



Mixtures for Congener Specific PCB Analysis

PCBS

Method 1668 Congener Set of 209 Chlorinated Biphenyl Congeners by GC/MS (continued)

PCB Congener Mix #4

M-1668A-4-0.01X

At stated conc. in Isooctane

1 x 1 mL

15 comps.

2,3',4'-Trichlorobiphenyl	(2.5 µg/mL)
2,3,4-Trichlorobiphenyl	(2.5 µg/mL)
2,3',4,6'-Tetrachlorobiphenyl	(5.0 µg/mL)
2,2',4,4'-Tetrachlorobiphenyl	(5.0 µg/mL)
2,2',3,4'-Tetrachlorobiphenyl	(5.0 µg/mL)
2,3,4',6'-Tetrachlorobiphenyl	(5.0 µg/mL)
2,3',4',5'-Tetrachlorobiphenyl	(5.0 µg/mL)
2,2',4,5,6'-Pentachlorobiphenyl	(5.0 µg/mL)
2,2',3',4,5'-Pentachlorobiphenyl	(5.0 µg/mL)
2,3,4,4',6'-Pentachlorobiphenyl	(5.0 µg/mL)
2',3,4,4',5'-Pentachlorobiphenyl	(5.0 µg/mL)
2,2',3,3',5,6'-Hexachlorobiphenyl	(5.0 µg/mL)
2,2',3,3',4,6'-Hexachlorobiphenyl	(5.0 µg/mL)
2,3,3',4',5,6'-Hexachlorobiphenyl	(5.0 µg/mL)
2,2',3,3',4,4',5,5'-Heptachlorobiphenyl	(5.0 µg/mL)

PCB Congener Mix #5

M-1668A-5-0.01X

At stated conc. in Isooctane

1 x 1 mL

28 comps.

2-Chlorobiphenyl	(2.5 µg/mL)	2,2',3',4,6'-Pentachlorobiphenyl	(5.0 µg/mL)
4-Chlorobiphenyl	(2.5 µg/mL)	2',3,4,5,6'-Pentachlorobiphenyl	(5.0 µg/mL)
2,2'-Dichlorobiphenyl	(2.5 µg/mL)	2,3,3',4',6'-Pentachlorobiphenyl	(5.0 µg/mL)
4,4'-Dichlorobiphenyl	(2.5 µg/mL)	3,3',4,4',5'-Pentachlorobiphenyl	(5.0 µg/mL)
2,2',6'-Trichlorobiphenyl	(2.5 µg/mL)	2,2',4,4',6,6'-Hexachlorobiphenyl	(5.0 µg/mL)
2,2',3'-Trichlorobiphenyl	(2.5 µg/mL)	2,2',3,4,4',5'-Hexachlorobiphenyl	(5.0 µg/mL)
3,4,4'-Trichlorobiphenyl	(2.5 µg/mL)	3,3',4,4',5,5'-Hexachlorobiphenyl	(5.0 µg/mL)
2,2',6,6'-Tetrachlorobiphenyl	(5.0 µg/mL)	2,2',3,4',5,6,6'-Heptachlorobiphenyl	(5.0 µg/mL)
2,2',3,5'-Tetrachlorobiphenyl	(5.0 µg/mL)	2,3,3',4,4',5,5'-Heptachlorobiphenyl	(5.0 µg/mL)
2,2',3,5'-Tetrachlorobiphenyl	(5.0 µg/mL)	2,2',3,3',5,5',6,6'-Octachlorobiphenyl	(7.5 µg/mL)
2,4,4',5'-Tetrachlorobiphenyl	(5.0 µg/mL)	2,3,3',4,4',5,5',6,6'-Octachlorobiphenyl	(7.5 µg/mL)
2,3,3',4'-Tetrachlorobiphenyl	(5.0 µg/mL)	2,2',3,3',4,4',5,5',6,6'-Nonachlorobiphenyl	(7.5 µg/mL)
3,3',4,4'-Tetrachlorobiphenyl	(5.0 µg/mL)	2,2',3,3',4,4',5,5',6,6'-Nonachlorobiphenyl	(7.5 µg/mL)
2,2',4,6,6'-Pentachlorobiphenyl	(5.0 µg/mL)	Decachlorobiphenyl	(7.5 µg/mL)

Method 1668A/1668 Combined Congener Standards

M-1668A-C-NT-LOC-WD

M-1668A-C-NT-LOC-WD-PAK

20 µg/mL each in Isooctane

SAVE

1 x 1 mL

5 x 1 mL

33 comps.

2-Chlorobiphenyl	2,2',4,4',6,6'-Hexachlorobiphenyl
4-Chlorobiphenyl	2,3,3',4,4',5'-Hexachlorobiphenyl
2,2'-Dichlorobiphenyl	2,3,3',4,4',5'-Hexachlorobiphenyl
4,4'-Dichlorobiphenyl	2,3',4,4',5,5'-Hexachlorobiphenyl
2,2',6'-Trichlorobiphenyl	3,3',4,4',5,5'-Hexachlorobiphenyl
2,3,5'-Trichlorobiphenyl	2,2',3,3',4,4',5-Heptachlorobiphenyl
2',3,5-Trichlorobiphenyl	2,2',3,4,4',5,5'-Heptachlorobiphenyl
3,4,4'-Trichlorobiphenyl	2,2',3,4,4',5,6'-Heptachlorobiphenyl
2,2',6,6'-Tetrachlorobiphenyl	2,2',3,4',5,6,6'-Heptachlorobiphenyl
3,3',4,4'-Tetrachlorobiphenyl	2,3,3',4,4',5,5'-Heptachlorobiphenyl
3,4,4',5'-Tetrachlorobiphenyl	2,2',3,3',5,5',6,6'-Octachlorobiphenyl
2,2',4,6,6'-Pentachlorobiphenyl	2,3,3',4,4',5,5',6-Octachlorobiphenyl
2,3,3',4,4'-Pentachlorobiphenyl	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl
2,3,4,4',5-Pentachlorobiphenyl	2,2',3,3',4,4',5,5',6,6'-Nonachlorobiphenyl
2',3,4,4',5-Pentachlorobiphenyl	2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl
3,3',4,4',5-Pentachlorobiphenyl	

GPC Calibration Solution

CLP-027-R2-WL-10ML

At stated conc. in CH₂Cl₂

1 x 10 mL

5 comps.

Corn Oil	(25 mg/mL)
bis(2-Ethylhexyl)phthalate	(0.5 mg/mL)
Methoxychlor	(0.1 mg/mL)
Perylene	(0.02 mg/mL)
Sulfur	(0.08 mg/mL)

Level of Chlorination Calibration/Spike Set

Determination of Chlorobiphenyl content at each level of chlorination

Calibration/Spike Set

M-1668A-LOC-SET

2 x 1 mL (M-1668A-NAT, M-1668A-PAR)

Native PCB Calibration Mix

M-1668A-NAT

At stated conc. in Isooctane

1 x 1 mL

19 comps.

4-Chlorobiphenyl	(5 µg/mL)
4,4'-Dichlorobiphenyl	(5 µg/mL)
2,4,4'-Trichlorobiphenyl	(5 µg/mL)
3,3',4,4'-Tetrachlorobiphenyl	(1 µg/mL)
2,3,3',4,4'-Pentachlorobiphenyl	(5 µg/mL)
2,3,4,4',5-Pentachlorobiphenyl	(5 µg/mL)
2,3',4,4',5-Pentachlorobiphenyl	(5 µg/mL)
2',3,4,4',5-Pentachlorobiphenyl	(5 µg/mL)
3,3',4,4',5-Pentachlorobiphenyl	(5 µg/mL)
2,3,3',4,4',5-Hexachlorobiphenyl	(10 µg/mL)
2,3,3',4,4',5'-Hexachlorobiphenyl	(10 µg/mL)
2,3',4,4',5,5'-Hexachlorobiphenyl	(10 µg/mL)
3,3',4,4',5,5'-Hexachlorobiphenyl	(10 µg/mL)
2,2',3,3',4,4',5-Heptachlorobiphenyl	(10 µg/mL)
2,2',3,4,4',5,5'-Heptachlorobiphenyl	(10 µg/mL)
2,3,3',4,4',5,5'-Heptachlorobiphenyl	(10 µg/mL)
2,2',3,3',4,4',5,5'-Octachlorobiphenyl	(10 µg/mL)
2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	(10 µg/mL)
2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl	(20 µg/mL)

PAR PCB Spike Mix

M-1668A-PAR

At stated conc. in Isooctane

1 x 1 mL

19 comps.

4-Chlorobiphenyl	(10 µg/mL)
4,4'-Dichlorobiphenyl	(10 µg/mL)
2,4,4'-Trichlorobiphenyl	(10 µg/mL)
3,3',4,4'-Tetrachlorobiphenyl	(0.2 µg/mL)
2,3,3',4,4'-Pentachlorobiphenyl	(10 µg/mL)
2,3,4,4',5-Pentachlorobiphenyl	(10 µg/mL)
2,3',4,4',5-Pentachlorobiphenyl	(10 µg/mL)
2',3,4,4',5-Pentachlorobiphenyl	(10 µg/mL)
3,3',4,4',5-Pentachlorobiphenyl	(1 µg/mL)
2,3,3',4,4',5-Hexachlorobiphenyl	(10 µg/mL)
2,3,3',4,4',5'-Hexachlorobiphenyl	(10 µg/mL)
2,3',4,4',5,5'-Hexachlorobiphenyl	(10 µg/mL)
3,3',4,4',5,5'-Hexachlorobiphenyl	(2 µg/mL)
2,2',3,3',4,4',5-Heptachlorobiphenyl	(2 µg/mL)
2,2',3,4,4',5,5'-Heptachlorobiphenyl	(10 µg/mL)
2,3,3',4,4',5,5'-Heptachlorobiphenyl	(2 µg/mL)
2,2',3,3',4,4',5,5'-Octachlorobiphenyl	(10 µg/mL)
2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	(10 µg/mL)
2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl	(20 µg/mL)

Congener Specific PCB Analysis



Canadian Methods

A second set of four formulations has been selected by the Institute for Biological Sciences of Canada and can be purchased individually or as a complete set (C-CAN-SET). The concentration levels for these formulations are selected so that 1 mL of standard diluted into 100 mL will show equal response by ECD.

PCB Congener (Canadian RM) Set

C-CAN-SET

4 x 1 mL (set includes C-CAN-01, C-CAN-02, C-CAN-03, C-CAN-04)

PCB Congeners Mix #1

C-CAN-01

1 x 1 mL

At stated conc. in Isooctane

14 comps.

No.		
18	2,2',5-Trichlorobiphenyl	(11.8 µg/mL)
31	2,4',5-Trichlorobiphenyl	(6.6 µg/mL)
40	2,2',3,3'-Tetrachlorobiphenyl	(4.9 µg/mL)
44	2,2',3,5'-Tetrachlorobiphenyl	(5.9 µg/mL)
49	2,2',4,5'-Tetrachlorobiphenyl	(7.6 µg/mL)
54	2,2',6,6'-Tetrachlorobiphenyl	(16.6 µg/mL)
77	3,3',4,4'-Tetrachlorobiphenyl	(5.5 µg/mL)
86	2,2',3,4,5-Pentachlorobiphenyl	(2.9 µg/mL)
87	2,2',3,4,5'-Pentachlorobiphenyl	(3.8 µg/mL)
121	2,3',4,5',6-Pentachlorobiphenyl	(3.1 µg/mL)
153	2,2',4,4',5,5'-Hexachlorobiphenyl	(2.1 µg/mL)
156	2,3,3',4,4',5'-Hexachlorobiphenyl	(1.5 µg/mL)
159	2,3,3',4,5,5'-Hexachlorobiphenyl	(1.2 µg/mL)
209	2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl	(1.7 µg/mL)

PCB Congeners Mix #2

C-CAN-02

1 x 1 mL

At stated conc. in Isooctane

15 comps.

No.		
15	4,4'-Dichlorobiphenyl	(91.9 µg/mL)
52	2,2',5,5'-Tetrachlorobiphenyl	(15.2 µg/mL)
60	2,3,4,4'-Tetrachlorobiphenyl	(3.9 µg/mL)
103	2,2',4,5',6-Pentachlorobiphenyl	(10.8 µg/mL)
105	2,3,3',4,4'-Pentachlorobiphenyl	(4 µg/mL)
128	2,2',3,3',4,4'-Hexachlorobiphenyl	(4.9 µg/mL)
143	2,2',3,4,5,6'-Hexachlorobiphenyl	(5.7 µg/mL)
154	2,2',4,4',5,6'-Hexachlorobiphenyl	(6.2 µg/mL)
173	2,2',3,3',4,5,6-Heptachlorobiphenyl	(2.3 µg/mL)
182	2,2',3,4,4',5,6'-Heptachlorobiphenyl	(3.8 µg/mL)
202	2,2',3,3',5,5',6,6'-Octachlorobiphenyl	(3.6 µg/mL)
205	2,3,3',4,4',5,5',6-Octachlorobiphenyl	(3.2 µg/mL)
207	2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl	(3.8 µg/mL)
208	2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl	(2.4 µg/mL)
209	2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl	(2.8 µg/mL)

PCB Congeners Mix #3

C-CAN-03

1 x 1 mL

At stated conc. in Isooctane

15 comps.

No.		
15	4,4'-Dichlorobiphenyl	(138.1 µg/mL)
114	2,3,4,4',5-Pentachlorobiphenyl	(6.3 µg/mL)
129	2,2',3,3',4,5-Hexachlorobiphenyl	(8.3 µg/mL)
137	2,2',3,4,4',5-Hexachlorobiphenyl	(7.4 µg/mL)
153	2,2',4,4',5,5'-Hexachlorobiphenyl	(7.3 µg/mL)
171	2,2',3,3',4,4',6-Heptachlorobiphenyl	(5.2 µg/mL)
183	2,2',3,4,4',5',6-Heptachlorobiphenyl	(6.6 µg/mL)
185	2,2',3,4,5,5',6-Heptachlorobiphenyl	(3.5 µg/mL)
189	2,3,3',4,4',5,5',6-Heptachlorobiphenyl	(4.7 µg/mL)
191	2,3,3',4,4',5',6-Heptachlorobiphenyl	(5 µg/mL)
201	2,2',3,3',4,5',6,6'-Octachlorobiphenyl	(7 µg/mL)
199	2,2',3,3',4,5,5',6'-Octachlorobiphenyl	(4.8 µg/mL)
203	2,2',3,4,4',5,5',6-Octachlorobiphenyl	(5.1 µg/mL)
206	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	(6.7 µg/mL)
209	Decachlorobiphenyl	(5.1 µg/mL)

PCB Congeners Mix #4

C-CAN-04

1 x 1 mL

At stated conc. in Isooctane

15 comps.

No.		
14	4,4'-Dichlorobiphenyl	(76.7 µg/mL)
101	2,2',4,5,5'-Pentachlorobiphenyl	(8.9 µg/mL)
118	2,3',4,4',5-Pentachlorobiphenyl	(3.9 µg/mL)
138	2,2',3,4,4',5'-Hexachlorobiphenyl	(4.2 µg/mL)
141	2,2',3,4,5,5'-Hexachlorobiphenyl	(2.8 µg/mL)
151	2,2',3,5,5',6-Hexachlorobiphenyl	(5 µg/mL)
153	2,2',4,4',5,5'-Hexachlorobiphenyl	(3.3 µg/mL)
170	2,2',3,3',4,4',5-Heptachlorobiphenyl	(3 µg/mL)
180	2,2',3,4,4',5,5'-Heptachlorobiphenyl	(2.8 µg/mL)
187	2,2',3,4',5,5',6-Heptachlorobiphenyl	(3.2 µg/mL)
194	2,2',3,3',4,4',5,5'-Octachlorobiphenyl	(2.4 µg/mL)
195	2,2',3,3',4,4',5,6-Octachlorobiphenyl	(2.6 µg/mL)
196	2,2',3,3',4,4',5,6'-Octachlorobiphenyl	(3.3 µg/mL)
199	2,2',3,3',4,5,5',6'-Octachlorobiphenyl	(3.6 µg/mL)
209	Decachlorobiphenyl	(2.7 µg/mL)

Quebec Ministry of Environment Congener Mix

C-QME-01

1 x 1 mL

At stated conc. in Isooctane

41 comps.

No.			No.		
17	2,2',4-Trichlorobiphenyl	(500 ng/mL)	149	2,2',3,4',5',6-Hexachlorobiphenyl	(2000 ng/mL)
18	2,2',5-Trichlorobiphenyl	(2000 ng/mL)	151	2,2',3,5,5',6-Hexachlorobiphenyl	(2000 ng/mL)
28	2,4,4'-Trichlorobiphenyl	(2000 ng/mL)	153	2,2',4,4',5,5'-Hexachlorobiphenyl	(2000 ng/mL)
31	2,4',5-Trichlorobiphenyl	(1500 ng/mL)	156	2,3,3',4,4',5-Hexachlorobiphenyl	(2000 ng/mL)
33	2,3,4-Trichlorobiphenyl	(2000 ng/mL)	158	2,3,3',4,4',6-Hexachlorobiphenyl	(500 ng/mL)
44	2,2',3,5'-Tetrachlorobiphenyl	(2000 ng/mL)	169	3,3',4,4',5,5'-Hexachlorobiphenyl	(2000 ng/mL)
49	2,2',4,5'-Tetrachlorobiphenyl	(2000 ng/mL)	170	2,2',3,3',4,4',5-Heptachlorobiphenyl	(2000 ng/mL)
52	2,2',5,5'-Tetrachlorobiphenyl	(2000 ng/mL)	171	2,2',3,3',4,4',6-Heptachlorobiphenyl	(2000 ng/mL)
70	2,3',4',5-Tetrachlorobiphenyl	(2000 ng/mL)	177	2,2',3,3',4,4',5,6-Heptachlorobiphenyl	(2000 ng/mL)
74	2,4,4',5-Tetrachlorobiphenyl	(2000 ng/mL)	180	2,2',3,4,4',5,5'-Heptachlorobiphenyl	(2000 ng/mL)
82	2,2',3,3',4-Pentachlorobiphenyl	(500 ng/mL)	183	2,2',3,4,4',5',6-Heptachlorobiphenyl	(2000 ng/mL)
87	2,2',3,4,5'-Pentachlorobiphenyl	(2000 ng/mL)	187	2,2',3,4',5,5',6-Heptachlorobiphenyl	(2000 ng/mL)
95	2,2',3,5',6-Pentachlorobiphenyl	(1000 ng/mL)	191	2,3,3',4,4',5',6-Heptachlorobiphenyl	(2000 ng/mL)
99	2,2',4,4',5-Pentachlorobiphenyl	(2000 ng/mL)	194	2,2',3,3',4,4',5,5'-Octachlorobiphenyl	(2000 ng/mL)
101	2,2',4,5,5'-Pentachlorobiphenyl	(2000 ng/mL)	195	2,2',3,3',4,4',5,6-Octachlorobiphenyl	(2000 ng/mL)
105	2,3,3',4,4'-Pentachlorobiphenyl	(500 ng/mL)	199	2,2',3,3',4,5,5',6'-Octachlorobiphenyl	(1500 ng/mL)
110	2,3,3',4',6-Pentachlorobiphenyl	(2000 ng/mL)	205	2,3,3',4,4',5,5',6-Octachlorobiphenyl	(2000 ng/mL)
118	2,3',4,4',5-Pentachlorobiphenyl	(2000 ng/mL)	206	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	(2000 ng/mL)
128	2,2',3,3',4,4'-Hexachlorobiphenyl	(2000 ng/mL)	208	2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl	(2000 ng/mL)
132	2,2',3,3',4,6'-Hexachlorobiphenyl	(1000 ng/mL)	209	Decachlorobiphenyl	(2000 ng/mL)
138	2,2',3,4,4',5'-Hexachlorobiphenyl	(2000 ng/mL)			

PCBS



Congener Specific PCB Analysis

PCBS

Integrated Atmospheric Deposition Network (IADN)

The Integrated Atmospheric Deposition Network is composed of five agencies: the US EPA, Environment Canada's (EC) Metrological Service of Canada, EC's National Water Research Institute (NWRI), EC's Ecosystem Health Division of Ontario Region (EHD), and the Ontario Ministry of Environment (OME) whose goal it is to cooperatively implement the Great Lakes Water Quality Agreement.

This agreement requires certain chemicals to be monitored. The Tier 1 group specifically called for the measurement of PCB congeners. AccuStandard was requested to develop a set of IADN PCB congener standards to meet this specific chemical list.

IADN Congener Set

C-IADN-SET

3 x 1 mL (C-IADN-01, C-IADN-02, C-IADN-03)

IADN Congener Standard #1

C-IADN-01

1 x 1 mL

30 µg/mL each in Isooctane

28 comps.

2,2'-Dichlorobiphenyl
 2,4-Dichlorobiphenyl
 2,6-Dichlorobiphenyl
 4,4'-Dichlorobiphenyl
 2,2',5-Trichlorobiphenyl
 2,4,4'-Trichlorobiphenyl
 2,4',6-Trichlorobiphenyl
 2,2',3,4-Tetrachlorobiphenyl
 2,2',3,6-Tetrachlorobiphenyl
 2,2',5,5'-Tetrachlorobiphenyl
 2,3,3',4'-Tetrachlorobiphenyl
 2,3',4,4'-Tetrachlorobiphenyl
 2,4,4',5-Tetrachlorobiphenyl
 3,4,4',5-Tetrachlorobiphenyl
 2,2',3,4,4'-Pentachlorobiphenyl
 2,2',3,4',6-Pentachlorobiphenyl
 2,2',3',4,5-Pentachlorobiphenyl
 2,2',4,5,5'-Pentachlorobiphenyl
 2,3,4,4',5-Pentachlorobiphenyl
 2',3,4,4',5-Pentachlorobiphenyl
 2,2',3,3',4,6-Hexachlorobiphenyl
 2,2',3,4,4',5'-Hexachlorobiphenyl
 2,2',4,4',5,5'-Hexachlorobiphenyl
 2,3',4,4',5,5'-Hexachlorobiphenyl
 2,2',3,3',4,4',6-Heptachlorobiphenyl
 2,2',3,4,4',5,5'-Heptachlorobiphenyl
 2,2',3,3',4,5,6'-Octachlorobiphenyl
 2,3,3',4,4',5,5',6-Octachlorobiphenyl

IADN Congener Standard #2

C-IADN-02

1 x 1 mL

30 µg/mL each in Isooctane

28 comps.

2,3-Dichlorobiphenyl
 2,4'-Dichlorobiphenyl
 3,4-Dichlorobiphenyl
 2,2',3-Trichlorobiphenyl
 2,2',6-Trichlorobiphenyl
 2,3',5-Trichlorobiphenyl
 2',3,4-Trichlorobiphenyl
 2,2',3,4'-Tetrachlorobiphenyl
 2,2',4,4'-Tetrachlorobiphenyl
 2,2',4,5'-Tetrachlorobiphenyl
 2,3,4,4'-Tetrachlorobiphenyl
 2,3',4',5-Tetrachlorobiphenyl
 2',3,4,5-Tetrachlorobiphenyl
 2,2',3,3',5-Pentachlorobiphenyl
 2,2',3,4,5'-Pentachlorobiphenyl
 2,2',3,5,5'-Pentachlorobiphenyl
 2,2',4,4',5-Pentachlorobiphenyl
 2,3,3',4,4'-Pentachlorobiphenyl
 2,3',4,4',5-Pentachlorobiphenyl
 3,3',4,4',5-Pentachlorobiphenyl
 2,2',3,3',4,6'-Hexachlorobiphenyl
 2,2',3,4,5',6-Hexachlorobiphenyl
 2,3,3',4,4',5-Hexachlorobiphenyl
 3,3',4,4',5,5'-Hexachlorobiphenyl
 2,2',3,3',4,5,5'-Heptachlorobiphenyl
 2,3,3',4,4',5,6-Hexachlorobiphenyl
 2,2',3,3',4,5,5',6'-Octachlorobiphenyl
 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl

IADN Congener Standard #3

C-IADN-03

1 x 1 mL

30 µg/mL each in Isooctane

28 comps.

2,3'-Dichlorobiphenyl
 2,5-Dichlorobiphenyl
 3,4'-Dichlorobiphenyl
 2,2',4-Trichlorobiphenyl
 2,3,4'-Trichlorobiphenyl
 2,4',5-Trichlorobiphenyl
 3,4,4'-Trichlorobiphenyl
 2,2',3,5'-Tetrachlorobiphenyl
 2,2',4,5-Tetrachlorobiphenyl
 2,2',5,6'-Tetrachlorobiphenyl
 2,3,4',6-Tetrachlorobiphenyl
 2,3',4',6-Tetrachlorobiphenyl
 3,3',4,4'-Tetrachlorobiphenyl
 2,2',3,3',6-Pentachlorobiphenyl
 2,2',3,4,6'-Pentachlorobiphenyl
 2,2',3,5',6-Pentachlorobiphenyl
 2,2',4,4',6-Pentachlorobiphenyl
 2,3,3',4',6-Pentachlorobiphenyl
 2,3',4,4',6-Pentachlorobiphenyl
 2,2',3,3',4,4'-Hexachlorobiphenyl
 2,2',3,3',5,6'-Hexachlorobiphenyl
 2,2',3,4',5,6'-Hexachlorobiphenyl
 2,2',3,3',4,5,6'-Hexachlorobiphenyl
 2,2',3,3',4,4',5-Heptachlorobiphenyl
 2,2',3,3',4,5,6'-Heptachlorobiphenyl
 2,2',3,3',4,4',5,5'-Octachlorobiphenyl
 2,2',3,3',5,5',6,6'-Octachlorobiphenyl
 2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl

PCB Congener Content Evaluation

These Congener Calibration mixes have been formulated to meet the proposed International standard titled "Insulating Liquids - Contamination by PCBs - Method of Determination by Capillary Column Gas Chromatography".

Mix #1

AE-00059

1 x 1 mL

AE-00059-10ML

1 x 10 mL

10 µg/mL each in Isooctane

6 comps.

No.

28 2,4,4'-Trichlorobiphenyl
 52 2,2',5,5'-Tetrachlorobiphenyl
 101 2,2',4,5,5'-Pentachlorobiphenyl
 138 2,2',3,4,4',5'-Hexachlorobiphenyl
 153 2,2',4,4',5,5'-Hexachlorobiphenyl
 180 2,2',3,4,4',5,5'-Heptachlorobiphenyl

Mix #2

AE-00060

1 x 1 mL

AE-00060-10ML

1 x 10 mL

10 µg/mL each in Isooctane

3 comps.

No.

77 3,3',4,4'-Tetrachlorobiphenyl
 126 3,3',4,4',5-Pentachlorobiphenyl
 169 3,3',4,4',5,5'-Hexachlorobiphenyl

Congener Calibration Mix

AE-00061

1 x 1 mL

AE-00061-10ML

1 x 10 mL

10 µg/mL each in Isooctane

14 comps.

No.

18 2,2',5-Trichlorobiphenyl
 28 2,4,4'-Trichlorobiphenyl
 31 2,4',5-Trichlorobiphenyl
 44 2,2',3,5'-Tetrachlorobiphenyl
 52 2,2',5,5'-Tetrachlorobiphenyl
 101 2,2',4,5,5'-Pentachlorobiphenyl
 118 2,3',4,4',5-Pentachlorobiphenyl
 138 2,2',3,4,4',5'-Hexachlorobiphenyl
 149 2,2',3,4',5,6'-Hexachlorobiphenyl
 153 2,2',4,4',5,5'-Hexachlorobiphenyl
 170 2,2',3,3',4,4',5-Heptachlorobiphenyl
 180 2,2',3,4,4',5,5'-Heptachlorobiphenyl
 194 2,2',3,3',4,4',5,5'-Octachlorobiphenyl
 209 Decachlorobiphenyl

Internal Standards

Each at 100 µg/mL in Isooctane

C-030S-TP

1 x 1 mL

2,4,6-Trichlorobiphenyl

C-209S-TP

1 x 1 mL

2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl

Technical Note

These congener content evaluation mixtures have proven useful for European laboratories estimating the PCB content of a sample when following EU guideline 96/59/EU for cleanup of PCBs.

Congener Specific PCB Analysis



Formulations for Toxicity and Abundance Studies

Abundance Analysis

Five of the solutions AccuStandard offers are formulated to assist the investigator or analytical Chemist in their own studies and can be purchased individually or as a complete set (C-SCA-SET). According to the study the 36 congeners contained in these five groups are considered environmentally threatening due to their frequency of occurrence in environmental samples, abundance in the Aroclors and potential toxicity.

Group 1a: comprises the three congeners present to a small extent in the Aroclors that are the most toxic and have been characterized as pure 3-Methyl cholanthrene - type (3-MC) inducers.

Group 1b: congeners are mixed-type inducers but are of somewhat lesser toxicity and are very abundant in the Aroclors as well as in the environment. It includes Congener #105 which, while not as prevalent, is potentially almost as toxic as the Group 1a congeners.

Literature Reference

V.A. McFarland and J.U. Clarke, Environmental Health Perspectives, vol. 81, pp 225-239 (1989). 2. K.C. Jones, Sci. Total Environment, vol. 68, pp 141-159 (1988).

Group 2: includes the congeners which are Phenobarbital - type (PB) inducers for Mixed-Function Oxidase enzymes. These are less toxic but more abundant in the environment. They represent 25-41% of total PCB content found in animal tissue.

Group 3: congeners are weak- or non-inducers representing about 10% of the PCB content of tissues.

Group 4: congeners have some potential for toxicity but have very low presence in tissue.

Toxicity Analysis

A sixth solution is prepared for the analyst who is investigating the presence of PCB congeners in food and human tissues. Specific congeners are selected by K.C. Jones² as outlined in his article referenced below which is titled, "Determination of polychlorinated biphenyls in human food stuffs and tissues: Suggestions for a selective congener analytical approach"

PCBS

Complete Set of PCB Congeners

C-SCA-SET

5 x 1 mL (includes C-SCA-01, C-SCA-02, C-SCA-03, C-SCA-04, C-SCA-05)

Mix #1 Group 1a (3 MC Type Inducers)

C-SCA-01

10 µg/mL each in Isooctane

1 x 1 mL

3 comps.

3,3',4,4'-Tetrachlorobiphenyl (77) 3,3',4,4',5,5'-Hexachlorobiphenyl (169)
3,3',4,4',5-Pentachlorobiphenyl (126)

Mix #2 Group 1b (Mixed Type Inducers)

C-SCA-02

10 µg/mL each in Isooctane

1 x 1 mL

6 comps.

2,3,3',4,4'-Pentachlorobiphenyl (105) 2,2',3,4,4',5'-Hexachlorobiphenyl (138)
2,3',4,4',5'-Pentachlorobiphenyl (118) 2,3,3',4,4',5'-Hexachlorobiphenyl (156)
2,2',3,3',4,4'-Hexachlorobiphenyl (128) 2,2',3,3',4,4',5'-Heptachlorobiphenyl (170)

Mix #3 Group 2 (PB Type Inducers)

C-SCA-03

10 µg/mL each in Isooctane

1 x 1 mL

7 comps.

2,2',3,4,5'-Pentachlorobiphenyl (87) 2,2',3,4,4',5'-Heptachlorobiphenyl (180)
2,2',4,4',5'-Pentachlorobiphenyl (99) 2,2',3,4,4',5',6'-Heptachlorobiphenyl (183)
2,2',4,5,5'-Pentachlorobiphenyl (101) 2,2',3,3',4,4',5'-Octachlorobiphenyl (194)
2,2',4,4',5,5'-Hexachlorobiphenyl (153)

Mix #4 Group 3 (Non-Inducer Type)

C-SCA-04

10 µg/mL each in Isooctane

1 x 1 mL

10 comps.

2,2',5-Trichlorobiphenyl (18) 2,4,4',5-Tetrachlorobiphenyl (74)
2,2',3,5'-Tetrachlorobiphenyl (44) 2,2',3,5,5',6'-Hexachlorobiphenyl (151)
2,2',4,5'-Tetrachlorobiphenyl (49) 2,2',3,3',4',5,6'-Heptachlorobiphenyl (177)
2,2',5,5'-Tetrachlorobiphenyl (52) 2,2',3,4',5,5',6'-Heptachlorobiphenyl (187)
2,3',4',5-Tetrachlorobiphenyl (70) 2,2',3,3',4,5,5',6'-Octachlorobiphenyl (199)

Mix #5 Group 4

(Mixed Type Inducers present at very low levels)

C-SCA-05

10 µg/mL each in Isooctane

1 x 1 mL

10 comps.

3,4,4'-Trichlorobiphenyl (37) 2,3,3',4,4',5'-Hexachlorobiphenyl (157)
3,4,4',5-Tetrachlorobiphenyl (81) 2,3,3',4,4',6'-Hexachlorobiphenyl (157)
2,3,4,4',5-Pentachlorobiphenyl (114) 2,3',4,4',5,5'-Hexachlorobiphenyl (167)
2,3',4,4',6-Pentachlorobiphenyl (119) 2,3',4,4',5',6'-Hexachlorobiphenyl (168)
2',3,4,4',5-Pentachlorobiphenyl (123) 2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)

Mix #6 (Food & Human Tissue analysis)

C-SCA-06

10 µg/mL each in Isooctane

1 x 1 mL

32 comps.

2,4'-Dichlorobiphenyl (8) 2,3,4,4',5'-Pentachlorobiphenyl (114)
2,4,4'-Trichlorobiphenyl (28) 2,3',4,4',5'-Pentachlorobiphenyl (118)
3,4,4'-Trichlorobiphenyl (37) 3,3',4,4',5'-Pentachlorobiphenyl (126)
2,2',3,5'-Tetrachlorobiphenyl (44) 2,2',3,3',4,4'-Hexachlorobiphenyl (128)
2,2',4,5'-Tetrachlorobiphenyl (49) 2,2',3,4,4',5'-Hexachlorobiphenyl (138)
2,2',5,5'-Tetrachlorobiphenyl (52) 2,2',4,4',5,5'-Hexachlorobiphenyl (153)
2,3,4,4'-Tetrachlorobiphenyl (60) 2,3,3',4,4',5'-Hexachlorobiphenyl (156)
2,3',4,4'-Tetrachlorobiphenyl (66) 2,3,3',4,4',6'-Hexachlorobiphenyl (158)
2,3',4',5-Tetrachlorobiphenyl (70) 2,3,4,4',5,6'-Hexachlorobiphenyl (166)
2,4,4',5-Tetrachlorobiphenyl (74) 3,3',4,4',5,5'-Hexachlorobiphenyl (169)
3,3',4,4'-Tetrachlorobiphenyl (77) 2,2',3,3',4,4',5'-Heptachlorobiphenyl (170)
2,2',3,3',4-Pentachlorobiphenyl (82) 2,2',3,3',5,6,6'-Heptachlorobiphenyl (179)
2,2',3,4,5'-Pentachlorobiphenyl (87) 2,2',3,4,4',5,5'-Heptachlorobiphenyl (180)
2,2',4,4',5'-Pentachlorobiphenyl (99) 2,2',3,4,4',5',6'-Heptachlorobiphenyl (183)
2,2',4,5,5'-Pentachlorobiphenyl (101) 2,2',3,4',5,5',6'-Heptachlorobiphenyl (187)
2,3,3',4,4'-Pentachlorobiphenyl (105) 2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)

Non-Ortho Substituted PCBs

C-SCA-DIOXLIK

10 µg/mL each in Isooctane

1 x 1 mL

4 comps.

3,3',4,4'-Tetrachlorobiphenyl (77)
3,3',4,4',5-Pentachlorobiphenyl (126)
3,3',4,4',5,5'-Hexachlorobiphenyl (169)
3,4,4',5-Tetrachlorobiphenyl (81)

Internal Standard

C-EU-IS-10ML

At stated conc. in Isooctane

1 x 10 mL

2 comps.

2,4,6-Trichlorobiphenyl
2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl

Dutch Seven PCBs Standard

PCB-DUTCH7-SET

100 µg/mL each in Isooctane

7 x 1 mL

PCB-DUTCH7

10 µg/mL each in Isooctane

1 x 1 mL

7 comps.

2,4,4'-Trichlorobiphenyl
2,2',5,5'-Tetrachlorobiphenyl
2,2',4,5,5'-Pentachlorobiphenyl
2,3',4,4',5-Pentachlorobiphenyl
2,2',3,4,4',5'-Hexachlorobiphenyl
2,2',4,4',5,5'-Hexachlorobiphenyl
2,2',3,4,4',5,5'-Heptachlorobiphenyl



Congener Specific PCB Analysis

PCBS

PCB Congener Mix for West Coast Fish Studies

C-WCFS 1 x 1 mL
25 µg/mL each in Isooctane 24 comps.

2,4',5'-Trichlorobiphenyl	2,2',3,4,5,5'-Hexachlorobiphenyl
2',3,4'-Trichlorobiphenyl	2,2',3,4',5',6'-Hexachlorobiphenyl
2,2',4,5'-Tetrachlorobiphenyl	2,2',3,5,5',6'-Hexachlorobiphenyl
2,3,3',4'-Tetrachlorobiphenyl	2,3,3',4,4',5'-Hexachlorobiphenyl
2,3,4,4'-Tetrachlorobiphenyl	2,3,3',4,4',6'-Hexachlorobiphenyl
2,3',4',5'-Tetrachlorobiphenyl	2,2',3,3',4,5,6'-Heptachlorobiphenyl
2,2',3,4,5'-Pentachlorobiphenyl	2,2',3,3',4',5,6'-Heptachlorobiphenyl
2,2',3,5',6'-Pentachlorobiphenyl	2,2',3,3',4,4',5,5'-Octachlorobiphenyl
2,2',3',4,5'-Pentachlorobiphenyl	2,2',3,3',4,4,5,5',6'-Octachlorobiphenyl
2,2',4,4',5'-Pentachlorobiphenyl	2,2',3,4,4',5,5',6'-Octachlorobiphenyl
2,3,3',4',6'-Pentachlorobiphenyl	2,2',3,4,4',5',6'-Heptachlorobiphenyl
2,2',2,3,3',4,6'-Hexachlorobiphenyl	2,4,4',5'-Tetrachlorobiphenyl

WHO/NIST/NOAA Congener List

C-WNN 1 x 1 mL
C-WNN-PAK 5 x 1 mL
10 µg/mL each in Isooctane **SAVE** 28 comps.

2,4'-Dichlorobiphenyl	2,2',3,3',4,4'-Hexachlorobiphenyl
2,2',5'-Trichlorobiphenyl	2,2',3,4,4',5'-Hexachlorobiphenyl
2,4,4'-Trichlorobiphenyl	2,2',4,4',5,5'-Hexachlorobiphenyl
2,2',3,5'-Tetrachlorobiphenyl	2,3,3',4,4',5'-Hexachlorobiphenyl
2,2',5,5'-Tetrachlorobiphenyl	2,3,3',4,4',5'-Hexachlorobiphenyl
2,3',4,4'-Tetrachlorobiphenyl	2,2',3,3',4,4',5'-Hexachlorobiphenyl
3,4,4',5'-Tetrachlorobiphenyl	3,3',4,4',5,5'-Hexachlorobiphenyl
2,2',4,5,5'-Pentachlorobiphenyl	2,2',3,3',4,4',5'-Heptachlorobiphenyl
2,3,3',4,4'-Pentachlorobiphenyl	2,2',3,4,4',5,5'-Heptachlorobiphenyl
2,3,4,4',5'-Pentachlorobiphenyl	2,2',3,4,4',5,5',6'-Heptachlorobiphenyl
2,3',4,4',5'-Pentachlorobiphenyl	2,2',3,3',4,4',5,6'-Octachlorobiphenyl
2',3,4,4',5'-Pentachlorobiphenyl	2,2',3,3',4,4',5,5',6'-Octachlorobiphenyl
3,3',4,4',5'-Pentachlorobiphenyl	2,2',3,3',4,4',5,5',6'-Nonachlorobiphenyl
2,2',3,3',4,4',5,5',6'-Nonachlorobiphenyl	Decachlorobiphenyl

World Health Organization Congener Mix

C-WHO-01 1 x 1 mL
2.0 µg/mL each in Isooctane 12 comps.

3,3',4,4'-Tetrachlorobiphenyl	2,3',4,4',5'-Pentachlorobiphenyl	2,3,3',4,4',5'-Hexachlorobiphenyl
3,4,4',5'-Tetrachlorobiphenyl	2',3,4,4',5'-Pentachlorobiphenyl	2,3',4,4',5,5'-Hexachlorobiphenyl
2,3,3',4,4'-Pentachlorobiphenyl	3,3',4,4',5'-Pentachlorobiphenyl	3,3',4,4',5,5'-Hexachlorobiphenyl
2,3,4,4',5'-Pentachlorobiphenyl	2,3,3',4,4',5'-Hexachlorobiphenyl	2,3,3',4,4',5,5'-Heptachlorobiphenyl

DCMA-PCB Isomer Mixture

M-002 1 x 1 mL
M-002-PAK 5 x 1 mL
At stated conc. in Hexane **SAVE** 10 comps.

2-Chlorobiphenyl (100 µg/mL)	2,2',3,3',6,6'-Hexachlorobiphenyl (10 µg/mL)
3,3'-Dichlorobiphenyl (100 µg/mL)	2,2',3,4,5,5',6'-Heptachlorobiphenyl (5 µg/mL)
2,4,5-Trichlorobiphenyl (10 µg/mL)	2,2',3,3',4,4',5,5'-Octachlorobiphenyl (5 µg/mL)
2,2',4,4'-Tetrachlorobiphenyl (10 µg/mL)	2,2',3,3',4,4',5,5',6'-Nonachlorobiphenyl (5 µg/mL)
2,3',4,5'-Pentachlorobiphenyl (10 µg/mL)	2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl (5 µg/mL)

Technical Note

The Dry Color Manufacturer's Association (DCMA) recommends that its members use this type of mixture to monitor their process streams for PCBs. The DCMA-PCB congener method is made from pure PCB congeners in Hexane

CEN's Workgroup #22 for PCBs in Waste Oil

PCB-W22 1 x 1 mL
10 µg/mL each in Isooctane 15 comps.
PCB-W22-PAK 5 x 1 mL **SAVE**
PCB-W22-SET 15 x 1 mL
100 µg/mL in Isooctane (Set of Individual Solutions)

No.	No.	No.
(18) 2,2',5'-Trichlorobiphenyl	(52) 2,2',5,5'-Tetrachlorobiphenyl	(149) 2,2',3,4',5',6'-Hexachlorobiphenyl
(20) 2,3,3'-Trichlorobiphenyl	(101) 2,2',4,5,5'-Pentachlorobiphenyl	(153) 2,2',4,4',5,5'-Hexachlorobiphenyl
(28) 2,4,4'-Trichlorobiphenyl	(105) 2,3,3',4,4'-Pentachlorobiphenyl	(170) 2,2',3,3',4,4',5'-Heptachlorobiphenyl
(31) 2,4',5'-Trichlorobiphenyl	(118) 2,3',4,4',5'-Pentachlorobiphenyl	(180) 2,2',3,4,4',5,5'-Heptachlorobiphenyl
(44) 2,2',3,5'-Tetrachlorobiphenyl	(138) 2,2',3,4,4',5'-Hexachlorobiphenyl	(194) 2,2',3,3',4,4',5,5'-Octachlorobiphenyl

Technical Note

The Comité Européen de Normalisation (CEN) has assigned Workgroup Number 22 in Hamburg, Germany to develop a method for "PCBs" in waste oil.

Dioxin-Like Congeners

C-DIOXLIK	Level 1 -01	Level 2 -02	Level 3 -03	Level 4 -04	Level 5 -05	Level 6 -06	Level 7 -07	Level 8 -08	Level 9 -09	Level 10 -10	Level 11 -11	Level 12 -12
	ng/mL	ng/mL	ng/mL	ng/mL	ng/mL	ng/mL	ng/mL	ng/mL	ng/mL	ng/mL	ng/mL	ng/mL
3,3',4,4'-Tetrachlorobiphenyl (77)	0.05	0.1	0.2	0.5	1	2	5	10	20	50	100	250
3,4,4',5'-Tetrachlorobiphenyl (81)	0.05	0.1	0.2	0.5	1	2	5	10	20	50	100	250
2,3,3',4,4'-Pentachlorobiphenyl (105)	0.05	0.1	0.2	0.5	1	2	5	10	20	50	100	250
2,3,4,4',5'-Pentachlorobiphenyl (114)	0.05	0.1	0.2	0.5	1	2	5	10	20	50	100	250
2,3',4,4',5'-Pentachlorobiphenyl (118)	0.05	0.1	0.2	0.5	1	2	5	10	20	50	100	250
2',3,4,4',5'-Pentachlorobiphenyl (123)	0.05	0.1	0.2	0.5	1	2	5	10	20	50	100	250
3,3',4,4',5'-Pentachlorobiphenyl (126)	0.05	0.1	0.2	0.5	1	2	5	10	20	50	100	250
2,3,3',4,4',5'-Hexachlorobiphenyl (156)	0.05	0.1	0.2	0.5	1	2	5	10	20	50	100	250
2,3,3',4,4',5'-Hexachlorobiphenyl (157)	0.05	0.1	0.2	0.5	1	2	5	10	20	50	100	250
2,3',4,4',5,5'-Hexachlorobiphenyl (167)	0.05	0.1	0.2	0.5	1	2	5	10	20	50	100	250
3,3',4,4',5,5'-Hexachlorobiphenyl (169)	0.05	0.1	0.2	0.5	1	2	5	10	20	50	100	250
2,2',3,3',4,4',5-Heptachlorobiphenyl (170)	0.05	0.1	0.2	0.5	1	2	5	10	20	50	100	250
2,2',3,4,4',5,5'-Heptachlorobiphenyl (180)	0.05	0.1	0.2	0.5	1	2	5	10	20	50	100	250
2,3,3',4,4',5,5'-Heptachlorobiphenyl (189)	0.05	0.1	0.2	0.5	1	2	5	10	20	50	100	250

C-DIOXLIK1-SET 5 x 1 mL Set includes	C-DIOXLIK2-SET 5 x 1 mL Set includes	C-DIOXLIK3-SET 5 x 1 mL Set includes	Individual Levels 4, 6, 8, 10 12
C-DIOXLIK-02	C-DIOXLIK-03	C-DIOXLIK-04	C-DIOXLIK3-04 1 mL
C-DIOXLIK-04	C-DIOXLIK-05	C-DIOXLIK-06	C-DIOXLIK3-06 1 mL
C-DIOXLIK-06	C-DIOXLIK-07	C-DIOXLIK-08	C-DIOXLIK3-08 1 mL
		C-DIOXLIK-10	C-DIOXLIK3-10 1 mL
		C-DIOXLIK-12	C-DIOXLIK3-12 1 mL

PCB Congener Calibration Mixtures



9 Mixtures provide All 209 Congeners
Present in Aroclors

PCB Congener Mix #1

C-CS-01 1 x 1 mL
10 µg/mL each in Isooctane 39 comps.

No.	Congener
1	2-Chlorobiphenyl
2	3-Chlorobiphenyl †
3	4-Chlorobiphenyl
4	2,2'-Dichlorobiphenyl
6	2,3'-Dichlorobiphenyl
8	2,4'-Dichlorobiphenyl
9	2,5-Dichlorobiphenyl
16	2,2',3-Trichlorobiphenyl
18	2,2',5-Trichlorobiphenyl
19	2,2',6-Trichlorobiphenyl
22	2,3,4'-Trichlorobiphenyl
25	2,3',4-Trichlorobiphenyl
28	2,4,4'-Trichlorobiphenyl
44	2,2',3,5'-Tetrachlorobiphenyl
52	2,2',5,5'-Tetrachlorobiphenyl
56	2,3,3',4'-Tetrachlorobiphenyl
66	2,3',4,4'-Tetrachlorobiphenyl
67	2,3',4,5-Tetrachlorobiphenyl
71	2,3',4,6-Tetrachlorobiphenyl
74	2,4,4',5-Tetrachlorobiphenyl
82	2,2',3,3',4-Pentachlorobiphenyl
87	2,2',3,4,5'-Pentachlorobiphenyl
99	2,2',4,4',5-Pentachlorobiphenyl
110	2,3,3',4',6-Pentachlorobiphenyl
138	2,2',3,4,4',5'-Hexachlorobiphenyl
146	2,2',3,4',5,5'-Hexachlorobiphenyl
147	2,2',3,4',5,6-Hexachlorobiphenyl †
153	2,2',4,4',5,5'-Hexachlorobiphenyl
173	2,2',3,3',4,5,6-Heptachlorobiphenyl
174	2,2',3,3',4,5,6'-Heptachlorobiphenyl
177	2,2',3,3',4',5,6-Heptachlorobiphenyl
179	2,2',3,3',5,6,6'-Heptachlorobiphenyl
180	2,2',3,4,4',5,5'-Heptachlorobiphenyl
187	2,2',3,4',5,5',6-Heptachlorobiphenyl
194	2,2',3,3',4,4',5,5'-Octachlorobiphenyl
195	2,2',3,3',4,4',5,6-Octachlorobiphenyl
199	2,2',3,3',4,5,5',6-Octachlorobiphenyl
203	2,2',3,4,4',5,5',6-Octachlorobiphenyl
206	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl

PCB Congener Mix #4

C-CS-04 1 x 1 mL
10 µg/mL each in Isooctane 22 comps.

No.	Congener
13	3,4'-Dichlorobiphenyl
14	3,5-Dichlorobiphenyl †
35	3,3',4-Trichlorobiphenyl
51	2,2',4,6'-Tetrachlorobiphenyl
53	2,2',5,6'-Tetrachlorobiphenyl
54	2,2',6,6'-Tetrachlorobiphenyl †
73	2,3',5',6-Tetrachlorobiphenyl †
75	2,4,4',6-Tetrachlorobiphenyl
81	3,4,4',5-Tetrachlorobiphenyl †
90	2,2',3,4',5-Pentachlorobiphenyl †
100	2,2',4,4',6-Pentachlorobiphenyl †
117	2,3,4',5,6-Pentachlorobiphenyl
122	2',3,3',4,5-Pentachlorobiphenyl
124	2',3,4,5,5'-Pentachlorobiphenyl
130	2,2',3,3',4,5'-Hexachlorobiphenyl
154	2,2',4,4',5,6'-Hexachlorobiphenyl †
163	2,3,3',4',5,6-Hexachlorobiphenyl
165	2,3,3',5,5',6-Hexachlorobiphenyl †
175	2,2',3,3',4,5',6-Heptachlorobiphenyl
200	2,2',3,3',4,5,6,6'-Octachlorobiphenyl
201	2,2',3,3',4,5',6,6'-Octachlorobiphenyl
202	2,2',3,3',5,5',6,6'-Octachlorobiphenyl

PCB Congener Mix #2

C-CS-02 1 x 1 mL
10 µg/mL each in Isooctane 36 comps.

No.	Congener
5	2,3-Dichlorobiphenyl
7	2,4-Dichlorobiphenyl
10	2,6-Dichlorobiphenyl
17	2,2',4-Trichlorobiphenyl
24	2,3,6-Trichlorobiphenyl
26	2,3',5-Trichlorobiphenyl
31	2,4',5-Trichlorobiphenyl
32	2,4',6-Trichlorobiphenyl
37	3,4,4'-Trichlorobiphenyl
41	2,2',3,4-Tetrachlorobiphenyl
45	2,2',3,6-Tetrachlorobiphenyl
46	2,2',3,6'-Tetrachlorobiphenyl
48	2,2',4,5-Tetrachlorobiphenyl
60	2,3,4,4'-Tetrachlorobiphenyl
70	2,3',4',5-Tetrachlorobiphenyl
83	2,2',3,3',5-Pentachlorobiphenyl
84	2,2',3,3',6-Pentachlorobiphenyl
95	2,2',3,5',6-Pentachlorobiphenyl
103	2,2',4,5',6-Pentachlorobiphenyl †
107	2,3,3',4',5-Pentachlorobiphenyl
115	2,3,4,4',6-Pentachlorobiphenyl
131	2,2',3,3',4,6-Hexachlorobiphenyl
132	2,2',3,3',4,6'-Hexachlorobiphenyl
135	2,2',3,3',5,6'-Hexachlorobiphenyl
141	2,2',3,4,5,5'-Hexachlorobiphenyl
149	2,2',3,4',5,6-Hexachlorobiphenyl
164	2,3,3',4',5',6-Hexachlorobiphenyl
170	2,2',3,3',4,4',5-Heptachlorobiphenyl
171	2,2',3,3',4,4',6-Heptachlorobiphenyl
172	2,2',3,3',4,5,5'-Heptachlorobiphenyl
178	2,2',3,3',5,5',6-Heptachlorobiphenyl
183	2,2',3,4,4',5',6-Heptachlorobiphenyl
193	2,3,3',4',5,5',6-Heptachlorobiphenyl
196	2,2',3,3',4,4',5',6-Octachlorobiphenyl
197	2,2',3,3',4,4',6,6'-Octachlorobiphenyl
205	2,3,3',4,4',5,5',6-Octachlorobiphenyl

PCB Congener Mix #5

C-CS-05 1 x 1 mL
10 µg/mL each in Isooctane 20 comps.

No.	Congener
12	3,4-Dichlorobiphenyl
33	2',3,4-Trichlorobiphenyl
49	2,2',4,5'-Tetrachlorobiphenyl
59	2,3,3',6-Tetrachlorobiphenyl
63	2,3,4',5-Tetrachlorobiphenyl
64	2,3,4',6-Tetrachlorobiphenyl
77	3,3',4,4'-Tetrachlorobiphenyl
85	2,2',3,4,4'-Pentachlorobiphenyl
91	2,2',3,4',6-Pentachlorobiphenyl
97	2,2',3',4,5-Pentachlorobiphenyl
104	2,2',4,6,6'-Pentachlorobiphenyl †
114	2,3,4,4',5-Pentachlorobiphenyl
123	2',3,4,4',5-Pentachlorobiphenyl
129	2,2',3,3',4,5-Hexachlorobiphenyl
137	2,2',3,4,4',5-Hexachlorobiphenyl
156	2,3,3',4,4',5-Hexachlorobiphenyl
167	2,3',4,4',5,5'-Hexachlorobiphenyl
176	2,2',3,3',4,4',6,6'-Heptachlorobiphenyl
185	2,2',3,4,5,5',6-Heptachlorobiphenyl
189	2,3,3',4,4',5,5'-Heptachlorobiphenyl

PCB Congener Mix #3

C-CS-03 1 x 1 mL
10 µg/mL each in Isooctane 27 comps.

No.	Congener
15	4,4'-Dichlorobiphenyl
20	2,3,3'-Trichlorobiphenyl
27	2,3',6-Trichlorobiphenyl
29	2,4,5-Trichlorobiphenyl
34	2',3,5-Trichlorobiphenyl
40	2,2',3,3'-Tetrachlorobiphenyl
42	2,2',3,4'-Tetrachlorobiphenyl
47	2,2',4,4'-Tetrachlorobiphenyl
69	2,3',4,6-Tetrachlorobiphenyl †
92	2,2',3,5,5'-Pentachlorobiphenyl
93	2,2',3,5,6-Pentachlorobiphenyl †
101	2,2',4,5,5'-Pentachlorobiphenyl
105	2,3,3',4,4'-Pentachlorobiphenyl
118	2,3',4,4',5-Pentachlorobiphenyl
119	2,3',4,4',6-Pentachlorobiphenyl
128	2,2',3,3',4,4'-Hexachlorobiphenyl
134	2,2',3,3',5,6-Hexachlorobiphenyl
136	2,2',3,3',6,6'-Hexachlorobiphenyl
144	2,2',3,4,5',6-Hexachlorobiphenyl
151	2,2',3,5,5',6-Hexachlorobiphenyl
157	2,3,3',4,4',5-Hexachlorobiphenyl
158	2,3,3',4,4',6-Hexachlorobiphenyl
190	2,3,3',4,4',5,6-Heptachlorobiphenyl
191	2,3,3',4,4',5',6-Heptachlorobiphenyl
207	2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl †
208	2,2',3,3',4,4',5,5',6,6'-Nonachlorobiphenyl
209	2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl †

Reference Key

non-Bold = Congener in any of
Aroclors 1242, 1254 or
1260 @ < 1.0 Wt.%

Bold = Congener in any of
Aroclors 1242, 1254 or
1260 @ > 1.0 Wt.%

† = Congener not in any of the
3 Aroclors @ > 0.05 Wt.%

Bold congeners related to mixes #6, 7 & 8 marginally above
0.05 Wt.%, except #43 @ 0.24 Wt.% in Aroclor 1242.

Some "non-Aroclor" congeners assigned to Mixes 1-5 to
reduce coelutions and number of mixes needed.

PCBs Congeners Calibration Mixtures
NOT present in Aroclors
continued on next page

PCBs



PCB Congener Calibration Mixtures

9 Mixtures provide All 209 Congeners
NOT Present in Aroclors

PCBS

PCB Congener Mix #6

C-CS-06		1 x 1 mL
10 µg/mL each in Isooctane 18 comps.		
No.		
11	3,3'-Dichlorobiphenyl †	
21	2,3,4-Trichlorobiphenyl †	
38	3,4,5-Trichlorobiphenyl †	
50	2,2',4,6-Tetrachlorobiphenyl †	
57	2,3,3',5-Tetrachlorobiphenyl †	
61	2,3,4,5-Tetrachlorobiphenyl †	
65	2,3,5,6-Tetrachlorobiphenyl †	
86	2,2',3,4,5-Pentachlorobiphenyl †	
102	2,2',4,5,6'-Pentachlorobiphenyl †	
113	2,3,3',5',6-Pentachlorobiphenyl †	
126	3,3',4,4',5-Pentachlorobiphenyl †	
127	3,3',4,5,5'-Pentachlorobiphenyl †	
133	2,2',3,3',5,5'-Hexachlorobiphenyl †	
139	2,2',3,4,4',6-Hexachlorobiphenyl †	
145	2,2',3,4,6,6'-Hexachlorobiphenyl †	
161	2,3,3',4,5',6-Hexachlorobiphenyl †	
169	3,3',4,4',5,5'-Hexachlorobiphenyl †	
181	2,2',3,4,4',5,6-Heptachlorobiphenyl †	

PCB Congener Mix #7

C-CS-07		1 x 1 mL
10 µg/mL each in Isooctane 14 comps.		
No.		
36	3,3',5-Trichlorobiphenyl †	
72	2,3',5,5'-Tetrachlorobiphenyl †	
78	3,3',4,5-Tetrachlorobiphenyl †	
79	3,3',4,5'-Tetrachlorobiphenyl †	
89	2,2',3,4,6'-Pentachlorobiphenyl †	
96	2,2',3,6,6'-Pentachlorobiphenyl †	
98	2,2',3',4,6-Pentachlorobiphenyl †	
106	2,3,3',4,5-Pentachlorobiphenyl †	
108	2,3,3',4,5'-Pentachlorobiphenyl †	
152	2,2',3,5,6,6'-Hexachlorobiphenyl †	
166	2,3,4,4',5,6-Hexachlorobiphenyl †	
182	2,2',3,4,4',5,6'-Heptachlorobiphenyl †	
184	2,2',3,4,4',6,6'-Heptachlorobiphenyl †	
204	2,2',3,4,4',5,6,6'-Octachlorobiphenyl †	

PCB Congener Mix #8

C-CS-08		1 x 1 mL
10 µg/mL each in Isooctane 12 comps.		
No.		
30	2,4,6-Trichlorobiphenyl †	
43	2,2',3,5-Tetrachlorobiphenyl †	
55	2,3,3',4-Tetrachlorobiphenyl †	
58	2,3,3',5'-Tetrachlorobiphenyl †	
76	2',3,4,5-Tetrachlorobiphenyl †	
109	2,3,3',4,6-Pentachlorobiphenyl †	
112	2,3,3',5,6-Pentachlorobiphenyl †	
120	2,3',4,5,5'-Pentachlorobiphenyl †	
159	2,3,3',4,5,5'-Hexachlorobiphenyl †	
186	2,2',3,4,5,6,6'-Heptachlorobiphenyl †	
192	2,3,3',4,5,5',6-Heptachlorobiphenyl †	
198	2,2',3,3',4,5,5',6-Octachlorobiphenyl †	

PCB Congener Mix #9

C-CS-09		1 x 1 mL
10 µg/mL each in Isooctane 21 comps.		
No.		
23	2,3,5-Trichlorobiphenyl †	
39	3,4',5-Trichlorobiphenyl †	
62	2,3,4,6-Tetrachlorobiphenyl †	
68	2,3',4,5'-Tetrachlorobiphenyl †	
80	3,3',5,5'-Tetrachlorobiphenyl †	
88	2,2',3,4,6-Pentachlorobiphenyl †	
94	2,2',3,5,6'-Pentachlorobiphenyl †	
111	2,3,3',5,5'-Pentachlorobiphenyl †	
116	2,3,4,5,6-Pentachlorobiphenyl †	
121	2,3',4,5',6-Pentachlorobiphenyl †	
125	2',3,4,5,6'-Pentachlorobiphenyl †	
140	2,2',3,4,4',6'-Hexachlorobiphenyl †	
142	2,2',3,4,5,6-Hexachlorobiphenyl †	
143	2,2',3,4,5,6'-Hexachlorobiphenyl †	
148	2,2',3,4',5,6'-Hexachlorobiphenyl †	
150	2,2',3,4',6,6'-Hexachlorobiphenyl †	
155	2,2',4,4',6,6'-Hexachlorobiphenyl †	
160	2,3,3',4,5,6-Hexachlorobiphenyl †	
162	2,3,3',4',5,5'-Hexachlorobiphenyl †	
168	2,3',4,4',5',6-Hexachlorobiphenyl †	
188	2,2',3,4',5,6,6'-Heptachlorobiphenyl †	

Congener Calibration Solution Sets

Mixes containing all 209 PCB congeners.

C-CSQ-SET 9 x 1 mL†
1 mL each of:

C-CS-01	C-CS-04	C-CS-07
C-CS-02	C-CS-05	C-CS-08
C-CS-03	C-CS-06	C-CS-09

Mixes for congeners found in Aroclor® 1242, 1254 and 1260

C-CSA-SET 5 x 1 mL
1 mL each of:

C-CS-01	C-CS-03	C-CS-05
C-CS-02	C-CS-04	

Mixes for non-Aroclor congeners

C-CSN-SET 4 x 1 mL
1 mL each of:

C-CS-06	C-CS-08
C-CS-07	C-CS-09

Reference Key

non-Bold = Congener in any of Aroclors 1242, 1254 or 1260 @ < 1.0 Wt.%

Bold = Congener in any of Aroclors 1242, 1254 or 1260 @ > 1.0 Wt.%

† = Congener not in any of the 3 Aroclors @ > 0.05 Wt.%

Bold congeners related to mixes #6, 7 & 8 marginally above 0.05 Wt.%, except #43 @ 0.24 Wt.% in Aroclor 1242.

Some "non-Aroclor" congeners assigned to Mixes 1-5 to reduce coelutions and number of mixes needed.



PCB Congener Calibration Mixtures



Method 680 PCB Analytes

Internal Standards

M-680-IS	1 x 1 mL
M-680-IS-PAK <i>SAVE</i>	5 x 1 mL
75 µg/mL each in Hexane	
2 comps.	
M-680-IS-10X	1 x 1 mL
M-680-IS-10X-PAK <i>SAVE</i>	5 x 1 mL
750 µg/mL each in Hexane	
2 comps.	
Chrysene-d ₁₂	Phenanthrene-d ₁₀

PCB Locator Mixture

M-PCBL	1 x 1 mL
M-PCBL-PAK <i>SAVE</i>	5 x 1 mL
At stated conc. in Isooctane	
5 comps.	
Aroclor 1242	(0.5 µg/mL)
Aroclor 1260	(0.5 µg/mL)
2-Chlorobiphenyl	(0.1 µg/mL)
3-Chlorobiphenyl	(0.1 µg/mL)
Decachlorobiphenyl	(0.1 µg/mL)

Retention Time Calibration Std.

M-680-RT	1 x 1 mL
M-680-RT-PAK <i>SAVE</i>	5 x 1 mL
100 µg/mL each in Hexane	
3 comps.	
3,3',4,4'-Tetrachlorobiphenyl	
2,2',4,6,6'-Pentachlorobiphenyl	
2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl	

See EPA section Method 680 for complete analyte list.

PCB Isomer Calibration Mix

M-680A	1 x 1 mL
At stated conc. in Hexane	
9 comps.	
1	2-Chlorobiphenyl (50 µg/mL)
5	2,3-Dichlorobiphenyl (50 µg/mL)
29	2,4,5-Trichlorobiphenyl (50 µg/mL)
50	2,2',4,6-Tetrachlorobiphenyl (100 µg/mL)
87	2,2',3,4,5'-Pentachlorobiphenyl (100 µg/mL)
154	2,2',4,4',5,6'-Hexachlorobiphenyl (100 µg/mL)
188	2,2',3,4',5,6,6'-Heptachlorobiphenyl (150 µg/mL)
201	2,2',3,3',4,5',6,6'-Octachlorobiphenyl (150 µg/mL)
209	2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl (250 µg/mL)

Internal Standard

M-680B	1 x 1 mL
250 µg/mL in Toluene	
Chrysene-d ₁₂	

Tuning Standard

M-680-TS	1 x 1 mL
M-680-TS-PAK <i>SAVE</i>	5 x 1 mL
10 µg/mL in CH ₂ Cl ₂	
Decafluorotriphenylphosphine (DFTPP)	

PCB Isomer Calibration Set

M-680-SET	2 x 1 mL
Includes: M-680A (Mix) M-680B (Internal Standard)	

Level of Chlorination	Isomer Selected	Congener Number	RF Value vs. Chrysene-d ₁₂	Mean RF Value vs. Chrysene-d ₁₂
1	2-mono	1	0.899	0.925
2	2,3-di	5	0.651	0.642
3	2,4,5-tri	29	0.411	0.411
4	2,2',4,6-tetra	50	0.305	0.431
5	2,2',3,4,5'-penta	87	0.299	0.287
6	2,2',4,4',5,6'-hexa	154	0.254	0.254
7	2,2',3,4',5,6,6'-hepta	188	0.164	0.160
8	2,2',3,3',4,5',6,6'-octa	201	0.207	0.191
9,10	2,2',3,3',4,4',5,5',6,6'-deca	209	0.144	0.150

PCBS

Instrument Test Solutions

PCB Window Defining Mixture

C-WDM	1 x 1 mL
C-WDM-PAK <i>SAVE</i>	5 x 1 mL
2.5 µg/mL each in Isooctane	
20 comps.	
No.	
0	Biphenyl
1	2-Chlorobiphenyl
3	4-Chlorobiphenyl
10	2,6-Dichlorobiphenyl
15	4,4'-Dichlorobiphenyl
19	2,2',6-Trichlorobiphenyl
37	3,4,4'-Trichlorobiphenyl
54	2,2',6,6'-Tetrachlorobiphenyl
77	3,3',4,4'-Tetrachlorobiphenyl
104	2,2',4,6,6'-Pentachlorobiphenyl
126	3,3',4,4',5-Pentachlorobiphenyl
155	2,2',4,4',6,6'-Hexachlorobiphenyl
169	3,3',4,4',5,5'-Hexachlorobiphenyl
188	2,2',3,4',5,6,6'-Heptachlorobiphenyl
189	2,3,3',4,4',5,5'-Heptachlorobiphenyl
202	2,2',3,3',5,5',6,6'-Octachlorobiphenyl
205	2,3,3',4,4',5,5',6-Octachlorobiphenyl
208	2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl
206	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl
209	2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl

PCB Calibration Check Solution

C-CCSEC	1 x 1 mL
C-CCSEC-PAK <i>SAVE</i>	5 x 1 mL
100 µg/mL each in Acetone	
20 comps.	
C-CCSEC-R	1 x 1 mL
C-CCSEC-R-PAK <i>SAVE</i>	5 x 1 mL
C-CCSEC plus 2,2',3,3',4,5',6,6'-Octachlorobiphenyl	
Special Blend	
No.	
8	2,4'-Dichlorobiphenyl
18	2,2',5-Trichlorobiphenyl
28	2,4,4'-Trichlorobiphenyl
44	2,2',3,5'-Tetrachlorobiphenyl
52	2,2',5,5'-Tetrachlorobiphenyl
66	2,3',4,4'-Tetrachlorobiphenyl
77	3,3',4,4'-Tetrachlorobiphenyl
101	2,2',4,5,5'-Pentachlorobiphenyl
105	2,3,3',4,4'-Pentachlorobiphenyl
118	2,3',4,4',5-Pentachlorobiphenyl
126	3,3',4,4',5-Pentachlorobiphenyl
128	2,2',3,3',4,4'-Hexachlorobiphenyl
138	2,2',3,4,4',5'-Hexachlorobiphenyl
153	2,2',4,4',5,5'-Hexachlorobiphenyl
170	2,2',3,3',4,4',5-Heptachlorobiphenyl
180	2,2',3,4,4',5,5'-Heptachlorobiphenyl
187	2,2',3,4',5,5',6-Heptachlorobiphenyl
195	2,2',3,3',4,4',5,6-Octachlorobiphenyl
206	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl
209	2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl

PCB/Selective Ion Monitoring Solution

PCB-SIM	1 x 1 mL
PCB-SIM-PAK <i>SAVE</i>	5 x 1 mL
At stated conc. in Hexane	
12 comps.	
No.	
1	2-Chlorobiphenyl (10 µg/mL)
5	2,3-Dichlorobiphenyl (10 µg/mL)
29	2,4,5-Trichlorobiphenyl (10 µg/mL)
104	2,2',4,6,6'-Pentachlorobiphenyl (20 µg/mL)
87	2,2',3,4,5'-Pentachlorobiphenyl (20 µg/mL)
208	2,2',3,3',4,5',6,6'-Nonachlorobiphenyl (40 µg/mL)
50	2,2',4,6-Tetrachlorobiphenyl (20 µg/mL)
209	2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl (50 µg/mL)
77	3,3',4,4'-Tetrachlorobiphenyl (20 µg/mL)
200	2,2',3,3',4,5',6,6'-Octachlorobiphenyl (30 µg/mL)
186	2,2',3,4',5,6,6'-Heptachlorobiphenyl (30 µg/mL)
154	2,2',4,4',5,6'-Hexachlorobiphenyl (20 µg/mL)

Technical Note

For use with 5% phenyl methyl silicone type columns