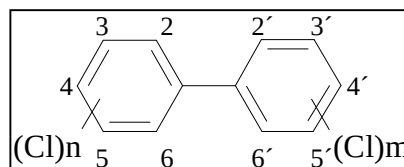
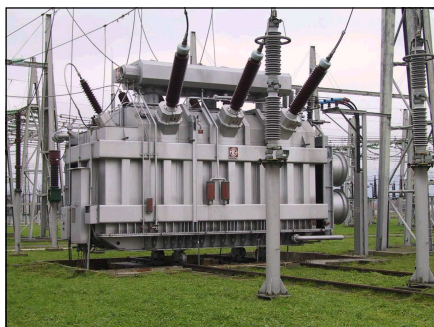




Polychlorinated biphenyls (PCBs)



Polychlorinated biphenyls (PCBs) have been the subject of a broad range of studies and investigations because of their environmental persistency and bioaccumulation. Their abundance as pollutants stems from their worldwide manufacture as heavy-used industrial chemicals, *e.g.* Aroclors with the main application as dielectric fluid in capacitors and transformers. PCBs are formed as mixtures by the addition of chlorine to biphenyl.

PCB congeners can be classified as coplanar, dioxinlike with none or one orthosubstitution and nonplanar with substitutions in the *ortho*-positions. The coplanar PCBs shows a similar toxicity as the dibenzofurans and the dioxins.

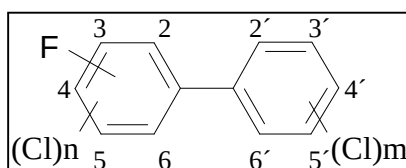
F-PCBs®, An overview of advantages

F-PCBs® Fluorinated Internal Standards for PCB analysis

A flexible and cost-efficient alternative:

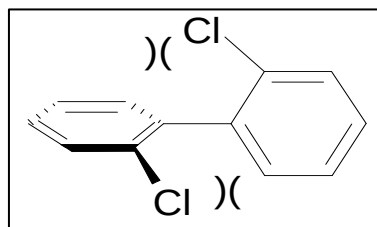
Mono- and difluorinated PCBs are closely similar to the parent PCBs in terms of physico-chemical properties, and are ideal internal or surrogate standards for GC-MS, GC-ECD, GC-FID and two-dimensional GC. The F-PCB® internal standards offered by Chiron have several advantages over the more traditionally used ^{13}C isotopes and unlabelled internal standards:

- Cost efficient. Much cheaper than the ^{13}C isotopes.
- Gives one single, pure isotope (F has only one isotope)
- Can be used with GC-ECD detection, ^{13}C can not since they coelute with the native.
- Do not discriminate from the native upon work-up.
- "Designer retention times" (*ortho*-, *meta*-, *para*-F) possible for optimal elution rate.





Native Non-coplanar PCBs: "Dutch Seven PCBs"



Solutions of single reference substances

IUPAC No.	Compound	Cat. No.	Cat. No. neat
Trichloro: CB-28	2,4,4'-Trichlorobiphenyl	1999.12-100-IO	1999.12-10MG
Tetrachloro: CB-52	2,2',5,5'-Tetrachlorobiphenyl	2000.12-100-IO	2000.12-10MG
Pentachloro: CB-101	2,2',4,5,5'-Pentachlorobiphenyl	2001.12-100-IO	2001.12-10MG
	CB-118	2002.12-100-IO	2002.12-10MG
Hexachloro: CB-138	2,2',3,4,4',5'-Hexachlorobiphenyl	2003.12-100-IO	2003.12-10MG
	CB-153	2004.12-100-IO	2004.12-10MG
Heptachloro: CB-180	2,2'3,4,4',5,5'-Heptachlorobiphenyl	2005.12-100-IO	2005.12-10MG
Multiple components	Dutch Seven PCBs, 10 µg/mL each	S-4236-10-IO	
Multiple components	Seven Dutch single components, Neat Mix, 1 mg each	-	S-4418-7x1MG
KIT	Seven Dutch single components, Solution-KIT	8549.7-KIT	-

Internal standards and multiple component solution, 100 µg/mL in isooctane, 1 mL or as neat

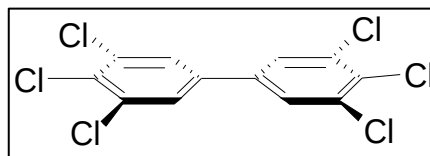
Internal Standards (IS) for Non-coplanar PCBs: "Dutch Seven F-PCBs ®"

IUPAC No.	Compound	Cat. No.	Cat No.
Trichloro: 3'-F-CB-28	3'-Fluoro-2,4,4'trichlorobiphenyl		2228.12-100-IO
Tetrachloro: 3-F-CB-52	3-Fluoro-2,2',5,5'-tetrachlorobiphenyl		2660.12-100-IO
Pentachloro: 5'-F-CB-118	5'-Fluoro-2,3',4,4',5-pentachlorobiphenyl	2865.12-10-IO	-
Hexachloro: 5'-F-CB-156	5'-Fluoro-2,3,3',4,4',5-hexachlorobiphenyl	2871.12-10-IO	-
	3'-F-CB-166	2746.12-10-IO	-
Heptachloro: 5'-F-CB-190	5'-Fluoro-2,3,3',4,4',5,6-heptachlorobiphenyl	3730.12-10-IO	-
Multiple components	Dutch Seven F-PCBs®	Please Inquire	
KIT	Dutch Seven F-PCBs®, single components	8550.6-KIT	

Solutions of single reference substances, internal standards and multiple component solution, 10 or 100 µg/mL in isooctane, 1mL.



Native Coplanar PCBs: "Dioxin-like PCBs"



IUPAC No.	Compound	Cat. No.	Cat. No. neat
Tetrachloro: CB-77	3,3',4,4'-Tetrachlorobiphenyl	2006.12-100-IO	2006.12-10MG
CB-81	3,4,4',5-Tetrachlorobiphenyl	2007.12-100-IO	2007.12-5MG
Pentachloro: CB-105	2,3,3',4,4'-Pentachlorobiphenyl	2008.12-100-IO	2008.12-5MG
CB-114	2,3,4,4',5-Pentachlorobiphenyl	2009.12-100-IO	2009.12-5MG
CB-126	3,3',4,4',5-Pentachlorobiphenyl	2012.12-100-IO	2012.12-5MG
Hexachloro: CB-156	2,3,3',4,4',5-Hexachlorobiphenyl	2013.12-100-IO	2013.12-5MG
CB-157	2,3,3',4,4',5'-Hexachlorobiphenyl	2014.12-100-IO	2014.12-5MG
CB-167	2,3',4,4',5,5'-Hexachlorobiphenyl	2015.12-100-IO	2015.12-5MG
CB-169	3,3',4,4',5,5'-Hexachlorobiphenyl	2220.12-100-IO	2220.12-5MG
CB-189	2,3,3',4,4',5,5'-Heptachlorobiphenyl	2016.12-100-IO	2016.12-5MG
Multiple components	Dioxin-like PCBs Multiple component solution, ISO 17858	S-4614-10-IO 10 µg each/mL	-
Multiple components	WHO Dioxin-like PCB Mixture, Includes also PCB-123 (2011.12)	S-4237-2-IO 2 µg each/mL	-
KIT	Dioxin-like PCB-Kit, solutions	8551.10-KIT	-

Solutions of single reference substances, internal standards and multiple component solutions, 100 µg/mL in isooctane, 1 mL or as neat.

Internal Standards (IS) for Coplanar PCBs: "Dioxinlike F-PCBs ®"

IUPAC No.	Compound	Cat.No.
Tetrachloro: 5-F-CB-77	5-Fluoro-3,3',4,4'-tetrachlorobiphenyl	2863.12-10-IO
3'-F-CB-81	3'-Fluoro-3,4,4',5-tetrachlorobiphenyl	2344.12-10-IO
Pentachloro: 5'-F-CB-105	5'-Fluoro-2,3,3',4,4'-pentachlorobiphenyl	2864.12-10-IO
3'-F-CB-114	3'Fluoro-2,3,4,4',5-pentachlorobiphenyl	2870.12-10-IO
5'-F-CB-118	5'-Fluoro-2,3',4,4',5-pentachlorobiphenyl	2865.12-10-IO
5'-F-CB-126	5'-Fluoro-3,3',4,4',5-pentachlorobiphenyl	2866.12-10-IO
Hexachloro: 5'-F-CB-156	5'-Fluoro-2,3,3',4,4',5-hexachlorobiphenyl	2871.12-10-IO
3'-F-CB-166	3'-Fluoro-2,3,4,4',5,6-hexachlorobiphenyl	2746.12-10-IO
Heptachloro: 5'-F-CB-190	5'-Fluoro-2,3,3',4,4',5,6-heptachlorobiphenyl	3730.12-10-IO
Multiple components	Dioxin-like F-PCB Multiple-component solution, 2 µg/mL each in isooctane	S-4614-2-IO
KIT	Dioxin-like F-PCB Kit, all single solutions	3087.9-KIT

Solutions of single reference substances, internal standards and multiple component solution, 10 µg/mL in isooctane, 1mL.



Dioxin-like PCBs: Optional calibration standards

IUPAC No.	Compound	Cat.No.
CB-170	2,2',3,3',4,4'5-Heptachlorobiphenyl	2267.12-10-IO
CB-180	2,2',3,4,4',5,5'-Heptachlorobiphenyl	2005.12-10-IO

10 µg/mL in isooctane, 1 mL.

Technical Mixtures

Chiron No.	Name
2124.12	Aroclor 1016
2125.12	Aroclor 1221
2661.12	Aroclor 1232
2126.12	Aroclor 1242
2127.12	Aroclor 1248
2128.12	Aroclor 1254
2129.12	Aroclor 1260

Available in concentrations 10-1000 µg/mL in isooctane 1mL.

International Standard Methods for PCB Analysis:

ISO 17858-2004	Water quality - Dioxin-like PCBs by GC-MS
ISO 10382-2002	Soil quality - Organochlorine pesticides and PCBs by GC-ECD
ISO 6468-1996	Water quality - Organochlorine insecticides and PCBs by GC methods
EPA 505-1995	Organohalide pesticides and PCBs in water by GC
EPA 608-1984	Organochlorine pesticides and PCBs by GC and GC-MS (cf methods 625) in municipal discharges.
EPA 8082-1996	PCBs from solid and aqueous matrices by GC-ECD or GC-ELCD.
EPA 1668A-1999	PCB congeners in water, soil, sediments and tissue by HRGC/HRMS
EPA 8270C-1996	Semivolatile compounds from solid waste, soil, air, and water by GC-MS

**Native PCBs, Complete list of most relevant PCB congeners:**

IUPAC No.	Compound	Cat. No.	Cat. No. neat
CB-14	3,5-Dichlorobiphenyl	3731.12-100-IO	
CB-15	4,4'-Dichlorobiphenyl	3732.12-100-IO	
CB-18	2,2',5-Trichlorobiphenyl	2263.12-100-IO	
CB-22	2,3,4'-Trichlorobiphenyl	3734.12-100-IO	
CB-28	2,4,4'-Trichlorobiphenyl	1999.12-100-IO	1999.12-10MG
CB-30	2,4,6-Trichlorobiphenyl	3619.12-100-IO	
CB-31	2,4',5-Trichlorobiphenyl	2264.12-100-IO	
CB-37	3,4,4'-Trichlorobiphenyl	3735.12-100-IO	
CB-39	3,4',5-Trichlorobiphenyl	3736.12-100-IO	
CB-42	2,2',3,4'-Tetrachlorobiphenyl	3737.12-100-IO	
CB-44	2,2',3,5'-Tetrachlorobiphenyl	2265.12-100-IO	
CB-47	2,2',4,4'-Tetrachlorobiphenyl	3738.12-100-IO	
CB-52	2,2',5,5'-Tetrachlorobiphenyl	2000.12-100-IO	2000.12-25MG
CB-54	2,2',6,6'-Tetrachlorobiphenyl	8701.12-100-IO	8701.12-10MG
CB-65	2,3,5,6-Tetrachlorobiphenyl	3739.12-100-ME	
CB-67	2,3',4,5-Tetrachlorobiphenyl	3740.12-100-IO	
CB-74	2,4,4',5-Tetrachlorobiphenyl	2904.12-100-IO	2904.12-10MG
CB-77	3,3',4,4'-Tetrachlorobiphenyl	2006.12-100-IO	2006.12-25MG
CB-81	3,4,4',5-Tetrachlorobiphenyl	2007.12-100-IO	2007.12-5MG
CB-95	2,2',3,5',6-Pentachlorobiphenyl	2906.12-100-IO	2906.12-10MG
CB-99	2,2',4,4',5-Pentachlorobiphenyl	8702.12-100-IO	8702.12-5MG
CB-100	2,2',4,4',6-Pentachlorobiphenyl	8703.12-100-IO	8703.12-5MG
CB-101	2,2',4,5,5'-Pentachlorobiphenyl	2001.12-100-IO	2001.12-10MG
CB-105	2,3,3',4,4'-Pentachlorobiphenyl	2008.12-100-IO	2008.12-5MG
CB-110	2,3,3',4',6-Pentachlorobiphenyl	8704.12-100-IO	8704.12-5MG
CB-111	2,3,3',5,5'-Pentachlorobiphenyl	2720.12-100-IO	
CB-112	2,3,3',5,6-Pentachlorobiphenyl	8356.12-100-IO	8356.12-5MG
CB-114	2,3,4,4',5-Pentachlorobiphenyl	2009.12-100-IO	2009.12-5MG
CB-117	2,3,4',5,6-Pentachlorobiphenyl	3741.12-100-IO	
CB-118	2,3',4,4',5-Pentachlorobiphenyl	2002.12-100-IO	2002.12-10MG
CB-123	2',3,4,4',5-Pentachlorobiphenyl	2011.12-100-IO	2011.12-5MG
CB-126	3,3',4,4',5-Pentachlorobiphenyl	2012.12-100-IO	2012.12-5MG
CB-137	2,2',3,4,4',5-Hexachlorobiphenyl	2895.12-100-IO	2895.12-10MG
CB-138	2,2',3,4,4',5'-Hexachlorobiphenyl	2003.12-100-IO	2003.12-10MG
CB-143	2,2',3,4,5,6'-Hexachlorobiphenyl	3252.12-100-IO	
CB-149	2,2',3,4',5',6-Hexachlorobiphenyl	2266.12-100-IO	
CB-153	2,2',4,4',5,5'-Hexachlorobiphenyl	2004.12-100-IO	2004.12-10MG
CB-155	2,2',4,4',6,6'-Hexachlorobiphenyl	3308.12-100-IO	
CB-156	2,3,3',4,4',5-Hexachlorobiphenyl	2013.12-100-IO	2013.12-5MG
CB-157	2,3,3',4,4',5'-Hexachlorobiphenyl	2014.12-100-IO	2014.12-5MG
CB-163	2,3,3',4',5,6-Hexachlorobiphenyl	8711.12-100-IO	8711.12-5MG
CB-166	2,3,4,4',5,6-Hexachlorobiphenyl	3742.12-100-IO	
CB-167	2,3',4,4',5,5'-Hexachlorobiphenyl	2015.12-100-IO	2015.12-5MG
CB-169	3,3',4,4',5,5'-Hexachlorobiphenyl	2220.12-100-IO	2220.12-5MG
CB-170	2,2',3,3',4,4',5-Heptachlorobiphenyl	2267.12-100-IO	
CB-177	2,2',3,3',4',5,6-Heptachlorobiphenyl	8705.12-100-IO	8705.12-5MG
CB-180	2,2',3,4,4',5,5'-Heptachlorobiphenyl	2005.12-100-IO	2005.12-10MG
CB-183	2,2',3,4,4',5',6-Heptachlorobiphenyl	8706.12-100-IO	8706.12-5MG
CB-187	2,2',3,4',5,5',6-Heptachlorobiphenyl	8707.12-100-IO	8707.12-5MG
CB-189	2,3,3',4,4',5,5'-Heptachlorobiphenyl	2016.12-100-IO	2016.12.5MG
CB-190	2,3,3',4,4',5,6-Heptachlorobiphenyl	3743.12-100-IO	
CB-194	2,2',3,3',4,4',5,5'-Octachlorobiphenyl	2268.12-100-IO	
CB-196	2,2',3,3',4,4',5',6-Octachlorobiphenyl	8712.12-100-IO	8712.12-5MG
CB-199	2,2',3,3',4,5,6,6-Octachlorobiphenyl	8713.12-100-IO	8713.12-5MG
CB-204	2,2',3,4,4',5,6,6'-Octachlorobiphenyl	2477.12-100-IO	
CB-207	2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl	3604.12-100-IO	
CB-209	Decachlorobiphenyl	8708.12-100-CY	8708.12-10MG

Solutions of single reference substances, solutions 10 or 100 µg/mL, 1 mL or as neat

**Internal Standards (IS) F-PCBs ®: Complete list**

IUPAC No	Compound	Cat No.
2-F-CB-0	2-Fluorobiphenyl	1601.12-100MG
4-F-CB-0	4-Fluorobiphenyl	1712.12-100MG
4,4'-FF-CB-0	4,4'-Difluorobiphenyl	8238.12-100MG
4-F-CB-3	4-Chloro-4'-fluorobiphenyl	2654.12-100-IO
3'-F-CB-14	3'-Fluoro-3,5-dichlorobiphenyl	2745.12-100-IO
3-F-CB-15	3-Fluoro-4,4'-dichlorobiphenyl	2655.12-100-IO
3,3'-FF-CB-15	3,3'-Difluoro-4,4'-dichlorobiphenyl	8360.12-10-IO
3-F-CB-18	3-Fluoro-2,2',5-trichlorobiphenyl	2656.12-100-IO
3'-F-CB-22	3'-Fluoro-2,3,4'-trichlorobiphenyl	2657.12-100-IO
3'-F-CB-28	3'-Fluoro-2,4,4'-trichlorobiphenyl	2228.12-100-IO
3'-F-CB-29	3'-Fluoro-2,4,5-trichlorobiphenyl	2223.12-100-IO
2'-F-CB-30	2'-Fluoro-2,4,6-trichlorobiphenyl	2224.12-100-IO
3'-F-CB-30	3'-Fluoro-2,4,6-trichlorobiphenyl	2225.12-100-IO
4'-F-CB-30	4'-Fluoro-2,4,6-trichlorobiphenyl	2229.12-100-IO
3'-F-CB -37	3'-Fluoro-3,4,4'-trichlorobiphenyl	2658.12-100-IO
3'-F-CB-39	3'-Fluoro-3,4',5-trichlorobiphenyl	2666.12-100-IO
3-F-CB-47	3-Fluoro-2,2',4,4'-tetrachlorobiphenyl	2177.12-100-IO
3-F-CB-52	3-Fluoro-2,2',5,5'-tetrachlorobiphenyl	2660.12-100-IO
3'-F-CB-65	3'-Fluoro-2,3,5,6-tetrachlorobiphenyl	2869.12-100-IO
4'-F-CB-67	4'-Fluoro-2,3',4,5-tetrachlorobiphenyl	2222.12-100-IO
3'-F-CB-74	3'-Fluoro-2,4,4',5-tetrachlorobiphenyl	3800.12-100-IO
5-F-CB-77	5-Fluoro-3,3',4,4'-tetrachlorobiphenyl	2863.12-10-IO
5,5'-FF-CB-77	5,5'-Difluoro-3,3',4,4'-tetrachlorobiphenyl	8358.12-10-IO
3'-F-CB-81	3'-Fluoro-3,4,4',5-tetrachlorobiphenyl	2344.12-10-IO
3'-F-CB-101	3'-Fluoro-2,2',4,5,5'-pentachlorobiphenyl	8353.12-10-IO
5'-F-CB-105	5'-Fluoro-2,3,3',4,4'-pentachlorobiphenyl	2864.12-10-IO
3'-F-CB-114	3'-Fluoro-2,3,4,4',5-pentachlorobiphenyl	2870.12-10-IO
3'-F-CB-116	3'-Fluoro-2,3,4,5,6-pentachlorobiphenyl	3801.12-10-IO
3'-F-CB-117	3'-Fluoro-2,3,4',5,6-pentachlorobiphenyl	2868.12-10-IO
5'-F-CB-118	5'-Fluoro-2,3',4,4',5-pentachlorobiphenyl	2865.12-10-IO
5'-F-CB-126	5'-Fluoro-3,3',4,4',5-pentachlorobiphenyl	2866.12-10-IO
5'-F-CB-156	5'-Fluoro-2,3,3',4,4',5-hexachlorobiphenyl	2871.12-10-IO
2'-F-CB-160	2'-Fluoro-2,3,3',4,5,6-hexachlorobiphenyl	3727.12-10-IO
5'-F-CB-160	5'-Fluoro-2,3,3',4,5,6-hexachlorobiphenyl	3728.12-10-IO
4'-F-CB-160	4'-Fluoro-2,3,3',4,5,6-hexachlorobiphenyl	3729.12-10-IO
3'-F-CB-166	3'-Fluoro-2,3,4,4',5,6-hexachlorobiphenyl	2746.12-10-IO
5'-F-CB-190	5'-Fluoro-2,3,3',4,4',5,6-heptachlorobiphenyl	3730.12-10-IO
	Decafluorobiphenyl	1958.12-2K-AN
	Decafluorobiphenyl	1958.12-100MG
	F-PCB Kit (all solutions, neat when given)	3088.38-KIT