404N	1 mg	APP-9-167	5 µg/mL	Toluene	1 mL
		-----	-----	M-613	10 µg/mL	Toluene	1 mL
		-----	-----	D-404S	50 µg/mL	Toluene	1 mL
1,3,6,8-Tetrachlorodibenzo- <i>p</i> -dioxin	33423-92-6	D-405N	5 mg	D-405S	50 µg/mL	Toluene	1 mL
1,2,8,9-Tetrachlorodibenzo- <i>p</i> -dioxin	116889-69-1	D-406N	5 mg	D-406S	50 µg/mL	Toluene	1 mL
1,3,7,9-Tetrachlorodibenzo- <i>p</i> -dioxin	116889-70-4	D-407N	5 mg	D-407S	50 µg/mL	Toluene	1 mL
1,2,6,8-Tetrachlorodibenzo- <i>p</i> -dioxin	67323-56-2	D-408N	1 mg	D-408S	50 µg/mL	Toluene	1 mL
1,2,6,7-Tetrachlorodibenzo- <i>p</i> -dioxin	41903-57-5	D-409N	5 mg	D-409S	50 µg/mL	Toluene	1 mL
1,2,3,7,8-Pentachlorodibenzo- <i>p</i> -dioxin	40321-76-4	D-501N	5 mg	APP-9-168	5 µg/mL	Toluene	1 mL
		-----	-----	D-501S	50 µg/mL	Toluene	1 mL
1,2,4,7,8-Pentachlorodibenzo- <i>p</i> -dioxin	58802-08-7	D-502N	5 mg	D-502S	50 µg/mL	Toluene	1 mL
1,2,3,4,7-Pentachlorodibenzo- <i>p</i> -dioxin	39227-61-7	D-503N	1 mg	D-503S	50 µg/mL	Toluene	1 mL
1,2,3,8,9-Pentachlorodibenzo- <i>p</i> -dioxin	71925-18-3	D-504N	1 mg	D-504S	50 µg/mL	Toluene	1 mL
1,2,4,6,8/1,2,4,7,9-Pentachlorodibenzo- <i>p</i> -dioxin	71998-76-0/ 82291-37-0	D-505N	1 mg	D-505S	50 µg/mL	Toluene	1 mL
1,2,3,4,7,8-Hexachlorodibenzo- <i>p</i> -dioxin	39227-28-6	D-601N	5 mg	APP-9-169	5 µg/mL	Toluene	1 mL
		-----	-----	D-601S	50 µg/mL	Toluene	1 mL
1,2,3,6,7,8-Hexachlorodibenzo- <i>p</i> -dioxin	57653-85-7	D-602N	1 mg	D-602S	50 µg/mL	Toluene	1 mL
1,2,3,4,6,7-Hexachlorodibenzo- <i>p</i> -dioxin	58200-66-1	D-603N	1 mg	D-603S	50 µg/mL	Toluene	1 mL
1,2,4,6,7,9/1,2,4,6,8,9-Hexachlorodibenzo- <i>p</i> -dioxin	39227-62-8/ 58802-09-8	D-604N	1 mg	D-604S	50 µg/mL	Toluene	1 mL
1,2,3,7,8,9-Hexachlorodibenzo- <i>p</i> -dioxin	19408-74-3	D-605N	1 mg	D-605S	50 µg/mL	Toluene	1 mL
1,2,3,4,6,7,8-Heptachlorodibenzo- <i>p</i> -dioxin	35822-46-9	D-701N	1 mg	D-701S	50 µg/mL	Toluene	1 mL
1,2,3,4,6,7,9-Heptachlorodibenzo- <i>p</i> -dioxin	58200-70-7	D-702N	5 mg	D-702S	50 µg/mL	Toluene	1 mL
Octachlorodibenzo- <i>p</i> -dioxin	3268-87-9	D-801N	50 mg	D-801S	50 µg/mL	Toluene	1 mL

## Chlorinated Dibenzofuran Congeners

Compound	CAS No.	NEAT		SOLUTION		Matrix	Unit
		Cat. No.	Unit	Cat. No.	Conc.		
Dibenzofuran	132-64-9	F-100N	50 mg	F-100S	50 µg/mL	Isooctane	1 mL
		-----	-----	APP-9-059	100 µg/mL	MeOH	1 mL
		-----	-----	APP-9-059-2X	200 µg/mL	MeOH	1 mL
		-----	-----	AS-E0261	5 mg/mL	MeOH	1 mL
2-Chlorodibenzofuran	51230-49-0	-----	-----	F-102S	50 µg/mL	Isooctane	1 mL
4-Chlorodibenzofuran	74992-96-4	-----	-----	F-104S	50 µg/mL	Isooctane	1 mL
2,8-Dichlorodibenzofuran	5409-83-6	F-201N	10 mg	F-201S	50 µg/mL	Isooctane	1 mL
2,4,8-Trichlorodibenzofuran	54589-71-8	-----	-----	F-301S	50 µg/mL	Isooctane	1 mL
1,2,3,4-Tetrachlorodibenzofuran	24478-72-6	-----	-----	F-401S	50 µg/mL	Toluene	1 mL
1,3,6,8-Tetrachlorodibenzofuran	30402-14-3	-----	-----	F-403S	50 µg/mL	Toluene	1 mL
2,3,7,8-Tetrachlorodibenzofuran	51207-31-9	F-402N	1 mg	APP-9-170	5 µg/mL	Toluene	1 mL
				F-402S	50 µg/mL	Toluene	1 mL
1,2,3,7,8-Pentachlorodibenzofuran	57117-41-6	-----	-----	APP-9-171	5 µg/mL	Toluene	1 mL
2,3,4,7,8-Pentachlorodibenzofuran	57117-31-4	-----	-----	F-502S-0.1X	5 µg/mL	Toluene	1 mL
1,2,3,4,7,8-Hexachlorodibenzofuran	55684-94-1	-----	-----	APP-9-172	5 µg/mL	Toluene	1 mL
1,2,3,6,7,8-Hexachlorodibenzofuran	57117-44-9	-----	-----	F-602S	50 µg/mL	Toluene	1 mL
1,2,3,7,8,9-Hexachlorodibenzofuran	72918-21-9	-----	-----	F-605S	50 µg/mL	Toluene	1 mL
2,3,4,6,7,8-Hexachlorodibenzofuran	60851-34-5	-----	-----	F-610S	50 µg/mL	Toluene	1 mL
1,2,3,4,6,7,8-Heptachlorodibenzofuran	38998-75-3	-----	-----	F-701S-0.1X	5 µg/mL	Toluene	1 mL
				F-701S	50 µg/mL	Toluene	1 mL
2,3,4,6,7,8-Hexachlorodibenzofuran	60851-34-5	-----	-----	F-702S	50 µg/mL	Toluene	1 mL
Octachlorodibenzofuran	39001-02-0	F-801N	50 mg	F-801S	50 µg/mL	Toluene	1 mL
3-Nitrodibenzofuran	5410-97-9	R-009N	5 mg	R-009S	100 µg/mL	Toluene	1 mL

These compounds are described as environmental pollutants. Recent studies have shown that they may be formed from ortho-substituted hydroxy BDEs by environmental factors and/or biogenic processes.

## Brominated Dibenzo-p-dioxins

Compound	Conc.	Matrix	Cat. No.	Unit
1,3,7-Tribromodibenzo-p-dioxin	10 µg/mL	Toluene	BDD-301S	1 mL
	25 µg/mL	Toluene	BDD-301S-2.5X	1 mL
1,3,8-Tribromodibenzo-p-dioxin	10 µg/mL	Toluene	BDD-302S	1 mL
	25 µg/mL	Toluene	BDD-302S-2.5X	1 mL
2,3,7-Tribromodibenzo-p-dioxin	10 µg/mL	Toluene	BDD-303S	1 mL
	25 µg/mL	Toluene	BDD-303S-2.5X	1 mL
1,2,3,7-Tetrabromodibenzo-p-dioxin	10 µg/mL	Toluene	BDD-401S	1 mL
	25 µg/mL	Toluene	BDD-401S-2.5X	1 mL
1,2,3,8-Tetrabromodibenzo-p-dioxin	10 µg/mL	Toluene	BDD-402S	1 mL
	25 µg/mL	Toluene	BDD-402S-2.5X	1 mL
Tetrabromodibenzo-p-dioxin-Mixed Isomers	10 µg/mL	Toluene	BDD-403S	1 mL
	25 µg/mL	Toluene	BDD-403S-2.5X	1 mL
1,2,4,7-Tetrabromodibenzo-p-dioxin / 1,2,4,8-Tetrabromodibenzo-p-dioxin	10 µg/mL	Toluene	BDD-404S	1 mL
	25 µg/mL	Toluene	BDD-404S-2.5X	1 mL
2,3,7,8-Tetrabromodibenzo-p-dioxin	-----	NEAT	BDD-405N	1 mg

Custom Dioxin/Furan formulations can be prepared for window defining mixes and other applications.

Contact our Technical Service Department for your specific requirements.

## Method 1613 Dioxins & Furans by HRGC/HRMS

### Method 1613 Native Calibration Curve

M-1613-CAL-SET

5 x 1 mL

	M-1613-CAL-01	M-1613-CAL-02	M-1613-CAL-03	M-1613-CAL-04	M-1613-CAL-05
2,3,7,8-Tetrachlorodibenzo-p-dioxin	0.5	2	10	40	200
2,3,7,8-Tetrachlorodibenzofuran	0.5	2	10	40	200
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	2.5	10	50	200	1000
1,2,3,7,8-Pentachlorodibenzofuran	2.5	10	50	200	1000
2,3,4,7,8-Pentachlorodibenzofuran	2.5	10	50	200	1000
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	2.5	10	50	200	1000
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	2.5	10	50	200	1000
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	2.5	10	50	200	1000
1,2,3,4,7,8-Hexachlorodibenzofuran	2.5	10	50	200	1000
1,2,3,6,7,8-Hexachlorodibenzofuran	2.5	10	50	200	1000
1,2,3,7,8,9-Hexachlorodibenzofuran	2.5	10	50	200	1000
2,3,4,6,7,8-Hexachlorodibenzofuran	2.5	10	50	200	1000
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	2.5	10	50	200	1000
1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.5	10	50	200	1000
1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.5	10	50	200	1000
Octachlorodibenzo-p-dioxin	5	20	100	400	2000
Octachlorodibenzofuran	5	20	100	400	2000

### Method 1613 Precision and Recovery Standard

M-1613-PAR

1 x 1 mL

M-1613-PAR-PAK

SAVE 5 x 1 mL

At stated conc. (ng/mL) in Nonane

17 comps.

2,3,7,8-Tetrachlorodibenzo-p-dioxin	40
2,3,7,8-Tetrachlorodibenzofuran	40
1,2,3,7,8-Pentachlorodibenzo-p-dioxin	200
1,2,3,7,8-Pentachlorodibenzofuran	200
2,3,4,7,8-Pentachlorodibenzofuran	200
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	200
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	200
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	200
1,2,3,4,7,8-Hexachlorodibenzofuran	200
1,2,3,6,7,8-Hexachlorodibenzofuran	200
1,2,3,7,8,9-Hexachlorodibenzofuran	200
2,3,4,6,7,8-Hexachlorodibenzofuran	200
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	200
1,2,3,4,6,7,8-Heptachlorodibenzofuran	200
1,2,3,4,7,8,9-Heptachlorodibenzofuran	200
Octachlorodibenzo-p-dioxin	400
Octachlorodibenzofuran	400

This solution is for those labs only determining the concentration of the two most toxic isomers.

### 2,3,7,8 Isomers Only Mix

M-1613-DF

1 x 1 mL

40 ng/mL each in Nonane

2 comps.

2,3,7,8-Tetrachlorodibenzo-p-dioxin  
2,3,7,8-Tetrachlorodibenzofuran

#### Technical Note

These native solutions of the USEPA Method 1613 analytes can also be used for USEPA Method 23, 8280, 8290A, EU Method EN-1948 and Japanese Methods JIS-K0311 and K0312.

## Method 8280A Dioxins & Furans by HRGC/LRMS

### Dioxin Mix

M-8280A

1 x 1 mL

M-8280A-PAK

SAVE 5 x 1 mL

5 µg/mL each in Toluene

5 comps.

2,3,7,8-Tetrachlorodibenzo-p-dioxin  
1,2,3,7,8-Pentachlorodibenzo-p-dioxin  
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin  
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin  
Octachlorodibenzo-p-dioxin

### Furan Mix

M-8280B

1 x 1 mL

M-8280B-PAK

SAVE 5 x 1 mL

5 µg/mL each in Toluene

5 comps.

2,3,7,8-Tetrachlorodibenzofuran  
1,2,3,7,8-Pentachlorodibenzofuran  
1,2,3,4,7,8-Hexachlorodibenzofuran  
1,2,3,4,6,7,8-Heptachlorodibenzofuran  
Octachlorodibenzofuran

### Column Performance Check

M-8280-CPC

1 x 1 mL

5 µg/mL each in Toluene

7 comps.

1,2,3,4-Tetrachlorodibenzo-p-dioxin  
2,3,7,8-Tetrachlorodibenzo-p-dioxin  
1,2,3,4,7-Pentachlorodibenzo-p-dioxin  
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin  
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin  
Octachlorodibenzo-p-dioxin  
2,3,7,8-Tetrachlorodibenzofuran

**AccuStandard can synthesize  
rare dioxin and furan compounds.**

**Contact our Technical Service  
Department for your needs.**

## Additional Dioxin Mixes

### Dioxin Window Defining Mix

**D-WD** 1 x 1 mL  
20 ng/mL each in Toluene 7 comps.

**D-WD-2.5X** 1 x 1 mL  
50 ng/mL each in Toluene 7 comps.

1,2,4,6,8/1,2,4,7,9-Pentachlorodibenzo-*p*-dioxin (Isomer pair)  
1,2,3,8,9-Pentachlorodibenzo-*p*-dioxin  
1,2,4,6,7,9/1,2,4,6,8,9-Hexachlorodibenzo-*p*-dioxin (Isomer pair)  
1,2,3,4,6,7-Hexachlorodibenzo-*p*-dioxin  
1,2,3,4,6,7,8-Heptachlorodibenzo-*p*-dioxin  
1,2,3,4,6,7,9-Heptachlorodibenzo-*p*-dioxin  
Octachlorodibenzo-*p*-dioxin

### Dioxin Calibration Mix

**D-CAL** 1 x 1 mL  
20 ng/mL each in Toluene 6 comps.

**D-CAL-2.5X** 1 x 1 mL  
50 ng/mL each in Toluene 6 comps.

1,2,3,7,8-Pentachlorodibenzo-*p*-dioxin  
1,2,3,4,7,8-Hexachlorodibenzo-*p*-dioxin  
1,2,3,6,7,8-Hexachlorodibenzo-*p*-dioxin  
1,2,3,7,8,9-Hexachlorodibenzo-*p*-dioxin  
1,2,3,4,6,7,8-Heptachlorodibenzo-*p*-dioxin  
Octachlorodibenzo-*p*-dioxin

## Related Compounds

Compound	CAS No.		Cat. No.	Unit
2-Amino-7,8-dibromodibenzo- <i>p</i> -dioxin 0.1 mg/mL in Toluene		SOLUTION	X-011	1 mL
4-Chlorophenyl methyl sulfoxide	934-73-6	NEAT	X-004	10 mg
4,6-Dinitro- <i>o</i> -toluidine	7477-94-3	NEAT	X-002	10 mg
1,4-Dioxino(2,3,6,5,6,6')dipyridine (Dipyridine analog of dibenzo- <i>p</i> -dioxin)	262-16-8	NEAT	X-005	5 mg
N,N'-bis(4-Isopropylphenyl) urea	113260-74-5	NEAT	X-012	10 mg
9-Methylacridine	611-64-3	NEAT	X-008	10 mg
3,3',4,4'-Tetrachloroazobenzene	14047-09-7	NEAT	X-009	10 mg
3,3',4,4'-Tetrachloroazoxybenzene	21232-47-3	NEAT	X-010	10 mg
N,N'-bis(2,4,6-Trichlorophenyl) urea	20632-35-3	NEAT	X-003	10 mg

## ASTM D5837 Furanic Compounds in Electrical Insulating Liquids by HPLC

### Furanic Compound Extraction Standard

**D-5837-01** 1 x 1 mL  
1000 µg/mL each in Acetonitrile 5 comps.

2-Acetylfuran  
2-Furaldehyde  
Furfuryl alcohol  
5-(Hydroxymethyl)-2-furaldehyde  
5-Methylfurfural

### Furanic Compound Calibration Standard

**D-5837-02** 1 x 1 mL  
1000 µg/mL each in Toluene 5 comps.

2-Acetylfuran  
2-Furaldehyde  
Furfuryl alcohol  
5-(Hydroxymethyl)-2-furaldehyde  
5-Methylfurfural





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