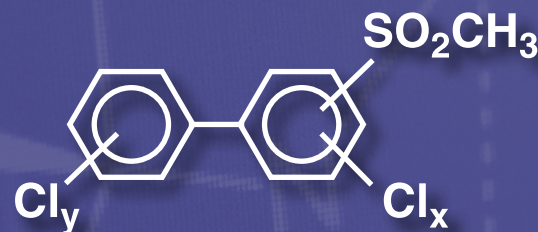
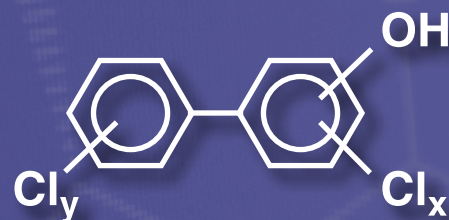
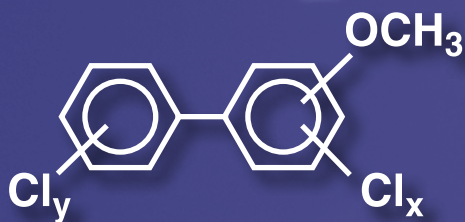
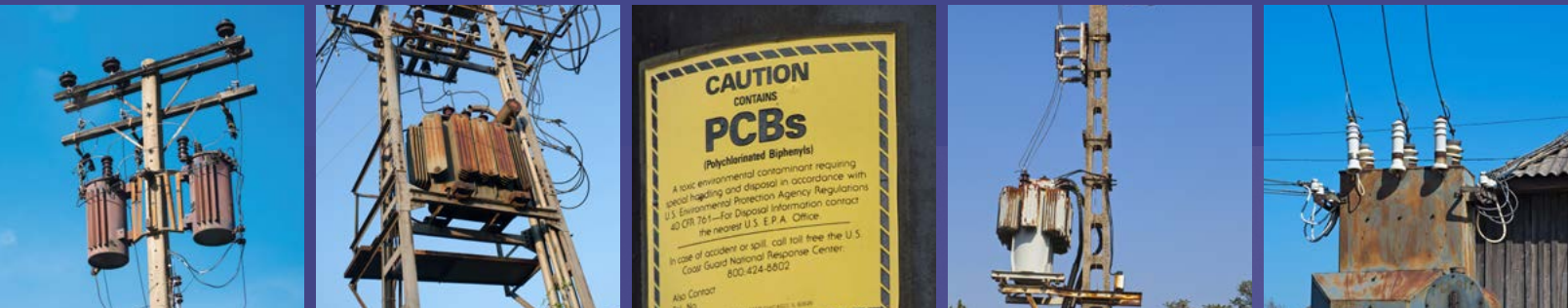


PCBs and Related Compounds



AccuStandard®

Certified Reference Standards

To facilitate the availability and distribution of PCBs, the EPA granted manufacturing and export exemptions to a few select standards manufacturers.

The Founder of AccuStandard, Inc. was the first to obtain this exemption. AccuStandard is the leader in synthesizing PCBs. Indeed, it is the first - and so far the only - manufacturer to have synthesized all 209 congeners. Our expertise can assist you in your PCB investigations.

Legacy

Polychlorinated biphenyls (PCBs) were manufactured worldwide for a large number of technical applications. The chemical stability of PCB's made them exceptionally suitable as coolants and insulating fluids for transformers and capacitors. Other applications included carbonless copy paper, paints, hydraulic fluids, plasticizers, plastic additives and flame retardants. Estimates suggest that the total global production volume of PCBs exceeded 1.5 million tons. As late as 1984, about 758 million pounds were still in use in the United States alone.

The toxicity associated with PCBs was already documented in medical cases in the 1920's and 30's. Factory workers involved in the manufacturing of PCBs exhibited detrimental health effects like severe skin conditions. In 1968, Japan reported the first of over 1200 patients, many of them children, who developed acne-type skin eruptions (chloracne) and other clinical symptoms. The contamination of rice oil (Yusho) with industrial PCBs (Kanechlor 400) was the source of this malady, later termed Yusho Disease. The average amount of actual PCBs consumed by the victims was estimated at two grams. By 1973, 22 of the 1200 victims had died, 41% from malignant tumors, suggesting a possible link to PCB ingestion.

One of the first signals of the effect of PCBs on the environment in the United States was noted in 1970, on Great Gull Island at the entrance to Long Island Sound. Scientists observed a sharp increase in the number of abnormalities found in young sea gulls such as feather loss, crossed beaks and four legs. In addition, the egg shells were extremely thin.

By 1979, the production of PCBs was banned in the United States. In 2001, PCBs were added to the list of Persistent Organic Pollutants by the Stockholm Convention of Persistent Organic Pollutants.

The high persistency and ubiquitous distribution through prior use, disposal and leakages have caused global contamination of soils, air, rivers and other waterways that will affect our food and water supplies for years to come. Although PCB concentrations in the environment are slowly decreasing, a constant, low-level human PCB exposure via dietary intake and inhalation of contaminated indoor air is still of concern. Numerous studies have linked PCBs, even at low levels, to toxic effects such as endocrine disruption, neurotoxicity, immunotoxicity and carcinogenesis.

Toxicity and molecular structure

There are 209 PCB congeners containing one to ten chlorine atoms. Technical mixtures like Aroclors contain about 130 of these congeners.

The toxicity and environmental impact of the congeners correlate to their substitution pattern and fall into two general categories: coplanar (or non-ortho-substituted) and noncoplanar (or ortho-substituted).

Congeners that contain no chlorine substitutions in the ortho positions are structurally more rigid because the two phenyl rings remain in the same plane (coplanar). This makes them dioxin-like not only structurally but also regarding their toxicity. They are more toxic than those having chlorine atoms in the ortho positions (noncoplanar). The most toxic PCBs are the tetra, penta and hexachlorobiphenyl congeners that are unsubstituted in the ortho position.

PCB Metabolites

PCBs are metabolized in vivo to hydroxyl and sulfur compounds. They can be formed in different organisms, including humans and birds of prey. Many studies suggest that these metabolites can be more toxic than the parent compounds.

AccuStandard offers a variety of hydroxyl-/methoxy-PCBs as well as methylsulfonyl-PCB congeners.

Analytical Methods and Reference Materials

To obtain meaningful analytical data, the PCB congeners need to be formulated into groupings of solutions that are all resolved on a gas chromatographic column. The single column on which all 209 congeners are separated has, to date, eluded all GC column manufacturers.

There are some columns that are closest to achieving the status of separating all the PCB congeners. They are Agilent DB-XLB and SGE's HT 8 which resolve all but four pairs of significant congeners and five pairs of minor congeners.

Earlier work by George Frame and his co-workers at General Electric Company have coordinated a seminal study of specially formulated PCB groups - five of which are composed of the congeners contained in Aroclors, the remaining four mixtures contain those congeners generally absent in Aroclors. AccuStandard prepared and supplied the nine mixtures used in Dr. Frame's study from its inventory of the 209 pure congeners.

These nine mixtures were then tested on 17 different columns by independent laboratories and column manufacturers. The resulting chromatographic retention time and response data was compiled and published. This information has proven invaluable for identification and quantification of the different Aroclors as well as for congener specific analysis.

In the course of the investigations, it was determined that some of the 209 congeners that constitute the industrial PCB product behave differently than others. Therefore it is very helpful, even essential, to the scientific and regulatory communities, that individual congeners be available. For this reason, the EPA permits the synthesis and distribution of small quantities for research purposes.

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In 1993, AccuStandard completed the syntheses of all 209 congeners (with 99+% purity).

New Compounds

6 Methoxy PCBs
10 Polychlorinated Terphenyls
6 Chlorodiphenyl Ethers

Technical Literature



PCB related papers visit <https://www.accustandard.com/publications-presentations>

Physical, Spectral and Chromatographic Properties of All 209 Individual PCB Congeners

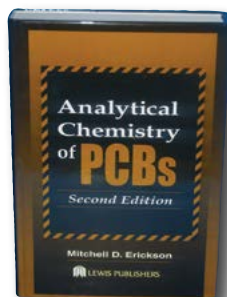
Chemosphere, Vol. 31. 2, pp. 2687-2705, 1995. Michael Bolgar, James Cunningham, Russell Cooper, Richard Kozloski and Jack Hubball

GC Elution Order Data, Design & Employment of 9 PCB Congener Mixtures for Conducting Comprehensive, Quantitative Congener-Specific (QCS) PCB Analyses

Close Elutions of PCB Congeners in 9 Mixes on 12 Phases, Capillary GC System Characteristics, Researchers and Aroclor PCB Coelutions and System Resolving Power, GC Column Injection, Column Pressure and Temp. Parameters, Distribution of PCB Congeners into 9 Mixes for Calibration on 12 GC Columns, Elution Order Tables. By Dr. George Frame

Analytical Chemistry of PCBs

The Second Edition of this book is a comprehensive review of the analytical chemistry of PCBs. It is an invaluable resource for both chemists with no experience in PCB analysis and seasoned PCB researchers.

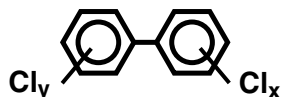


PCB Book

Analytical Chemistry of PCBs
BOOK-PCB-001

Chlorobiphenyl Congeners (PCBs)

- All 209 congeners are available in Neat and Solution form
- All congeners are 99+% pure by GC/FID or GC/MS



209 Solutions in a Set Exclusive

C-35-SET
C-100-SET

35 µg/mL in Isooctane
100 µg/mL in Isooctane

set of 209 x 1 mL
set of 209 x 1 mL

Purity 99+%

SOLUTIONS in Isooctane

Chlorobiphenyl Congeners (PCBs)

No.	Compound	CAS No.	NEAT Cat. No.	Unit	35 µg/mL Cat. No.	1 mL	100 µg/mL Cat. No.	1 mL
1	2-Chlorobiphenyl	2051-60-7	C-001N	50 mg	C-001S		C-001S-TP	
2	3-Chlorobiphenyl	2051-61-8	C-002N	50 mg	C-002S		C-002S-TP	
3	4-Chlorobiphenyl	2051-62-9	C-003N	50 mg	C-003S		C-003S-TP	
4	2,2'-Dichlorobiphenyl	13029-08-8	C-004N	25 mg	C-004S		C-004S-TP	
5	2,3-Dichlorobiphenyl	16605-91-7	C-005N	50 mg	C-005S		C-005S-TP	
6	2,3'-Dichlorobiphenyl	25569-80-6	C-006N	5 mg	C-006S		C-006S-TP	
7	2,4-Dichlorobiphenyl	33284-50-3	C-007N	25 mg	C-007S		C-007S-TP	
8	2,4'-Dichlorobiphenyl	34883-43-7	C-008N	25 mg	C-008S		C-008S-TP	
9	2,5-Dichlorobiphenyl	34883-39-1	C-009N	50 mg	C-009S		C-009S-TP	
10	2,6-Dichlorobiphenyl	33146-45-1	C-010N	25 mg	C-010S		C-010S-TP	
11	3,3'-Dichlorobiphenyl	2050-67-1	C-011N	50 mg	C-011S		C-011S-TP	
12	3,4-Dichlorobiphenyl	2974-92-7	C-012N	50 mg	C-012S		C-012S-TP	
13	3,4'-Dichlorobiphenyl	2974-90-5	C-013N	5 mg	C-013S		C-013S-TP	
14	3,5-Dichlorobiphenyl	34883-41-5	C-014N	50 mg	C-014S		C-014S-TP	
15	4,4'-Dichlorobiphenyl	2050-68-2	C-015N	10 mg	C-015S		C-015S-TP	
16	2,2',3-Trichlorobiphenyl	38444-78-9	C-016N	5 mg	C-016S		C-016S-TP	
17	2,2',4-Trichlorobiphenyl	37680-66-3	C-017N	5 mg	C-017S		C-017S-TP	
18	2,2',5-Trichlorobiphenyl	37680-65-2	C-018N	25 mg	C-018S		C-018S-TP	
19	2,2',6-Trichlorobiphenyl	38444-73-4	C-019N	5 mg	C-019S		C-019S-TP	
20	2,3,3'-Trichlorobiphenyl	38444-84-7	C-020N	5 mg	C-020S		C-020S-TP	
21	2,3,4-Trichlorobiphenyl	55702-46-0	C-021N	25 mg	C-021S		C-021S-TP	
22	2,3,4'-Trichlorobiphenyl	38444-85-8	C-022N	5 mg	C-022S		C-022S-TP	
23	2,3,5-Trichlorobiphenyl	55720-44-0	C-023N	5 mg	C-023S		C-023S-TP	
24	2,3,6-Trichlorobiphenyl	55702-45-9	C-024N	10 mg	C-024S		C-024S-TP	
25	2,3',4-Trichlorobiphenyl	55712-37-3	C-025N	5 mg	C-025S		C-025S-TP	
26	2,3',5-Trichlorobiphenyl	38444-81-4	C-026N	25 mg	C-026S		C-026S-TP	
27	2,3',6-Trichlorobiphenyl	38444-76-7	C-027N	5 mg	C-027S		C-027S-TP	
28	2,4,4'-Trichlorobiphenyl	7012-37-5	C-028N	10 mg	C-028S		C-028S-TP	
29	2,4,5-Trichlorobiphenyl	15862-07-4	C-029N	50 mg	C-029S		C-029S-TP	
30	2,4,6-Trichlorobiphenyl	35693-92-6	C-030N	50 mg	C-030S		C-030S-TP	
31	2,4',5-Trichlorobiphenyl	16606-02-3	C-031N	25 mg	C-031S		C-031S-TP	
32	2,4',6-Trichlorobiphenyl	38444-77-8	C-032N	5 mg	C-032S		C-032S-TP	
33	2',3,4-Trichlorobiphenyl	38444-86-9	C-033N	10 mg	C-033S		C-033S-TP	
34	2',3,5-Trichlorobiphenyl	37680-68-5	C-034N	5 mg	C-034S		C-034S-TP	
35	3,3',4-Trichlorobiphenyl	37680-69-6	C-035N	5 mg	C-035S		C-035S-TP	
36	3,3',5-Trichlorobiphenyl	38444-87-0	C-036N	5 mg	C-036S		C-036S-TP	
37	3,4,4'-Trichlorobiphenyl	38444-90-5	C-037N	5 mg	C-037S		C-037S-TP	
38	3,4,5-Trichlorobiphenyl	53555-66-1	C-038N	5 mg	C-038S		C-038S-TP	
39	3,4',5-Trichlorobiphenyl	38444-88-1	C-039N	5 mg	C-039S		C-039S-TP	



Technical Note

For specific applications (i.e. toxicological studies) that require absolute dioxin and furan-free PCBs please contact Technical Service.

Significant discounts are available on larger quantities of selected congeners.

Chlorobiphenyl Congeners (PCBs)

Purity 99+%

SOLUTIONS in Isooctane

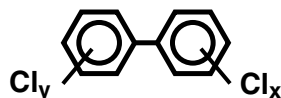
Chlorobiphenyl Congeners (PCBs)

No.	Compound	CAS No.	NEAT Cat. No.	Unit	35 µg/mL Cat. No.	1 mL	100 µg/mL Cat. No.	1 mL
40	2,2',3,3'-Tetrachlorobiphenyl	38444-93-8	C-040N	50 mg	C-040S		C-040S-TP	
41	2,2',3,4'-Tetrachlorobiphenyl	52663-59-9	C-041N	5 mg	C-041S		C-041S-TP	
42	2,2',3,4'-Tetrachlorobiphenyl	36559-22-5	C-042N	5 mg	C-042S		C-042S-TP	
43	2,2',3,5'-Tetrachlorobiphenyl	70362-46-8	C-043N	5 mg	C-043S		C-043S-TP	
44	2,2',3,5'-Tetrachlorobiphenyl	41464-39-5	C-044N	25 mg	C-044S		C-044S-TP	
45	2,2',3,6'-Tetrachlorobiphenyl	70362-45-7	C-045N	5 mg	C-045S		C-045S-TP	
46	2,2',3,6'-Tetrachlorobiphenyl	41464-47-5	C-046N	5 mg	C-046S		C-046S-TP	
47	2,2',4,4'-Tetrachlorobiphenyl	2437-79-8	C-047N	50 mg	C-047S		C-047S-TP	
48	2,2',4,5'-Tetrachlorobiphenyl	70362-47-9	C-048N	5 mg	C-048S		C-048S-TP	
49	2,2',4,5'-Tetrachlorobiphenyl	41464-40-8	C-049N	20 mg	C-049S		C-049S-TP	
50	2,2',4,6'-Tetrachlorobiphenyl	62796-65-0	C-050N	5 mg	C-050S		C-050S-TP	
51	2,2',4,6'-Tetrachlorobiphenyl	68194-04-7	C-051N	5 mg	C-051S		C-051S-TP	
52	2,2',5,5'-Tetrachlorobiphenyl	35693-99-3	C-052N	10 mg	C-052S		C-052S-TP	
53	2,2',5,6'-Tetrachlorobiphenyl	41464-41-9	C-053N	25 mg	C-053S		C-053S-TP	
54	2,2',6,6'-Tetrachlorobiphenyl	15968-05-5	C-054N	50 mg	C-054S		C-054S-TP	
55	2,3,3',4'-Tetrachlorobiphenyl	74338-24-2	C-055N	5 mg	C-055S		C-055S-TP	
56	2,3,3',4'-Tetrachlorobiphenyl	41464-43-1	C-056N	5 mg	C-056S		C-056S-TP	
57	2,3,3',5'-Tetrachlorobiphenyl	70424-67-8	C-057N	5 mg	C-057S		C-057S-TP	
58	2,3,3',5'-Tetrachlorobiphenyl	41464-49-7	C-058N	5 mg	C-058S		C-058S-TP	
59	2,3,3',6'-Tetrachlorobiphenyl	74472-33-6	C-059N	5 mg	C-059S		C-059S-TP	
60	2,3,4,4'-Tetrachlorobiphenyl	33025-41-1	C-060N	5 mg	C-060S		C-060S-TP	
61	2,3,4,5'-Tetrachlorobiphenyl	33284-53-6	C-061N	50 mg	C-061S		C-061S-TP	
62	2,3,4,6'-Tetrachlorobiphenyl	54230-22-7	C-062N	5 mg	C-062S		C-062S-TP	
63	2,3,4',5'-Tetrachlorobiphenyl	74472-34-7	C-063N	5 mg	C-063S		C-063S-TP	
64	2,3,4',6'-Tetrachlorobiphenyl	52663-58-8	C-064N	5 mg	C-064S		C-064S-TP	
65	2,3,5,6'-Tetrachlorobiphenyl	33284-54-7	C-065N	25 mg	C-065S		C-065S-TP	
66	2,3',4,4'-Tetrachlorobiphenyl	32598-10-0	C-066N	20 mg	C-066S		C-066S-TP	
67	2,3',4,5'-Tetrachlorobiphenyl	73575-53-8	C-067N	5 mg	C-067S		C-067S-TP	
68	2,3',4,5'-Tetrachlorobiphenyl	73575-52-7	C-068N	5 mg	C-068S		C-068S-TP	
69	2,3',4,6'-Tetrachlorobiphenyl	60233-24-1	C-069N	5 mg	C-069S		C-069S-TP	
70	2,3',4',5'-Tetrachlorobiphenyl	32598-11-1	C-070N	10 mg	C-070S		C-070S-TP	
71	2,3',4',6'-Tetrachlorobiphenyl	41464-46-4	C-071N	5 mg	C-071S		C-071S-TP	
72	2,3',5,5'-Tetrachlorobiphenyl	41464-42-0	C-072N	25 mg	C-072S		C-072S-TP	
73	2,3',5',6'-Tetrachlorobiphenyl	74338-23-1	C-073N	5 mg	C-073S		C-073S-TP	
74	2,4,4',5'-Tetrachlorobiphenyl	32690-93-0	C-074N	5 mg	C-074S		C-074S-TP	
75	2,4,4',6'-Tetrachlorobiphenyl	32598-12-2	C-075N	5 mg	C-075S		C-075S-TP	
76	2',3,4,5'-Tetrachlorobiphenyl	70362-48-0	C-076N	5 mg	C-076S		C-076S-TP	
77	3,3',4,4'-Tetrachlorobiphenyl	32598-13-3	C-077N	25 mg	C-077S		C-077S-TP	
78	3,3',4,5'-Tetrachlorobiphenyl	70362-49-1	C-078N	5 mg	C-078S		C-078S-TP	
79	3,3',4,5'-Tetrachlorobiphenyl	41464-48-6	C-079N	5 mg	C-079S		C-079S-TP	
80	3,3',5,5'-Tetrachlorobiphenyl	33284-52-5	C-080N	5 mg	C-080S		C-080S-TP	
81	3,4,4',5'-Tetrachlorobiphenyl	70362-50-4	C-081N	5 mg	C-081S		C-081S-TP	
82	2,2',3,3',4'-Pentachlorobiphenyl	52663-62-4	C-082N	5 mg	C-082S		C-082S-TP	
83	2,2',3,3',5'-Pentachlorobiphenyl	60145-20-2	C-083N	5 mg	C-083S		C-083S-TP	
84	2,2',3,3',6'-Pentachlorobiphenyl	52663-60-2	C-084N	5 mg	C-084S		C-084S-TP	
85	2,2',3,4,4'-Pentachlorobiphenyl	65510-45-4	C-085N	5 mg	C-085S		C-085S-TP	
86	2,2',3,4,5'-Pentachlorobiphenyl	55312-69-1	C-086N	5 mg	C-086S		C-086S-TP	
87	2,2',3,4,5'-Pentachlorobiphenyl	38380-02-8	C-087N	10 mg	C-087S		C-087S-TP	
88	2,2',3,4,6'-Pentachlorobiphenyl	55215-17-3	C-088N	5 mg	C-088S		C-088S-TP	
89	2,2',3,4,6'-Pentachlorobiphenyl	73575-57-2	C-089N	5 mg	C-089S		C-089S-TP	
90	2,2',3,4',5'-Pentachlorobiphenyl	68194-07-0	C-090N	5 mg	C-090S		C-090S-TP	
91	2,2',3,4',6'-Pentachlorobiphenyl	68194-05-8	C-091N	5 mg	C-091S		C-091S-TP	
92	2,2',3,5,5'-Pentachlorobiphenyl	52663-61-3	C-092N	5 mg	C-092S		C-092S-TP	
93	2,2',3,5,6'-Pentachlorobiphenyl	73575-56-1	C-093N	5 mg	C-093S		C-093S-TP	
94	2,2',3,5,6'-Pentachlorobiphenyl	73575-55-0	C-094N	5 mg	C-094S		C-094S-TP	
95	2,2',3,5',6'-Pentachlorobiphenyl	38379-99-6	C-095N	5 mg	C-095S		C-095S-TP	
96	2,2',3,6,6'-Pentachlorobiphenyl	73575-54-9	C-096N	5 mg	C-096S		C-096S-TP	
97	2,2',3',4,5'-Pentachlorobiphenyl	41464-51-1	C-097N	10 mg	C-097S		C-097S-TP	
98	2,2',3',4,6'-Pentachlorobiphenyl	60233-25-2	C-098N	5 mg	C-098S		C-098S-TP	
99	2,2',4,4',5'-Pentachlorobiphenyl	38380-01-7	C-099N	5 mg	C-099S		C-099S-TP	
100	2,2',4,4',6'-Pentachlorobiphenyl	39485-83-1	C-100N	5 mg	C-100S		C-100S-TP	
101	2,2',4,5,5'-Pentachlorobiphenyl	37680-73-2	C-101N	10 mg	C-101S		C-101S-TP	
102	2,2',4,5,6'-Pentachlorobiphenyl	68194-06-9	C-102N	5 mg	C-102S		C-102S-TP	
103	2,2',4,5',6'-Pentachlorobiphenyl	60145-21-3	C-103N	10 mg	C-103S		C-103S-TP	
104	2,2',4,6,6'-Pentachlorobiphenyl	56558-16-8	C-104N	5 mg	C-104S		C-104S-TP	
105	2,3,3',4,4'-Pentachlorobiphenyl	32598-14-4	C-105N	5 mg	C-105S		C-105S-TP	
106	2,3,3',4,5'-Pentachlorobiphenyl	70424-69-0	C-106N	5 mg	C-106S		C-106S-TP	

Other solvents, concentrations and quantities are available upon request.

Chlorobiphenyl Congeners (PCBs)
continued on next page

Chlorobiphenyl Congeners (PCBs)



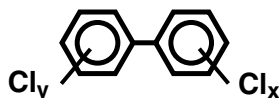
Purity 99+%

SOLUTIONS in Isooctane

Chlorobiphenyl Congeners (PCBs)

No.	Compound	CAS No.	NEAT Cat. No.	Price / Unit	35 µg/mL Cat. No.	1 mL	100 µg/mL Cat. No.	1 mL
107	2,3,3',4',5-Pentachlorobiphenyl	70424-68-9	C-107N	5 mg	C-107S		C-107S-TP	
108	2,3,3',4,5'-Pentachlorobiphenyl	70362-41-3	C-108N	5 mg	C-108S		C-108S-TP	
109	2,3,3',4,6-Pentachlorobiphenyl	74472-35-8	C-109N	5 mg	C-109S		C-109S-TP	
110	2,3,3',4',6-Pentachlorobiphenyl	38380-03-9	C-110N	5 mg	C-110S		C-110S-TP	
111	2,3,3',5,5'-Pentachlorobiphenyl	39635-32-0	C-111N	5 mg	C-111S		C-111S-TP	
112	2,3,3',5,6-Pentachlorobiphenyl	74472-36-9	C-112N	5 mg	C-112S		C-112S-TP	
113	2,3,3',5',6-Pentachlorobiphenyl	68194-10-5	C-113N	5 mg	C-113S		C-113S-TP	
114	2,3,4,4',5-Pentachlorobiphenyl	74472-37-0	C-114N	5 mg	C-114S		C-114S-TP	
115	2,3,4,4',6-Pentachlorobiphenyl	74472-38-1	C-115N	5 mg	C-115S		C-115S-TP	
116	2,3,4,5,6-Pentachlorobiphenyl	18259-05-7	C-116N	10 mg	C-116S		C-116S-TP	
117	2,3,4',5,6-Pentachlorobiphenyl	68194-11-6	C-117N	5 mg	C-117S		C-117S-TP	
118	2,3',4,4',5-Pentachlorobiphenyl	31508-00-6	C-118N	5 mg	C-118S		C-118S-TP	
119	2,3',4,4',6-Pentachlorobiphenyl	56558-17-9	C-119N	5 mg	C-119S		C-119S-TP	
120	2,3',4,5,5'-Pentachlorobiphenyl	68194-12-7	C-120N	5 mg	C-120S		C-120S-TP	
121	2,3',4,5',6-Pentachlorobiphenyl	56558-18-0	C-121N	5 mg	C-121S		C-121S-TP	
122	2',3,3',4,5-Pentachlorobiphenyl	76842-07-4	C-122N	5 mg	C-122S		C-122S-TP	
123	2',3,4,4',5-Pentachlorobiphenyl	65510-44-3	C-123N	5 mg	C-123S		C-123S-TP	
124	2',3,4,5,5'-Pentachlorobiphenyl	70424-70-3	C-124N	5 mg	C-124S		C-124S-TP	
125	2',3,4,5,6'-Pentachlorobiphenyl	74472-39-2	C-125N	5 mg	C-125S		C-125S-TP	
126	3,3',4,4',5-Pentachlorobiphenyl	57465-28-8	C-126N	5 mg	C-126S		C-126S-TP	
127	3,3',4,5,5'-Pentachlorobiphenyl	39635-33-1	C-127N	5 mg	C-127S		C-127S-TP	
128	2,2',3,3',4,4'-Hexachlorobiphenyl	38380-07-3	C-128N	20 mg	C-128S		C-128S-TP	
129	2,2',3,3',4,5-Hexachlorobiphenyl	55215-18-4	C-129N	5 mg	C-129S		C-129S-TP	
130	2,2',3,3',4,5'-Hexachlorobiphenyl	52663-66-8	C-130N	5 mg	C-130S		C-130S-TP	
131	2,2',3,3',4,6-Hexachlorobiphenyl	61798-70-7	C-131N	5 mg	C-131S		C-131S-TP	
132	2,2',3,3',4,6'-Hexachlorobiphenyl	38380-05-1	C-132N	5 mg	C-132S		C-132S-TP	
133	2,2',3,3',5,5'-Hexachlorobiphenyl	35694-04-3	C-133N	5 mg	C-133S		C-133S-TP	
134	2,2',3,3',5,6-Hexachlorobiphenyl	52704-70-8	C-134N	5 mg	C-134S		C-134S-TP	
135	2,2',3,3',5,6'-Hexachlorobiphenyl	52744-13-5	C-135N	5 mg	C-135S		C-135S-TP	
136	2,2',3,3',6,6'-Hexachlorobiphenyl	38411-22-2	C-136N	20 mg	C-136S		C-136S-TP	
137	2,2',3,4,4',5-Hexachlorobiphenyl	35694-06-5	C-137N	5 mg	C-137S		C-137S-TP	
138	2,2',3,4,4',5'-Hexachlorobiphenyl	35065-28-2	C-138N	5 mg	C-138S		C-138S-TP	
139	2,2',3,4,4',6-Hexachlorobiphenyl	56030-56-9	C-139N	5 mg	C-139S		C-139S-TP	
140	2,2',3,4,4',6'-Hexachlorobiphenyl	59291-64-4	C-140N	5 mg	C-140S		C-140S-TP	
141	2,2',3,4,5,5'-Hexachlorobiphenyl	52712-04-6	C-141N	5 mg	C-141S		C-141S-TP	
142	2,2',3,4,5,6-Hexachlorobiphenyl	41411-61-4	C-142N	5 mg	C-142S		C-142S-TP	
143	2,2',3,4,5,6'-Hexachlorobiphenyl	68194-15-0	C-143N	5 mg	C-143S		C-143S-TP	
144	2,2',3,4,5',6-Hexachlorobiphenyl	68194-14-9	C-144N	5 mg	C-144S		C-144S-TP	
145	2,2',3,4,6,6'-Hexachlorobiphenyl	74472-40-5	C-145N	5 mg	C-145S		C-145S-TP	
146	2,2',3,4',5,5'-Hexachlorobiphenyl	51908-16-8	C-146N	5 mg	C-146S		C-146S-TP	
147	2,2',3,4',5,6-Hexachlorobiphenyl	68194-13-8	C-147N	5 mg	C-147S		C-147S-TP	
148	2,2',3,4',5,6'-Hexachlorobiphenyl	74472-41-6	C-148N	5 mg	C-148S		C-148S-TP	
149	2,2',3,4',5',6-Hexachlorobiphenyl	38380-04-0	C-149N	5 mg	C-149S		C-149S-TP	
150	2,2',3,4',6,6'-Hexachlorobiphenyl	68194-08-1	C-150N	5 mg	C-150S		C-150S-TP	
151	2,2',3,5,5',6-Hexachlorobiphenyl	52663-63-5	C-151N	5 mg	C-151S		C-151S-TP	
152	2,2',3,5,6,6'-Hexachlorobiphenyl	68194-09-2	C-152N	5 mg	C-152S		C-152S-TP	
153	2,2',4,4',5,5'-Hexachlorobiphenyl	35065-27-1	C-153N	10 mg	C-153S		C-153S-TP	
154	2,2',4,4',5,6'-Hexachlorobiphenyl	60145-22-4	C-154N	5 mg	C-154S		C-154S-TP	
155	2,2',4,4',6,6'-Hexachlorobiphenyl	33979-03-2	C-155N	50 mg	C-155S		C-155S-TP	
156	2,3,3',4,4',5-Hexachlorobiphenyl	38380-08-4	C-156N	5 mg	C-156S		C-156S-TP	
157	2,3,3',4,4',5'-Hexachlorobiphenyl	69782-90-7	C-157N	5 mg	C-157S		C-157S-TP	
158	2,3,3',4,4',6-Hexachlorobiphenyl	74472-42-7	C-158N	5 mg	C-158S		C-158S-TP	
159	2,3,3',4,5,5'-Hexachlorobiphenyl	39635-35-3	C-159N	5 mg	C-159S		C-159S-TP	
160	2,3,3',4,5,6-Hexachlorobiphenyl	41411-62-5	C-160N	5 mg	C-160S		C-160S-TP	
161	2,3,3',4,5',6-Hexachlorobiphenyl	74474-43-8	C-161N	5 mg	C-161S		C-161S-TP	
162	2,3,3',4',5,5'-Hexachlorobiphenyl	39635-34-2	C-162N	5 mg	C-162S		C-162S-TP	
163	2,3,3',4',5,6-Hexachlorobiphenyl	74472-44-9	C-163N	5 mg	C-163S		C-163S-TP	
164	2,3,3',4',5',6-Hexachlorobiphenyl	74472-45-0	C-164N	5 mg	C-164S		C-164S-TP	
165	2,3,3',5,5',6-Hexachlorobiphenyl	74472-46-1	C-165N	5 mg	C-165S		C-165S-TP	
166	2,3,4,4',5,6-Hexachlorobiphenyl	41411-63-6	C-166N	5 mg	C-166S		C-166S-TP	
167	2,3',4,4',5,5'-Hexachlorobiphenyl	52663-72-6	C-167N	5 mg	C-167S		C-167S-TP	
168	2,3',4,4',5',6-Hexachlorobiphenyl	59291-65-5	C-168N	5 mg	C-168S		C-168S-TP	
169	3,3',4,4',5,5'-Hexachlorobiphenyl	32774-16-6	C-169N	5 mg	C-169S		C-169S-TP	

Chlorobiphenyl Congeners (PCBs)



Purity 99+%

SOLUTIONS in Isooctane

Chlorobiphenyl Congeners (PCBs)

No.	Compound	CAS No.	NEAT Cat. No.	Unit	35 µg/mL Cat. No.	1 mL	100 µg/mL Cat. No.	1 mL
170	2,2',3,3',4,4',5-Heptachlorobiphenyl	35065-30-6	C-170N	5 mg	C-170S		C-170S-TP	
171	2,2',3,3',4,4',6-Heptachlorobiphenyl	52663-71-5	C-171N	5 mg	C-171S		C-171S-TP	
172	2,2',3,3',4,5,5'-Heptachlorobiphenyl	52663-74-8	C-172N	5 mg	C-172S		C-172S-TP	
173	2,2',3,3',4,5,6-Heptachlorobiphenyl	68194-16-1	C-173N	5 mg	C-173S		C-173S-TP	
174	2,2',3,3',4,5,6'-Heptachlorobiphenyl	38411-25-5	C-174N	5 mg	C-174S		C-174S-TP	
175	2,2',3,3',4,5',6-Heptachlorobiphenyl	40186-70-7	C-175N	5 mg	C-175S		C-175S-TP	
176	2,2',3,3',4,6,6'-Heptachlorobiphenyl	52663-65-7	C-176N	5 mg	C-176S		C-176S-TP	
177	2,2',3,3',4',5,6-Heptachlorobiphenyl	52663-70-4	C-177N	5 mg	C-177S		C-177S-TP	
178	2,2',3,3',5,5',6-Heptachlorobiphenyl	52663-67-9	C-178N	5 mg	C-178S		C-178S-TP	
179	2,2',3,3',5,6,6'-Heptachlorobiphenyl	52663-64-6	C-179N	5 mg	C-179S		C-179S-TP	
180	2,2',3,4,4',5,5'-Heptachlorobiphenyl	35065-29-3	C-180N	5 mg	C-180S		C-180S-TP	
181	2,2',3,4,4',5,6-Heptachlorobiphenyl	74472-47-2	C-181N	5 mg	C-181S		C-181S-TP	
182	2,2',3,4,4',5,6'-Heptachlorobiphenyl	60145-23-5	C-182N	5 mg	C-182S		C-182S-TP	
183	2,2',3,4,4',5',6-Heptachlorobiphenyl	52663-69-1	C-183N	5 mg	C-183S		C-183S-TP	
184	2,2',3,4,4',6,6'-Heptachlorobiphenyl	74472-48-3	C-184N	5 mg	C-184S		C-184S-TP	
185	2,2',3,4,5,5',6-Heptachlorobiphenyl	52712-05-7	C-185N	5 mg	C-185S		C-185S-TP	
186	2,2',3,4,5,6,6'-Heptachlorobiphenyl	74472-49-4	C-186N	5 mg	C-186S		C-186S-TP	
187	2,2',3,4',5,5',6-Heptachlorobiphenyl	52663-68-0	C-187N	5 mg	C-187S		C-187S-TP	
188	2,2',3,4',5,6,6'-Heptachlorobiphenyl	74487-85-7	C-188N	5 mg	C-188S		C-188S-TP	
189	2,3,3',4,4',5,5'-Heptachlorobiphenyl	39635-31-9	C-189N	5 mg	C-189S		C-189S-TP	
190	2,3,3',4,4',5,6-Heptachlorobiphenyl	41411-64-7	C-190N	5 mg	C-190S		C-190S-TP	
191	2,3,3',4,4',5',6-Heptachlorobiphenyl	74472-50-7	C-191N	5 mg	C-191S		C-191S-TP	
192	2,3,3',4,5,5',6-Heptachlorobiphenyl	74472-51-8	C-192N	5 mg	C-192S		C-192S-TP	
193	2,3,3',4',5,5',6-Heptachlorobiphenyl	69782-91-8	C-193N	5 mg	C-193S		C-193S-TP	
194	2,2',3,3',4,4',5,5'-Octachlorobiphenyl	35694-08-7	C-194N	5 mg	C-194S		C-194S-TP	
195	2,2',3,3',4,4',5,6-Octachlorobiphenyl	52663-78-2	C-195N	5 mg	C-195S		C-195S-TP	
196	2,2',3,3',4,4',5,6'-Octachlorobiphenyl	42740-50-1	C-196N	5 mg	C-196S		C-196S-TP	
197	2,2',3,3',4,4',6,6'-Octachlorobiphenyl	33091-17-7	C-197N	5 mg	C-197S		C-197S-TP	
198	2,2',3,3',4,5,5',6-Octachlorobiphenyl	68194-17-2	C-198N	5 mg	C-198S		C-198S-TP	
199	2,2',3,3',4,5,5',6'-Octachlorobiphenyl	52663-75-9	C-199N-R1	5 mg	C-199S-R1		C-199S-TP-R1	
200	2,2',3,3',4,5,6,6'-Octachlorobiphenyl	52663-73-7	C-200N-R1	5 mg	C-200S-R1		C-200S-TP-R1	
201	2,2',3,3',4,5',6,6'-Octachlorobiphenyl	40186-71-8	C-201N-R1	5 mg	C-201S-R1		C-201S-TP-R1	
202	2,2',3,3',5,5',6,6'-Octachlorobiphenyl	2136-99-4	C-202N	5 mg	C-202S		C-202S-TP	
203	2,2',3,4,4',5,5',6-Octachlorobiphenyl	52663-76-0	C-203N	5 mg	C-203S		C-203S-TP	
204	2,2',3,4,4',5,6,6'-Octachlorobiphenyl	74472-52-9	C-204N	5 mg	C-204S		C-204S-TP	
205	2,3,3',4,4',5,5',6-Octachlorobiphenyl	74472-53-0	C-205N	5 mg	C-205S		C-205S-TP	
206	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	40186-72-9	C-206N	5 mg	C-206S		C-206S-TP	
207	2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl	52663-79-3	C-207N	5 mg	C-207S		C-207S-TP	
208	2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl	52663-77-1	C-208N	5 mg	C-208S		C-208S-TP	
209	2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl	2051-24-3	C-209N	10 mg	C-209S		C-209S-TP	

Technical Note

The PCB congener numbering system is being used. The only changes from the BZ numbering system affect congeners #199 (formerly BZ#201), #200 (formerly BZ#199) and #201 (formerly BZ#200).

PCB Questions?

AccuStandard chemists have been involved in the synthesis of PCBs and related compounds for over 30 years.

You can rely on our experience and expertise in this area.

Method 1668 - Congener Specific PCB Analysis

Method 1668 (continued) Set of 209 Congeners by HRGC/HRMS

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',3,4,4',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-Octachlorobiphenyl	(7.5 µg/mL)
2,3,3',4'-Tetrachlorobiphenyl	(5.0 µg/mL)	2,2',3,3',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-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.

GPC Calibration Solution

CLP-027-R2-WL-10ML

At stated conc. in CH₂Cl₂

1 x 10 mL

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

Level of Chlorination Calibration/Spike Set

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	(2 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)

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

At stated conc. in Isooctane

No.	1 x 1 mL 14 comps.
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

At stated conc. in Isooctane

No.	1 x 1 mL 15 comps.
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

At stated conc. in Isooctane

No.	1 x 1 mL 15 comps.
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'-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

At stated conc. in Isooctane

No.	1 x 1 mL 15 comps.
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

At stated conc. in Isooctane

No.	1 x 1 mL 41 comps.
17	2,2',4-Trichlorobiphenyl (500 ng/mL)
18	2,2',5-Trichlorobiphenyl (2000 ng/mL)
28	2,4,4'-Trichlorobiphenyl (2000 ng/mL)
31	2,4',5-Trichlorobiphenyl (1500 ng/mL)
33	2',3,4-Trichlorobiphenyl (2000 ng/mL)
44	2,2',3,5'-Tetrachlorobiphenyl (2000 ng/mL)
49	2,2',4,5'-Tetrachlorobiphenyl (2000 ng/mL)
52	2,2',5,5'-Tetrachlorobiphenyl (2000 ng/mL)
70	2,3',4',5-Tetrachlorobiphenyl (2000 ng/mL)
74	2,4,4',5-Tetrachlorobiphenyl (2000 ng/mL)
82	2,2',3,3',4-Pentachlorobiphenyl (500 ng/mL)
87	2,2',3,4,5'-Pentachlorobiphenyl (2000 ng/mL)
95	2,2',3,5',6-Pentachlorobiphenyl (1000 ng/mL)
99	2,2',4,4',5-Pentachlorobiphenyl (2000 ng/mL)
101	2,2',4,5,5'-Pentachlorobiphenyl (2000 ng/mL)
105	2,3,3',4,4'-Pentachlorobiphenyl (500 ng/mL)
110	2,3,3',4',6-Pentachlorobiphenyl (2000 ng/mL)
118	2,3',4,4',5-Pentachlorobiphenyl (2000 ng/mL)
128	2,2',3,3',4,4'-Hexachlorobiphenyl (2000 ng/mL)
132	2,2',3,3',4,6'-Hexachlorobiphenyl (1000 ng/mL)
138	2,2',3,4,4',5'-Hexachlorobiphenyl (2000 ng/mL)
149	2,2',3,4',5',6-Hexachlorobiphenyl (2000 ng/mL)
151	2,2',3,5,5',6-Hexachlorobiphenyl (2000 ng/mL)
153	2,2',4,4',5,5'-Hexachlorobiphenyl (2000 ng/mL)
156	2,3,3',4,4',5-Hexachlorobiphenyl (2000 ng/mL)
158	2,3,3',4,4',6-Hexachlorobiphenyl (500 ng/mL)
169	3,3',4,4',5,5'-Hexachlorobiphenyl (2000 ng/mL)
170	2,2',3,3',4,4',5-Heptachlorobiphenyl (2000 ng/mL)
171	2,2',3,3',4,4',6-Heptachlorobiphenyl (2000 ng/mL)
177	2,2',3,3',4',5,6-Heptachlorobiphenyl (2000 ng/mL)
180	2,2',3,4,4',5,5'-Heptachlorobiphenyl (2000 ng/mL)
183	2,2',3,4,4',5',6-Heptachlorobiphenyl (2000 ng/mL)
187	2,2',3,4',5,5',6-Heptachlorobiphenyl (2000 ng/mL)
191	2,3,3',4,4',5',6-Heptachlorobiphenyl (2000 ng/mL)
194	2,2',3,3',4,4',5,5'-Octachlorobiphenyl (2000 ng/mL)
195	2,2',3,3',4,4',5,6-Octachlorobiphenyl (2000 ng/mL)
199	2,2',3,3',4,5,5',6'-Octachlorobiphenyl (1500 ng/mL)
205	2,3,3',4,4',5,5',6-Octachlorobiphenyl (2000 ng/mL)
206	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl (2000 ng/mL)
208	2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl (2000 ng/mL)
209	Decachlorobiphenyl (2000 ng/mL)

Congener Specific PCB Analysis

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 calls 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-Heptachlorobiphenyl
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
2,3,3',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'-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

Toxicity and Abundance Based PCB Congener Formulations

A study was conducted in 1989 by McFarland and J. Clarke¹, (Environmental Occurrence, Abundance, and Potential Toxicity of Polychlorinated Biphenyl Congeners: Consideration for a Congener - Specific Analysis). The data that formed the basis for conclusions in the study have been referenced by the National Oceanic & Atmospheric Administration (NOAA) which came out with a method in the same year.

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.

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".

Literature Reference

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

Formulations for Toxicity & Abundance Studies

C-SCA-SET

Complete Set of PCB Congeners

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

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

1 x 1 mL
3 comps.

Mix #2 Group 1b (Mixed Type Inducers)

C-SCA-02

10 µg/mL each in Isooctane

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)

1 x 1 mL
6 comps.

Mix #3 Group 2 (PB Type Inducers)

C-SCA-03

10 µg/mL each in Isooctane

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',3,3',4,4',5,5'-Octachlorobiphenyl (194)
2,2',4,4',5,5'-Hexachlorobiphenyl (153)

1 x 1 mL
7 comps.

Mix #4 Group 3 (Non-Inducer Type)

C-SCA-04

10 µg/mL each in Isooctane

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)

1 x 1 mL
10 comps.

Mix #5 Group 4 (Mixed Type Inducers present at very low levels)

C-SCA-05

10 µg/mL each in Isooctane

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)

1 x 1 mL
10 comps.

Mix #6 (Food & Human Tissue analysis)

C-SCA-06

10 µg/mL each in Isooctane

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)

1 x 1 mL
32 comps.

Non-Ortho Substituted PCBs

C-SCA-DIOXLIK

10 µg/mL each in Isooctane

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)

1 x 1 mL
4 comps.

Internal Standard

C-EU-IS-10ML

At stated conc. in Isooctane

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

1 x 10 mL
2 comps.

Dutch Seven PCBs Standard

PCB-DUTCH7-SET

100 µg/mL each in Isooctane

PCB-DUTCH7

10 µg/mL each in Isooctane

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

7 x 1 mL

1 x 1 mL
7 comps.

Congener Specific PCB Analysis

PCB Congener Mix for West Coast Fish Studies

C-WCFS

25 µg/mL each in Isooctane

1 x 1 mL
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',4,5,5',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',3,3',4,6'-Hexachlorobiphenyl	2,4,4',5'-Tetrachlorobiphenyl

World Health Organization Congener Mix

C-WHO-01

2.0 µg/mL each in Isooctane

1 x 1 mL
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

M-002-PAK

At stated conc. in Hexane

SAVE

1 x 1 mL
5 x 1 mL
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',6'-Pentachlorobiphenyl (10 µg/mL)	2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl (5 µg/mL)

Technical Note

The Dry Color Manufacturers 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

10 µg/mL each in Isooctane

PCB-W22-PAK

SAVE

1 x 1 mL
15 comps.
5 x 1 mL

PCB-W22-SET

100 µg/mL in Isooctane

15 x 1 mL
(Set of Individual Solutions)

No. (18) 2,2',5'-Trichlorobiphenyl	No. (52) 2,2',5,5'-Tetrachlorobiphenyl	No. (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 Commite' Europeen 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

Set includes

C-DIOXLIK-02
C-DIOXLIK-04
C-DIOXLIK-06

5 x 1 mL

C-DIOXLIK-08
C-DIOXLIK-10

C-DIOXLIK2-SET

Set includes

C-DIOXLIK-03
C-DIOXLIK-05
C-DIOXLIK-07

5 x 1 mL

C-DIOXLIK-09
C-DIOXLIK-11

C-DIOXLIK3-SET

Set includes

C-DIOXLIK-04
C-DIOXLIK-06
C-DIOXLIK-08

5 x 1 mL

C-DIOXLIK-10
C-DIOXLIK-12

Individual Levels 4, 6, 8, 10 12

C-DIOXLIK3-04 1 mL
C-DIOXLIK3-06 1 mL
C-DIOXLIK3-08 1 mL
C-DIOXLIK3-10 1 mL
C-DIOXLIK3-12 1 mL

PCB Congener Calibration Mixtures

9 Mixtures Contain All 209 Congeners Present in Aroclors

PCB Congener Mix #1

C-CS-01

10 µg/mL each in Isooctane

1 x 1 mL

39 comps.

No.	
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	2,2',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

10 µg/mL each in Isooctane

1 x 1 mL

22 comps.

No.	
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

10 µg/mL each in Isooctane

1 x 1 mL

36 comps.

No.	
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',6-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

10 µg/mL each in Isooctane

1 x 1 mL

20 comps.

No.	
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',4,6,6'-Heptachlorobiphenyl
185	2,2',3,4,5,5',6-Heptachlorobiphenyl
189	2,3,3',4,4',5,5'-Heptachlorobiphenyl

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

9 Mixtures Contain All 209 Congeners **Not Present in Aroclors**

PCB Congener Mix #6

C-CS-06

10 µg/mL each in Isooctane

1 x 1 mL

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 #9

C-CS-09

10 µg/mL each in Isooctane

1 x 1 mL

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 †

PCB Congener Mix #7

C-CS-07

10 µg/mL each in Isooctane

1 x 1 mL

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

10 µg/mL each in Isooctane

1 x 1 mL

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 †

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

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.

Method 680 - PCB Congener Calibration Mixtures

Method 680 PCB Analytes

Internal Standards

M-680-IS 1 x 1 mL
M-680-IS-PAK SAVE 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 SAVE 5 x 1 mL
 750 µg/mL each in Hexane 2 comps.

Chrysene-d₁₂
 Phenanthrene-d₁₀

PCB Locator Mixture

M-PCBL 1 x 1 mL
M-PCBL-PAK SAVE 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 Standard

M-680-RT 1 x 1 mL
M-680-RT-PAK SAVE 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

Tuning Standard

M-680-TS 1 x 1 mL
M-680-TS-PAK SAVE 5 x 1 mL
 10 µg/mL in CH₂Cl₂

Decafluorotriphenylphosphine (DFTPP)

The EPA has designated the following isomers for use in quantifying PCB's by GC/MS. The PCBs are identified and measured as isomer groups (i.e., by level of chlorination). A concentration is measured for each PCB isomer group; total PCB concentration in each sample extract is obtained by summing isomer group concentrations.

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

PCB Isomer Calibration Set

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

PCB Isomer Calibration Mix

M-680A 1 x 1 mL
 At stated conc. in Hexane 9 comps.

No. 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-d₁₂

See Master Catalog for complete Method 680,
 which include Pesticide Mixtures.

Method 8082 - PCB Congener Mixtures

Method 8082/8082A PCBs by Capillary Column GC by ECD or ELCD

PCB Congeners Mixture

M-8082

M-8082-PAK

100 µg/mL each in Hexane

SAVE

1 x 1 mL

5 x 1 mL

19 comps.

No.	No.	No.
1	2-Chlorobiphenyl	137 2,2',3,4,4',5-Hexachlorobiphenyl
5	2,3-Dichlorobiphenyl	141 2,2',3,4,5,5'-Hexachlorobiphenyl
18	2,2',5-Trichlorobiphenyl	151 2,2',3,5,5',6-Hexachlorobiphenyl
31	2,4',5-Trichlorobiphenyl	153 2,2',4,4',5,5'-Hexachlorobiphenyl
44	2,2',3,5'-Tetrachlorobiphenyl	170 2,2',3,3',4,4',5-Heptachlorobiphenyl
52	2,2',5,5'-Tetrachlorobiphenyl	180 2,2',3,4,4',5,5'-Heptachlorobiphenyl
66	2,3',4,4'-Tetrachlorobiphenyl	183 2,2',3,4,4',5',6-Heptachlorobiphenyl
87	2,2',3,4,5'-Pentachlorobiphenyl	187 2,2',3,4',5,5',6-Heptachlorobiphenyl
101	2,2',4,5,5'-Pentachlorobiphenyl	206 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl
110	2,3,3',4',6-Pentachlorobiphenyl	

Reformulated PCB Congeners Mixture

M-8082A

M-8082A-PAK

100 µg/mL each in Hexane

SAVE

1 x 1 mL

5 x 1 mL

19 comps.

No.	No.	No.
1	2-Chlorobiphenyl	138 2,2',3,4,4',5'-Hexachlorobiphenyl
5	2,3-Dichlorobiphenyl	141 2,2',3,4,5,5'-Hexachlorobiphenyl
18	2,2',5-Trichlorobiphenyl	151 2,2',3,5,5',6-Hexachlorobiphenyl
31	2,4',5-Trichlorobiphenyl	153 2,2',4,4',5,5'-Hexachlorobiphenyl
44	2,2',3,5'-Tetrachlorobiphenyl	170 2,2',3,3',4,4',5-Heptachlorobiphenyl
52	2,2',5,5'-Tetrachlorobiphenyl	180 2,2',3,4,4',5,5'-Heptachlorobiphenyl
66	2,3',4,4'-Tetrachlorobiphenyl	183 2,2',3,4,4',5',6-Heptachlorobiphenyl
87	2,2',3,4,5'-Pentachlorobiphenyl	187 2,2',3,4',5,5',6-Heptachlorobiphenyl
101	2,2',4,5,5'-Pentachlorobiphenyl	206 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl
110	2,3,3',4',6-Pentachlorobiphenyl	

Technical Note

AccuStandard has formulated these standards for use in determining the concentrations of Aroclors (Industrial PCBs), specific PCB congeners, or "total PCBs". Additional Aroclor stock solutions are available at higher concentrations and in other solvents.

Internal and Surrogate Standard

CLP-032-H-5X

1.0 mg/mL each in Hexane

1 x 1 mL

2 comps.

Decachlorobiphenyl Tetrachloro-*m*-xylene

Surrogate Standards

M-8082-SSA-WL-10ML

M-8082-SSA-WL-10ML-PAK

5 µg/mL in Acetone

SAVE

1 x 10 mL

5 x 10 mL

Decachlorobiphenyl

M-8082-SS

100 µg/mL in Hexane

1 x 1 mL

M-8082-SS-10X

1.0 mg/mL in Hexane

1 x 1 mL

Tetrachloro-*m*-xylene (TCMX)

Internal Standards

M-8082-ISC-WL-10ML

M-8082-ISC-WL-10ML-PAK

5 µg/mL in Hexane

SAVE

1 x 10 mL

5 x 10 mL

Decachlorobiphenyl

M-8082-SSC-WL-10ML

M-8082-SSC-WL-10ML-PAK

5 µg/mL in Acetone

SAVE

1 x 10 mL

5 x 10 mL

Tetrachloro-*m*-xylene

Method 8082 Aroclor 1016/1260 Calibration Curve

Aroclor 1016/1260 Calibration Curve

C-216/260-CAL-SET

All solutions in Isooctane

6 x 1 mL

4 comps.

Components (units in ng/mL)	Level 1	Level 2 (2X)	Level 3 (5X)	Level 4 (10X)	Level 5 (15X)	Level 6 (20X)
Aroclor 1016	50	100	250	500	750	1000
Aroclor 1260	50	100	250	500	750	1000
Decachlorobiphenyl	10	20	50	100	150	200
Tetrachloro- <i>m</i> -xylene	10	20	50	100	150	200

Level 3 Daily Working Level

CCC (for low level curves)

C-216/260-WL-5X-5ML

1 x 5 mL

C-216/260-WL-5X-10ML

1 x 10 mL

At stated conc. in Isooctane

Level 4 Daily Working Level

CCC (for higher level curves)

C-216/260-WL-10X-5ML

1 x 5 mL

C-216/260-WL-10X-10ML

1 x 10 mL

At stated conc. in Isooctane

Method 8082A Polychlorinated Biphenyl (PCBs) by GC/ECD

Individual PCB Congener Solutions

Congener	35 µg/mL in Isooctane	100 µg/mL in Isooctane	1 mL
2-Chlorobiphenyl	C-001S	C-001S-TP	
2,3-Dichlorobiphenyl	C-005S	C-005S-TP	
2,2',5-Trichlorobiphenyl	C-018S	C-018S-TP	
2,4',5-Trichlorobiphenyl	C-031S	C-031S-TP	
2,2',3,5'-Tetrachlorobiphenyl	C-044S	C-044S-TP	
2,2',5,5'-Tetrachlorobiphenyl	C-052S	C-052S-TP	
2,3',4,4'-Tetrachlorobiphenyl	C-066S	C-066S-TP	
2,2',3,4,5'-Pentachlorobiphenyl	C-087S	C-087S-TP	
2,2',4,5,5'-Pentachlorobiphenyl	C-101S	C-101S-TP	
2,3,3',4',6-Pentachlorobiphenyl	C-110S	C-110S-TP	
2,2',3,4,4',5-Hexachlorobiphenyl	C-137S	C-137S-TP	
2,2',3,4,4',5'-Hexachlorobiphenyl	C-138S	C-138S-TP	
2,2',3,4,5,5'-Hexachlorobiphenyl	C-141S	C-141S-TP	
2,2',3,5,5',6-Hexachlorobiphenyl	C-151S	C-151S-TP	
2,2',4,4',5,5'-Hexachlorobiphenyl	C-153S	C-153S-TP	
2,2',3,3',4,4',5-Heptachlorobiphenyl	C-170S	C-170S-TP	
2,2',3,4,4',5,5'-Heptachlorobiphenyl	C-180S	C-180S-TP	
2,2',3,4,4',5',6-Heptachlorobiphenyl	C-183S	C-183S-TP	
2,2',3,4',5,5',6-Heptachlorobiphenyl	C-187S	C-187S-TP	
2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	C-206S	C-206S-TP	

Internal Standards

C-209S-H

100 µg/mL in Hexane

1 x 1 mL

C-209S-H-10X

1.0 mg/mL in Hexane

1 x 1 mL

Decachlorobiphenyl

Internal and Surrogate Standard

CLP-032-H-5X

1.0 mg/mL each in Hexane

1 x 1 mL

2 comps.

Decachlorobiphenyl

Tetrachloro-*m*-xylene

Surrogate Standard

M-8082-SS

100 µg/mL in Hexane

1 x 1 mL

M-8082-SS-10X

1.0 mg/mL in Hexane

1 x 1 mL

Tetrachloro-*m*-xylene (TCMX)

Instrument Test Solution

Instrument Test Solutions

PCB Window Defining Mixture

C-WDM 1 x 1 mL
C-WDM-PAK SAVE 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'-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 SAVE 5 x 1 mL
 100 µg/mL each in Acetone 20 comps.

C-CCSEC-R 1 x 1 mL
C-CCSEC-R-PAK SAVE 5 x 1 mL
 C-CCSEC plus 2,2',3,3',4,5',6,6'-Octachlorobiphenyl
Special Blend 21 comps.

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 SAVE 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',4,5,5',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',4,5,5',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 Phenyl methyl silicone type columns.



Aroclors

(Industrial PCBs)

Aroclors

Aroclor Solutions in Isooctane and Methanol, 2 Concentrations (Individuals, PAKs, Sets)

Aroclor #	Isooctane		SAVE PAK		Isooctane		Methanol		SAVE PAK		Methanol	
	35 µg/mL	1 mL	5 x 1 mL	5 x 1 mL	100 µg/mL	1 mL	35 µg/mL	1 mL	5 x 1 mL	5 x 1 mL	100 µg/mL	1 mL
Aroclor 1016	C-216S		C-216S-PAK		C-216S-TP		C-216S-M		C-216S-M-PAK		C-216S-M-2.85X	
Aroclor 1221	C-221S		C-221S-PAK		C-221S-TP		C-221S-M		C-221S-M-PAK		C-221S-M-2.85X	
Aroclor 1232	C-232S		C-232S-PAK		C-232S-TP		C-232S-M		C-232S-M-PAK		C-232S-M-2.85X	
Aroclor 1242	C-242S		C-242S-PAK		C-242S-TP		C-242S-M		C-242S-M-PAK		C-242S-M-2.85X	
Aroclor 1248	C-248S		C-248S-PAK		C-248S-TP		C-248S-M		C-248S-M-PAK		C-248S-M-2.85X	
Aroclor 1254	C-254S		C-254S-PAK		C-254S-TP		C-254S-M		C-254S-M-PAK		C-254S-M-2.85X	
Aroclor 1260	C-260S		C-260S-PAK		C-260S-TP		C-260S-M		C-260S-M-PAK		C-260S-M-2.85X	
Aroclor 1262	C-262S		C-262S-PAK		C-262S-TP		C-262S-M		C-262S-M-PAK		C-262S-M-2.85X	
Aroclor 1268	C-268S		C-268S-PAK		C-268S-TP		C-268S-M		C-268S-M-PAK		C-268S-M-2.85X	
Set of above	Z-008S-SET		9 x 1 mL		Z-008S-M-SET		9 x 1 mL					

Aroclor Solutions in Hexane, 2 Concentrations (Individuals, PAKs, Sets)

Aroclor #	Hexane		Hexane		SAVE PAK	
	100 µg/mL	1 mL	1000 µg/mL	1 mL	5 x 1 mL	5 x 1 mL
Aroclor 1016	C-216S-H		C-216S-H-10X		C-216S-H-10X-PAK	
Aroclor 1221	C-221S-H		C-221S-H-10X		C-221S-H-10X-PAK	
Aroclor 1232	C-232S-H		C-232S-H-10X		C-232S-H-10X-PAK	
Aroclor 1242	C-242S-H		C-242S-H-10X		C-242S-H-10X-PAK	
Aroclor 1248	C-248S-H		C-248S-H-10X		C-248S-H-10X-PAK	
Aroclor 1254	C-254S-H		C-254S-H-10X		C-254S-H-10X-PAK	
Aroclor 1260	C-260S-H		C-260S-H-10X		C-260S-H-10X-PAK	
Aroclor 1262	C-262S-H		C-262S-H-10X		C-262S-H-10X-PAK	
Aroclor 1268	C-268S-H		C-268S-H-10X		C-268S-H-10X-PAK	
Set of 9 above	Z-008S-H-SET		Z-008S-H-10X-SET			

Aroclor Neats (Individuals)

Aroclor #	Neat	Unit
Aroclor 1016	C-216N	100 mg
Aroclor 1221	C-221N-50MG	50 mg
Aroclor 1232	-----	-----
Aroclor 1242	C-242N-50MG	50 mg
Aroclor 1248	C-248N-50MG	50 mg
Aroclor 1254	C-254N-50MG	50 mg
Aroclor 1260	C-260N-50MG	50 mg
Aroclor 1262	C-262N-50MG	50 mg
Aroclor 1268	-----	-----

Solutions in PCB-Free Transformer Oil (Individuals, 2 Concentrations)

Aroclor # CAS No.	Conc. ppm w/w	Individual		PAK SAVE	
		Cat. No.	1 mL	Cat. No.	5 x 1 mL
Aroclor 1016	50	C-216-ST-1		C-216-ST-1-PAK	
12674-11-2	500	C-216-ST-2		C-216-ST-2-PAK	
Aroclor 1221	50	C-221-ST-1		C-221-ST-1-PAK	
11104-28-2	500	C-221-ST-2		C-221-ST-2-PAK	
Aroclor 1232	50	C-232-ST-1		C-232-ST-1-PAK	
11141-16-5	500	C-232-ST-2		C-232-ST-2-PAK	
Aroclor 1242	50	C-242-ST-1		C-242-ST-1-PAK	
53469-21-9	500	C-242-ST-2		C-242-ST-2-PAK	
Aroclor 1248	50	C-248-ST-1		C-248-ST-1-PAK	
12672-29-6	500	C-248-ST-2		C-248-ST-2-PAK	
Aroclor 1254	50	C-254-ST-1		C-254-ST-1-PAK	
11097-69-1	500	C-254-ST-2		C-254-ST-2-PAK	
Aroclor 1260	50	C-260-ST-1		C-260-ST-1-PAK	
11096-82-5	500	C-260-ST-2		C-260-ST-2-PAK	
Aroclor 1262	50	C-262-ST-1		C-262-ST-1-PAK	
37324-23-5	500	C-262-ST-2		C-262-ST-2-PAK	
Aroclor 1268	50	C-268-ST-1		C-268-ST-1-PAK	
11100-14-4	500	C-268-ST-2		C-268-ST-2-PAK	

Aroclor-free Transformer Oil T-W130 1 x 1 mL

Aroclors 1221 & 1254 Similar but Different

Reference Standards of Aroclor Mixtures (for GC analysis)

Technical mixtures of PCBs (Aroclors) were manufactured by Monsanto from the 1930s through 1977. In some instances there was an alteration in the manufacturing process which resulted in a more radical components change than the usual variations. This was the case for a particular batch of Aroclor 1254 (54% Chlorine by weight) that was chlorinated in two stages rather than the usual one. The product of the two stage manufacturing process was a material containing higher concentrations of the more toxic non-ortho substituted congeners. Consequently, the analyst may have to identify and quantify two distinct types of Aroclor 1254. For different reasons there also exist two distinct types of Aroclor 1221. To eliminate any confusion when encountering these Aroclors, AccuStandard offers (as an exclusive) all four variations.

C-221S-TYPE1* and C-221S-TYPE2*	C-221S-SET	2 x 1 mL
C-254S-TYPE1* and C-254S-TYPE2*	C-254S-SET	2 x 1 mL

Solutions in these sets are 35 µg/mL in Isooctane

All Standards cited in this monograph are bonafide and unadulterated Monsanto products.

Technical Note

Major Isomer Components of Aroclor 1254

Aroclor® 1254 was the most commonly used of the industrial PCB fluids. This list contains congeners which constitute the majority of the components in this material. They are offered in both neat form and solution. Solutions are in 35 µg/mL in isooctane.

For 1254 only the following congeners may be found at > 0.5% by weight by Congener Number:

#s 44, 49, 52, 56, 64, 66, 70, 74, 82, 84, 85, 87, 91, 92, 95, 97, 99, 101, 105, 110, 118, 128, 130, 132, 135, 136, 138, 141, 146, 149, 151, 153, 156, 158, 163, 170, 180.

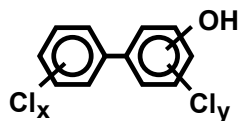
- The coplanar polychlorinated biphenyl (PCB) congeners; 3,3',4,4'-Tetrachlorobiphenyl (# 77), 3,3',4,4',5-Pentachlorobiphenyl (# 126), and 3,3',4,4',5,5'-Hexachlorobiphenyl (# 169) are recognized as the most toxic components of Aroclors.
- The major problem in isolation of these PCB congeners is the separation of 2,3,3',4',6-Pentachlorobiphenyl (# 110) from 3,3',4,4'-Tetrachlorobiphenyl (# 77).
- A simple cleanup procedure using alumina is proposed for the fractionation of the Aroclors on alumina which allows the isolation and analysis of the coplanar PCB congeners (1).
- The proposed internal standard 3,3',4,4'-Tetrabromobiphenyl (B-077S) enhances the accuracy of the procedure.

3,3',4,4'-Tetrabromobiphenyl is used as an Internal Standard to identify and quantify the coplanar components of Aroclors (1).

(1) Analysis of coplanar PCB congeners in Aroclors using alumina column cleanup. Jerry W. Anderson, ManTech Environmental Technology, Inc., R.S. Kerr Environmental Research Laboratory, U.S. Environmental Protection Agency, P.O. Box 1198, Ada, OK 74820 - Pittsburgh Conference, March 1992, New Orleans

B-077S 1 x 1 mL
35 µg/mL in Isooctane
3,3',4,4'-Tetrabromobiphenyl

PCB Metabolites



Hydroxy-Chlorobiphenyls

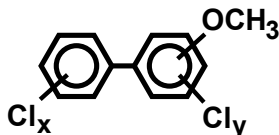
Compound	CAS No.	NEAT Cat. No.	Unit	100 µg/mL in Isooctane Cat. No.	1 mL
2-Hydroxy-5-chlorobiphenyl	607-12-5	HPCB-1001N	5 mg	HPCB-1001S	
4-Hydroxy-2-chlorobiphenyl	23719-22-4	HPCB-1002N	5 mg	HPCB-1002S	
4-Hydroxy-3-chlorobiphenyl	92-04-6	HPCB-1003N	5 mg	HPCB-1003S	
4-Hydroxy-4'-chlorobiphenyl	28034-99-3	HPCB-1004N	10 mg	HPCB-1004S	
2-Hydroxy-2',5'-dichlorobiphenyl	53905-30-9	HPCB-2001N	10 mg	HPCB-2001S	
3-Hydroxy-2',5'-dichlorobiphenyl	53905-29-6	HPCB-2002N	10 mg	HPCB-2002S	
4-Hydroxy-2',5'-dichlorobiphenyl	53905-28-5	HPCB-2003N	10 mg	HPCB-2003S	
4-Hydroxy-3,5-dichlorobiphenyl	1137-59-3	HPCB-2004N	10 mg	HPCB-2004S	
2-Hydroxy-2',3'-dichlorobiphenyl		HPCB-2005N	10 mg	HPCB-2005S	
2-Hydroxy-3',4'-dichlorobiphenyl		HPCB-2006N	10 mg	HPCB-2006S	
2-Hydroxy-2',4',6'-trichlorobiphenyl		HPCB-3001N	10 mg	HPCB-3001S	
2-Hydroxy-2',5,5'-trichlorobiphenyl		HPCB-3002N	10 mg	HPCB-3002S	
3-Hydroxy-2',4',6'-trichlorobiphenyl		HPCB-3003N	10 mg	HPCB-3003S	
4-Hydroxy-2,2',5'-trichlorobiphenyl	53905-33-2	HPCB-3004N	5 mg	HPCB-3004S	
4-Hydroxy-2',3,5'-trichlorobiphenyl		HPCB-3005N	5 mg	HPCB-3005S	
4-Hydroxy-2',4',6'-trichlorobiphenyl	14962-28-8	HPCB-3006N	10 mg	HPCB-3006S	
2-Hydroxy-2',3',4',5'-tetrachlorobiphenyl		HPCB-4001N	10 mg	HPCB-4001S	
2-Hydroxy-2',3',5',6'-tetrachlorobiphenyl		HPCB-4002N	10 mg	HPCB-4002S	
2-Hydroxy-2',4',5,6'-tetrachlorobiphenyl		HPCB-4003N	10 mg	HPCB-4003S	
3-Hydroxy-2',3',4',5'-tetrachlorobiphenyl	67651-37-0	HPCB-4004N	10 mg	HPCB-4004S	
3-Hydroxy-2',3',5',6'-tetrachlorobiphenyl		HPCB-4005N	10 mg	HPCB-4005S	
4-Hydroxy-2,2',4',6'-tetrachlorobiphenyl	150304-08-8	HPCB-4006N	5 mg	HPCB-4006S	
4-Hydroxy-2',3',4',5'-tetrachlorobiphenyl	67651-34-7	HPCB-4007N	10 mg	HPCB-4007S	
4-Hydroxy-2',3,4',6'-tetrachlorobiphenyl		HPCB-4008N	5 mg	HPCB-4008S	
4-Hydroxy-2',3,5,5'-tetrachlorobiphenyl		HPCB-4009N	10 mg	HPCB-4009S	
4-Hydroxy-2',3',5',6'-tetrachlorobiphenyl	14962-32-4	HPCB-4010N	10 mg	HPCB-4010S	
4-Hydroxy-3,3',4,5'-tetrachlorobiphenyl NEW				HPCB-4011S	
3-Hydroxy-2,2',6,6'-tetrachlorobiphenyl				HPCB-4012S	
2-Hydroxy-2',3,5,6'-tetrachlorobiphenyl NEW				HPCB-4013S	
5-Hydroxy-2,2',4,6'-tetrachlorobiphenyl				HPCB-4014S	
4,4'-Dihydroxy-2,2',6,6'-tetrachlorobiphenyl				HPCB-4015S	
4,6'-Dihydroxy-2,2',4',6'-tetrachlorobiphenyl NEW				HPCB-4016S	
2-Hydroxy-2',3',4',5',6'-pentachlorobiphenyl	67651-36-9	HPCB-5001N	10 mg	HPCB-5001S	
2-Hydroxy-2',3',5,5',6'-pentachlorobiphenyl		HPCB-5002N	10 mg	HPCB-5002S	
4-Hydroxy-2,2',3',4',5'-pentachlorobiphenyl		HPCB-5003N	5 mg	HPCB-5003S	
4-Hydroxy-2,2',3',5',6'-pentachlorobiphenyl		HPCB-5004N	5 mg	HPCB-5004S	
4-Hydroxy-2',3,3',4',5'-pentachlorobiphenyl	67651-35-8	HPCB-5005N	5 mg	HPCB-5005S	
4-Hydroxy-2',3,3',5',6'-pentachlorobiphenyl		HPCB-5006N	5 mg	HPCB-5006S	
4-Hydroxy-2',3,4',5,6'-pentachlorobiphenyl		HPCB-5007N	10 mg	HPCB-5007S	
3-Hydroxy-2,2',4',5,5'-pentachlorobiphenyl	69278-58-6			HPCB-5008S	
4-Hydroxy-2,2',4',5,5'-pentachlorobiphenyl				HPCB-5009S	
2-Hydroxy-2',3,4',5',6'-pentachlorobiphenyl				HPCB-5010S	
4-Hydroxy-2',3,3',4',5,5'-hexachlorobiphenyl	158076-63-2	HPCB-6001N	10 mg	HPCB-6001S	
4-Hydroxy-2',3,3',5,5',6'-hexachlorobiphenyl		HPCB-6002N	10 mg	HPCB-6002S	
5-Hydroxy-2,2',3,4,4',5'-hexachlorobiphenyl NEW				HPCB-6003S	
4'-Hydroxy-2,2',3,3',4,5,5'-heptachlorobiphenyl				HPCB-7001S	
3'-Hydroxy-2,2',3,4,4',5,6'-heptachlorobiphenyl NEW				HPCB-7002S	
3'-Hydroxy-2,2',3,4,4',5,5'-heptachlorobiphenyl				HPCB-7003S	
5-Hydroxy-2,2',3,4,4',5,6'-heptachlorobiphenyl				HPCB-7004S	

Metabolite and Degradation Reference Material Importance to the Environment

As environmental testing progresses, researchers realize that often the original compounds are not the ones found in the ecosystem. In real-world samples, metabolites and degradation products of well-known common chemical pollutants, such as PCBs and BDEs, are becoming much more prevalent. These compounds are found in soil, water and wildlife samples. This occurs as the parent compounds are leached out of waste and are exposed to rainwater, sunlight and other environmental factors. The original materials form new compounds, most often the methoxy or the hydroxy derivatives of the original molecule. Sometimes substitutions of the halogens occur and chlorinated moieties are found.

The problem with these newly found pollutants is that they are not commercial chemicals. This means that they are not readily available as reference materials. Not having a reference material makes the identification and quantification of these materials extremely difficult. In order to support the research into these degradates, AccuStandard has worked with many different researchers to synthesize the novel compounds that they require for their work. By having these materials available, scientists can learn more about the environmental fate and true impact of pollutants.

PCB Metabolites



Methoxy PCBs

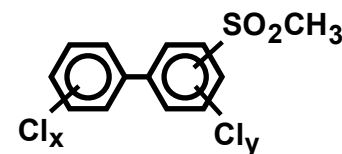
Compound	100 µg/mL in Isooctane Cat. No.	1 mL	Compound	* in 50 µg/mL, 100 µg/mL in Isooctane Cat. No.	1 mL
2-Methoxy-5-chlorobiphenyl	MOPCB-1001S		2-Methoxy-2',3',4',5'-tetrachlorobiphenyl	MOPCB-4001S	
4-Methoxy-2-chlorobiphenyl	MOPCB-1002S		2-Methoxy-2',3',5',6'-tetrachlorobiphenyl	MOPCB-4002S	
4-Methoxy-3-chlorobiphenyl	MOPCB-1003S		2-Methoxy-2',4',5,6'-tetrachlorobiphenyl	MOPCB-4003S	
4-Methoxy-4'-chlorobiphenyl	MOPCB-1004S		3-Methoxy-2',3',4',5'-tetrachlorobiphenyl	MOPCB-4004S	
2-Methoxy-3-chlorobiphenyl	NEW MOPCB-1005S		3-Methoxy-2',3',5',6'-tetrachlorobiphenyl	MOPCB-4005S	
3-Methoxy-5-chlorobiphenyl	NEW MOPCB-1006S		4-Methoxy-2',3',4',5'-tetrachlorobiphenyl	MOPCB-4007S	
2-Methoxy-3'-chlorobiphenyl	NEW MOPCB-1007S		4-Methoxy-2',3,4',6'-tetrachlorobiphenyl	MOPCB-4008S	
3-Methoxy-3'-chlorobiphenyl	NEW MOPCB-1008S		4-Methoxy-2',3,5,5'-tetrachlorobiphenyl	MOPCB-4009S	
4-Methoxy-3'-chlorobiphenyl	NEW MOPCB-1009S		4-Methoxy-2',3',5',6'-tetrachlorobiphenyl	MOPCB-4010S	
2-Methoxy-2'-5-dichlorobiphenyl	MOPCB-2001S		3-Methoxy-2,2',6,6'-tetrachlorobiphenyl	MOPCB-4012S-0.5X *	
3-Methoxy-2',5'-dichlorobiphenyl	MOPCB-2002S		2-Methoxy-2',3',4',5,5'-pentachlorobiphenyl	MOPCB-5001S	
4-Methoxy-2',5'-dichlorobiphenyl	MOPCB-2003S		2-Methoxy-2',3',5,5',6'-pentachlorobiphenyl	MOPCB-5002S	
4-Methoxy-3,5-dichlorobiphenyl	MOPCB-2004S		4-Methoxy-2,2',3',4',5'-pentachlorobiphenyl	MOPCB-5003S	
2-Methoxy-2',3'-dichlorobiphenyl	MOPCB-2005S		4-Methoxy-2,2',3',5',6'-pentachlorobiphenyl	MOPCB-5004S	
2-Methoxy-3',4'-dichlorobiphenyl	MOPCB-2006S		4-methoxy-2',3,4',5,6'-pentachlorobiphenyl	NEW MOPCB-5007S	
2-Methoxy-2',4',6'-trichlorobiphenyl	MOPCB-3001S		4-Methoxy-2,2',4',5,5'-pentachlorobiphenyl	MOPCB-5009S	
2-Methoxy-2',5,5'-trichlorobiphenyl	MOPCB-3002S		2-Methoxy-2',3,4',5',6'-pentachlorobiphenyl	MOPCB-5010S	
3-Methoxy-2',4',6'-trichlorobiphenyl	MOPCB-3003S		4-Methoxy-2',3,3',4',5,5'-hexachlorobiphenyl	MOPCB-6001S	
4-Methoxy-2,2',5'-trichlorobiphenyl	MOPCB-3004S		5-Methoxy-2,2',3,4,4',5'-hexachlorobiphenyl	MOPCB-6003S	
4-Methoxy-2',3,5'-trichlorobiphenyl	MOPCB-3005S		4'-Methoxy-2,2',3,3',4',5,5'-heptachlorobiphenyl	MOPCB-7001S-0.5X *	
4-Methoxy-2',4',6'-trichlorobiphenyl	MOPCB-3006S		5-Methoxy-2,2',3,4,4',5',6'-heptachlorobiphenyl	MOPCB-7004S-0.5X *	

Methylsulfonyl PCB Congeners

Compound	CAS No.	50 µg/mL in Isooctane Cat. No.	1 mL
3-Methylsulfonyl-2,2',4',5-tetrachlorobiphenyl	116807-52-4	MSCB-3049	
3-Methylsulfonyl-2,2',5,5'-tetrachlorobiphenyl	60640-54-2	MSCB-3052	
3-Methylsulfonyl-2,3',4',5-tetrachlorobiphenyl	116807-53-5	MSCB-3070	
3-Methylsulfonyl-2,2',3',4',5-pentachlorobiphenyl	66640-58-2	MSCB-3087	
3-Methylsulfonyl-2,2',4',5,6-pentachlorobiphenyl	149949-86-0	MSCB-3091	
3-Methylsulfonyl-2,2',3',5,6-pentachlorobiphenyl		MSCB-3095	
3-Methylsulfonyl-2,2',4',5,5'-pentachlorobiphenyl	66640-60-6	MSCB-3101	
3-Methylsulfonyl-2,3',4',5,6-pentachlorobiphenyl	116807-23-9	MSCB-3110	
3-Methylsulfonyl-2,2',3',4',5,6-hexachlorobiphenyl	149949-90-6	MSCB-3132	
3-Methylsulfonyl-2,2',3',4',5,5'-hexachlorobiphenyl	104086-18-2	MSCB-3141	
3-Methylsulfonyl-2,2',4',5,5',6-hexachlorobiphenyl	149949-88-2	MSCB-3149	
3-Methylsulfonyl-2,2',3',4',5,5',6-heptachlorobiphenyl		MSCB-3174	
4-Methylsulfonyl-2,2',4',5-tetrachlorobiphenyl	69797-52-0	MSCB-4049	
4-Methylsulfonyl-2,2',5,5'-tetrachlorobiphenyl	60640-55-3	MSCB-4052	
4-Methylsulfonyl-2,3,4',6-tetrachlorobiphenyl	108736-08-9	MSCB-4064	
4-Methylsulfonyl-2,3',4',5-tetrachlorobiphenyl	69797-51-9	MSCB-4070	
4-Methylsulfonyl-2,2',3',4',5-pentachlorobiphenyl	66640-59-3	MSCB-4087	
4-Methylsulfonyl-2,2',4',5,6-pentachlorobiphenyl	149949-87-1	MSCB-4091	
4-Methylsulfonyl-2,2',3',5,6-pentachlorobiphenyl		MSCB-4095	
4-Methylsulfonyl-2,2',4',5,5'-pentachlorobiphenyl	66640-61-7	MSCB-4101	
4-Methylsulfonyl-2,2',4',5,6'-pentachlorobiphenyl		MSCB-4103	
4-Methylsulfonyl-2,3,3',4',6-pentachlorobiphenyl	149949-89-3	MSCB-4110	
4-Methylsulfonyl-2,2',3,3',4',6-hexachlorobiphenyl	104086-16-0	MSCB-4132	
4-Methylsulfonyl-2,2',3',4',5,5'-hexachlorobiphenyl	104086-19-3	MSCB-4141	
4-Methylsulfonyl-2,2',3,4',5',6-hexachlorobiphenyl	116806-76-9	MSCB-4149	
4-Methylsulfonyl-2,2',3',4',5,5',6-heptachlorobiphenyl	153310-30-6	MSCB-4174	

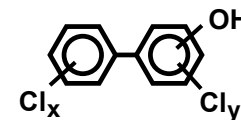
Technical Note

An important group of persistent PCB metabolites, the methylsulfonyl PCBs (MeSO₂-PCBs) have been added. Only the 3- and 4-MeSO₂-PCBs with chlorine atoms in the 2,5- or 2,3,6-position have been found in environmental samples, and therefore only those are offered by AccuStandard.



Hydroxy-Biphenyls

Compound	CAS No.	NEAT Cat. No.	Unit	100 µg/mL in MeOH Cat. No.	1 mL
2-Hydroxy-biphenyl	90-43-7	HBP-001N	100 mg	HBP-001S	
3-Hydroxy-biphenyl	580-51-8	HBP-002N	100 mg	HBP-002S	
4-Hydroxy-biphenyl	92-69-3	HBP-003N	100 mg	HBP-003S	
2,2'-Dihydroxy-biphenyl	1806-29-7	HBP-004N	100 mg	HBP-004S	
4,4'-Dihydroxy-biphenyl	92-88-6	HBP-006N	100 mg	HBP-006S	
2,5-Dihydroxy-biphenyl	1079-21-6	HBP-009N	100 mg	HBP-009S	



Other Halogenated Aromatics

Polychlorinated Terphenyls (PCTs) have physical and chemical properties similar to PCBs, and may contain up to 10% of PCBs within the product matrix. They have been used as plasticizers, fire retardants and in various types of coatings. AccuStandard now offers 20 PCT congeners to aid in the monitoring and environmental impact of these pollutants.

Polychlorinated Terphenyls (PCTs)

Compound	CAS No.	NEAT Cat. No.	Unit	In Toluene Conc.	Cat. No.	1 mL
o-Terphenyl	84-15-1	T-001N	100 mg	-----	----	--
m-Terphenyl	92-06-8	T-002N	100 mg	-----	----	--
p-Terphenyl	92-94-4	T-003N	100 mg	-----	----	--
Tetradecachloro-o-terphenyl		-----	-----	35 µg/mL	T-004S	
Tetradecachloro-m-terphenyl	42429-88-9	-----	-----	35 µg/mL	T-005S	
Tetradecachloro-p-terphenyl	31710-32-4	-----	-----	35 µg/mL	T-006S	
4-Chloro-o-terphenyl NEW		-----	-----	50 µg/mL	T-007S	
4-Chloro-p-terphenyl NEW		-----	-----	50 µg/mL	T-008S	
2,4-Dichloro-p-terphenyl NEW		-----	-----	50 µg/mL	T-009S	
2,5-Dichloro-o-terphenyl NEW		-----	-----	50 µg/mL	T-010S	
2,5-Dichloro-m-terphenyl NEW		-----	-----	50 µg/mL	T-011S	
2,5-Dichloro-p-terphenyl NEW		-----	-----	50 µg/mL	T-012S	
2,4,6-Trichloro-p-terphenyl NEW		-----	-----	50 µg/mL	T-013S	
2,3,5,6-Tetrachloro-p-terphenyl NEW		-----	-----	50 µg/mL	T-014S	
2,4,4",6-Tetrachloro-p-terphenyl NEW		-----	-----	50 µg/mL	T-015S	
2,3,4,5,6-Pentachloro-p-terphenyl NEW		-----	-----	50 µg/mL	T-016S	
Aroclor 5432	63496-31-1	-----	-----	35 µg/mL	T-432S	
Aroclor 5442	12642-23-8	-----	-----	35 µg/mL	T-442S	
Aroclor 5460	11126-42-4	-----	-----	35 µg/mL	T-460S	
Aroclor 6050		-----	-----	35 µg/mL	T-6050S	

Perchlorinated Aromatics

Compound	CAS No.	NEAT Cat. No.	Unit	In Toluene Conc.	Cat. No.	1 mL
Decachlorobiphenyl	2051-24-3	C-209N	10 mg	-----	----	--
Hexachlorobenzene	118-74-1	A-012	100 mg	-----	----	--
Octachlorodibenzofuran	39001-02-0	F-801N	50 mg	50 µg/mL	F-801S	
Octachlorodibenzo-p-dioxin	3268-87-9	D-801N	50 mg	50 µg/mL	D-801S	
Octachloronaphthalene	2234-13-1	-----	-----	100 µg/mL	N-003S	
Octachlorostyrene	29082-74-4	-----	-----	35 µg/mL	PC-001S	
Perchlorinated p,p'-DDE		-----	-----	35 µg/mL	PC-002S	
Tetradecachloro-o-terphenyl		-----	-----	35 µg/mL	T-004S	
Tetradecachloro-m-terphenyl	42429-88-9	-----	-----	35 µg/mL	T-005S	
Tetradecachloro-p-terphenyl	31710-32-4	-----	-----	35 µg/mL	T-006S	

Halogenated Aromatics (other than PCBs)

Compound	CAS No.	Conc	Matrix	Cat. No.	1 mL
Decafluorobiphenyl	434-90-2	10 µg/mL	Acetone	M-551.1-SS	
		0.1 mg/mL	AcCN	M-8310-SS	
		0.2 mg/mL	CH ₂ Cl ₂	M-625-04	
		1 mg/mL	Acetone	M-551.1-SS-100X	
4,4'-Dibromobiphenyl	92-86-4	2 mg/mL	CH ₂ Cl ₂	M-625-04-10X	
		0.1 mg/mL	Ethyl acetate	M-508.1-SS	
		0.2 mg/mL	CH ₂ Cl ₂	M-625-05	
		1 mg/mL	Acetone	M-8111-IS-20X	
4,4'-Dibromooctafluorobiphenyl	10386-84-2	2 mg/mL	CH ₂ Cl ₂	M-625-05-10X	
		0.2 mg/mL	CH ₂ Cl ₂	M-625-06	
		2 mg/mL	CH ₂ Cl ₂	M-625-06-10X	
2,2'-Difluorobiphenyl	388-82-9	0.2 mg/mL	CH ₂ Cl ₂	M-625-07	
		1 mg/mL	MeOH	M-1653-IIS	
		2 mg/mL	CH ₂ Cl ₂	M-625-07-10X	
		5 mg/mL	Acetone	M-1653-IIS-R	
2-Fluorobiphenyl	321-60-8	0.2 mg/mL	CH ₂ Cl ₂	M-625-09	
		2 mg/mL	CH ₂ Cl ₂	M-625-09-10X	
Halowax 1013	1321-64-8	0.1 mg/mL	MeOH	N-1013S	
Halowax 1014	1335-87-1	0.1 mg/mL	MeOH	N-1014S	
Halowax 1051		0.1 mg/mL	MeOH	N-1051S	
Halowax 1099	39450-05-0	0.1 mg/mL	MeOH	N-1099S	
		5 mg/mL	MeOH	AS-E0470	
1,2,3,4,5,6,7,8-Octachloronaphthalene	2234-13-1	100 µg/mL	MeOH	N-003S	

Other Halogenated Aromatics

PCNs were produced in high volume around 1910 in both Europe and the United States. In the United States, PCNs were called Halowax by New York based Union Carbide and was subsequently taken over by Koppers of Pittsburgh, PA.

Polychlorinated Naphthalenes

Halowaxes (Koppers PCNs)

Compound	CAS No.	NEAT Cat. No.	Unit	100 µg/mL in MeOH Cat. No.	1 mL
Halowax 1013 (56 %Cl)	1321-64-8	-----	-----	N-1013S	
Halowax 1014 (62 %Cl)	1335-87-1	-----	-----	N-1014S	
Halowax 1051 (70 %Cl)	2234-13-1	-----	-----	N-1051S	
Halowax 1099 (52 %Cl)	39450-05-0	-----	-----	N-1099S	

Polychlorinated Naphthalene Congeners

Naphthalene	91-20-3	H-152N	100 mg	-----	-----
1-Chloronaphthalene	90-13-1	N-001N	100 mg	-----	-----
2-Chloronaphthalene	91-58-7	N-002N	100 mg	-----	-----
1,4-Dichloronaphthalene	1825-31-6	N-004N	10 mg	-----	-----
Octachloronaphthalene	2234-13-1	-----	-----	N-003S	1 mL
1,2,3,4-Tetrachloronaphthalene	20020-02-4	N-005N	10 mg	-----	-----

Chlorodiphenyl Ether

Compound	CAS No.	Conc	Matrix	Cat. No.	1 mL
4-Chlorophenyl phenyl ether	7005-72-3	10 mg	NEAT	CDE-003N	
		50 µg/mL	Isooctane	CDE-003S	
2,4-Dichlorodiphenyl ether		10 mg	NEAT	CDE-007N	
		50 µg/mL	Isooctane	CDE-007S	
4,4'-Dichlorodiphenyl ether	2444-89-5	10 mg	NEAT	CDE-015N	
		50 µg/mL	Isooctane	CDE-015S	
2,2',4,4'-Tetrachlorodiphenyl ether NEW				CDE-047S	
3,3',4,4'-Tetrachlorodiphenyl ether		50 µg/mL	Isooctane	CDE-077S	
3,3',5,5'-Tetrachlorodiphenyl ether NEW				CDE-080S	
2,2',4,4',5-Pentachlorodiphenyl ether NEW				CDE-099S	
2,2',4,4',6-Pentachlorodiphenyl ether NEW				CDE-100S	
2,3,3',4,4'-Pentachlorodiphenyl ether		50 µg/mL	Isooctane	CDE-105S	
2,3',4,4',5-Pentachlorodiphenyl ether	60123-65-1	10 mg	NEAT	CDE-118N	
		50 µg/mL	Isooctane	CDE-118S	
2,2',4,4',5,5'-Hexachlorodiphenyl ether NEW				CDE-153S	
2,2',4,4',5,6-Hexachlorodiphenyl ether NEW				CDE-154S	
Decachlorodiphenyl ether	31710-30-2	10 mg	NEAT	CDE-209N	
		50 µg/mL	Isooctane	CDE-209S	



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