

# Polychlorinated Biphenyl Standards (PCBs)

## Introduction

Polychlorinated biphenyls (PCB's) are man made organic chemicals derived from combining between 1 and 10 chlorine atoms with biphenyls, a molecule that is composed of two benzene rings. When all of the possible positions of the chlorine atoms on the benzene rings are taken into account, a total of 209 configurations are possible and these are called congeners.

Of these 209 congeners about 130 have been used in commercial preparations, since the introduction of the products into the marketplace by a company called Swann Chemical Company, which commenced production in 1929. Synthesis at laboratory scale began in 1881 and from then significant amounts of PCB's were already being released into the environment.

## Applications

The commercial uses of PCB's were based on the products being good insulators, chemically stable and of low flammability. Therefore, they were used for a range of applications that include: coolants and insulating fluids for capacitors and transformers, hydraulic fluids, cutting oils, copying paper, plasticisers in paints and cements, additives in PVC coatings and as pesticide extenders. They also had a myriad of other commercial uses, description of which is beyond the scope of this document.

Often PCB's were sold as commercial mixtures under trade names, including Arochlor's, which is a brand name of Monsanto. Such Arochlor's had a four digit numbering system, with the first two digits referring to the number of carbons in the two benzene rings (12 in the case of PCB's) and the second two digits referred to the percentage of chlorine by mass in the mixture, although there are exceptions to this nomenclature. Arochlor's varied in terms of what they were used for, depending on availability and suitability for particular applications.

## Presence in the Environment

PCB's are highly resistant to oxidation or reduction processes, which makes them stable and persistent pollutants (POPs). They are unstable in water, which makes them more stable in the environment chemically and either intentional or natural destruction may lead to the generation and release of extremely toxic materials such as Dibenzodioxins and Dibenzofurans through partial oxidation.

Many rivers, lakes, buildings and other sites are contaminated by PCB's and they have been found also in soil and air. Because of their lipophilic properties, they are to be found in foodstuffs and at various points of the food chain.

## Health Effects

PCB's are readily absorbed through skin, but can also be absorbed through polyvinyl chloride (PVC) or latex rubber. However, most human absorption is through the alimentary or respiratory routes and once ingested they may change in chemical structure. One of the physical properties of PCB's includes lipophilicity which causes bioaccumulation in both adipose tissue and in liver tissue.

Persons exposed to very high levels may experience skin lesions, liver damage, ocular lesions, lowered immunity and irregular menstrual cycles by interference with estradiol. Generalised symptoms can include headaches, fatigue and cough. More severe symptomatic outcomes may include cancers, sexual, skeletal, and mental under-development in both sexes. In fact, evidence of reduced levels of certain thyroid hormones could have an adverse effect on every physiological process within the body.

## Analytical Methods

Generally the analytical method of choice for PCB's is Gas Chromatography using very specific columns and detectors. Reagecon can now offer over 80 of the most commercially sought after PCB standards ready to use in either isooctane or cyclohexane or as neat materials. We can also offer a wide range of PCB mixtures and offer several Aroclor's in various matrices.

## PCB Single Element Congeners

Product No.	Description	Concentration in Matrix	Pack Size
REPCB1001	4-Chlorobiphenyl (PCB-3)	100µg/mL in Isooctane	1ml
REPCB1001N	4-Chlorobiphenyl (PCB-3)	Neat	5mg
REPCB1002	2,4-Dichlorobiphenyl (PCB-7)	100µg/mL in Isooctane	1ml
REPCB1002N	2,4-Dichlorobiphenyl (PCB-7)	Neat	5mg
REPCB1003	2,4'-Dichlorobiphenyl (PCB-8)	100µg/mL in Isooctane	1ml
REPCB1003N	2,4'-Dichlorobiphenyl (PCB-8)	Neat	5mg
REPCB1004	2,6-Dichlorobiphenyl (PCB-10)	100µg/mL in Isooctane	1ml
REPCB1004N	2,6-Dichlorobiphenyl (PCB-10)	Neat	5mg
REPCB1005	3,5-Dichlorobiphenyl (PCB-14)	100µg/mL in Isooctane	1ml
REPCB1005N	3,5-Dichlorobiphenyl (PCB-14)	Neat	5mg
REPCB1006	4,4'-Dichlorobiphenyl (PCB-15)	100µg/mL in Isooctane	1ml
REPCB1006N	4,4'-Dichlorobiphenyl (PCB-15)	Neat	5mg
REPCB1007	2,2',5-Trichlorobiphenyl (PCB-18)	100µg/mL in Isooctane	1ml
REPCB1007N	2,2',5-Trichlorobiphenyl (PCB-18)	Neat	5mg
REPCB1008	2,3,3'-Trichlorobiphenyl (PCB-20)	100µg/mL in Isooctane	1ml
REPCB1008N	2,3,3'-Trichlorobiphenyl (PCB-20)	Neat	5mg
REPCB1009	2,3,4'-Trichlorobiphenyl (PCB-22)	100µg/mL in isooctane	1ml
REPCB1009N	2,3,4'-Trichlorobiphenyl (PCB-22)	Neat	5mg
REPET195	2,4,4'-Trichlorobiphenyl (PCB-28)	100µg/mL in Isooctane	1ml
REPET195N	2,4,4'-Trichlorobiphenyl (PCB-28)	Neat	5mg
REPCB1011	2,4,5-Trichlorobiphenyl (PCB-29)	100µg/mL in Isooctane	1ml
REPCB1011N	2,4,5-Trichlorobiphenyl (PCB-29)	Neat	5mg
REPCB1012	2,4,6-Trichlorobiphenyl (PCB-30)	100µg/mL in Isooctane	1ml
REPCB1012N	2,4,6-Trichlorobiphenyl (PCB-30)	Neat	5mg
REPCB1013	2,4',5-Trichlorobiphenyl (PCB-31)	100µg/mL in Isooctane	1ml
REPCB1013N	2,4',5-Trichlorobiphenyl (PCB-31)	Neat	5mg
REPCB1014	2',3,5-Trichlorobiphenyl (PCB-34)	100µg/mL in Isooctane	1ml
REPCB1014N	2',3,5-Trichlorobiphenyl (PCB-34)	Neat	5mg
REPCB1015	3,3',4-Trichlorobiphenyl (PCB-35)	100µg/mL in Isooctane	1ml
REPCB1015N	3,3',4-Trichlorobiphenyl (PCB-35)	Neat	5mg
REPCB1016	3,4,4'-Trichlorobiphenyl (PCB-37)	100µg/mL in isooctane	1ml
REPCB1016N	3,4,4'-Trichlorobiphenyl (PCB-37)	Neat	5mg
REPCB1017	3,4',5-Trichlorobiphenyl (PCB-39)	100µg/mL in isooctane	1ml
REPCB1017N	3,4',5-Trichlorobiphenyl (PCB-39)	Neat	5mg
REPCB1018	2,2',3,4'-Tetrachlorobiphenyl (PCB-42)	100µg/mL in isooctane	1ml

Product No.	Description	Concentration in Matrix	Pack Size
REPCB1018N	2,2',3,4'-Tetrachlorobiphenyl (PCB-42)	Neat	5mg
REPCB1019	2,2',3,5'-Tetrachlorobiphenyl (PCB-44)	100µg/mL in Isooctane	1ml
REPCB1019N	2,2',3,5'-Tetrachlorobiphenyl (PCB-44)	Neat	5mg
REPCB1020	2,2',4,4'-Tetrachlorobiphenyl (PCB-47)	100µg/mL in isooctane	1ml
REPCB1020N	2,2',4,4'-Tetrachlorobiphenyl (PCB-47)	Neat	5mg
REPCB1021	2,2',4,5'-Tetrachlorobiphenyl (PCB-49)	100µg/mL in isooctane	1ml
REPCB1021N	2,2',4,5'-Tetrachlorobiphenyl (PCB-49)	Neat	5mg
REPET196	2,2',5,5'-Tetrachlorobiphenyl (PCB-52)	100µg/mL in Isooctane	1ml
REPET196N	2,2',5,5'-Tetrachlorobiphenyl (PCB-52)	Neat	5mg
REPCB1023	2,2',5,6'-Tetrachlorobiphenyl (PCB-53)	100µg/mL in Isooctane	1ml
REPCB1023N	2,2',5,6'-Tetrachlorobiphenyl (PCB-53)	Neat	5mg
REPCB1024	2,2',6,6'-Tetrachlorobiphenyl (PCB-54)	100µg/mL in Isooctane	1ml
REPCB1024N	2,2',6,6'-Tetrachlorobiphenyl (PCB-54)	Neat	5mg
REPCB1025	2,3,3',4'-Tetrahalorobiphenyl (PCB-55)	100µg/mL in Isooctane	1ml
REPCB1025N	2,3,3',4'-Tetrahalorobiphenyl (PCB-55)	Neat	5mg
REPCB1026	2,3,5,6-Tetrachlorobiphenyl (PCB-65)	100µg/mL in methanol	1ml
REPCB1026N	2,3,5,6-Tetrachlorobiphenyl (PCB-65)	Neat	5mg
REPCB1027	2,3',4,4'-Tetrachlorobiphenyl (PCB-66)	100µg/mL in isooctane	1ml
REPCB1027N	2,3',4,4'-Tetrachlorobiphenyl (PCB-66)	Neat	5mg
REPCB1028	2,3',4,5-Tetrachlorobiphenyl (PCB-67)	100µg/mL in isooctane	1ml
REPCB1028N	2,3',4,5-Tetrachlorobiphenyl (PCB-67)	Neat	5mg
REPCB1029	2,4,4',5-Tetrachlorobiphenyl (PCB-74)	100µg/mL in Isooctane	1ml
REPCB1029N	2,4,4',5-Tetrachlorobiphenyl (PCB-74)	Neat	5mg
REPCB1030	3,3',4,4'-Tetrachlorobiphenyl (PCB-77)	100µg/mL in Isooctane	1ml
REPCB1030N	3,3',4,4'-Tetrachlorobiphenyl (PCB-77)	Neat	5mg
REPCB1031	3,3',4,5-Tetrachlorobiphenyl (PCB-78)	100µg/mL in Isooctane	1ml
REPCB1031N	3,3',4,5-Tetrachlorobiphenyl (PCB-78)	Neat	5mg
REPCB1032	3,4,4',5-Tetrachlorobiphenyl (PCB-81)	100µg/mL in Isooctane	1ml
REPCB1032N	3,4,4',5-Tetrachlorobiphenyl (PCB-81)	Neat	5mg
REPCB1033	2,2',3,5,6-Pentachlorobiphenyl (PCB-95)	100µg/mL in Isooctane	1ml
REPCB1033N	2,2',3,5,6-Pentachlorobiphenyl (PCB-95)	Neat	5mg
REPCB1034	2,2',4,4',5-Pentachlorobiphenyl (PCB-99)	100µg/mL in Isooctane	1ml
REPCB1034N	2,2',4,4',5-Pentachlorobiphenyl (PCB-99)	Neat	5mg
REPCB1035	2,2',4,4',6-Pentachlorobiphenyl (PCB-100)	100µg/mL in Isooctane	1ml
REPCB1035N	2,2',4,4',6-Pentachlorobiphenyl (PCB-100)	Neat	5mg
REPET197	2,2',4,5,5'-Pentachlorobiphenyl (PCB-101)	100µg/mL in Isooctane	1ml

## PCB Single Element Congeners

Product No.	Description	Concentration in Matrix	Pack Size
REPET197N	2,2',4,5,5'-Pentachlorobiphenyl (PCB-101)	Neat	5mg
REPCB1037	2,2',4,6,6'-Pentachlorobiphenyl (PCB-104)	100µg/mL in Isooctane	1ml
REPCB1037N	2,2',4,6,6'-Pentachlorobiphenyl (PCB-104)	Neat	5mg
REPCB1038	2,3,3',4,4'-Pentachlorobiphenyl (PCB-105)	100µg/mL in Isooctane	1ml
REPCB1038N	2,3,3',4,4'-Pentachlorobiphenyl (PCB-105)	Neat	5mg
REPCB1039	2,3,3',5,5'-Pentachlorobiphenyl (PCB-111)	100µg/mL in isooctane	1ml
REPCB1039N	2,3,3',5,5'-Pentachlorobiphenyl (PCB-111)	Neat	5mg
REPCB1040	2,3,3',5,6-Pentachlorobiphenyl (PCB-112)	100µg/mL in isooctane	1ml
REPCB1040N	2,3,3',5,6-Pentachlorobiphenyl (PCB-112)	Neat	5mg
REPCB1041	2,3,4,4',5-Pentachlorobiphenyl (PCB-114)	100µg/mL in Isooctane	1ml
REPCB1041N	2,3,4,4',5-Pentachlorobiphenyl (PCB-114)	Neat	5mg
REPCB1042	2,3,4',5,6-Pentachlorobiphenyl (PCB-117)	100µg/mL in Isooctane	1ml
REPCB1042N	2,3,4',5,6-Pentachlorobiphenyl (PCB-117)	Neat	5mg
REPCB1043	2,3',4,4',5-Pentachlorobiphenyl (PCB-118)	100µg/mL in Isooctane	1ml
REPCB1043N	2,3',4,4',5-Pentachlorobiphenyl (PCB-118)	Neat	5mg
REPCB1044	2,3',4,4',6-Pentachlorobiphenyl (PCB-119)	100µg/mL in Isooctane	1ml
REPCB1044N	2,3',4,4',6-Pentachlorobiphenyl (PCB-119)	Neat	5mg
REPCB1045	2',3,4,4',5-Pentachlorobiphenyl (PCB-123)	100µg/mL in Isooctane	1ml
REPCB1045N	2',3,4,4',5-Pentachlorobiphenyl (PCB-123)	Neat	5mg
REPCB1046	2,3',4',5',6-Pentachlorobiphenyl (PCB-125)	100µg/mL in isooctane	1ml
REPCB1046N	2,3',4',5',6-Pentachlorobiphenyl (PCB-125)	Neat	5mg

Product No.	Description	Concentration in Matrix	Pack Size
REPCB1047	3,3',4,4',5-Pentachlorobiphenyl (PCB-126)	100µg/mL in Isooctane	1ml
REPCB1047N	3,3',4,4',5-Pentachlorobiphenyl (PCB-126)	Neat	5mg
REPCB1048	2,2',3,4,4',5-Hexachlorobiphenyl (PCB-137)	100µg/mL in Isooctane	1ml
REPCB1048N	2,2',3,4,4',5-Hexachlorobiphenyl (PCB-137)	Neat	5mg
REPET198	2,2',3,4,4',5'-Hexachlorobiphenyl (PCB-138)	100µg/mL in Isooctane	1ml
REPET198N	2,2',3,4,4',5'-Hexachlorobiphenyl (PCB-138)	Neat	5mg
REPCB1050	2,2',3,4,5,5'-Hexachlorobiphenyl (PCB-141)	100µg/mL in Isooctane	1ml
REPCB1050N	2,2',3,4,5,5'-Hexachlorobiphenyl (PCB-141)	Neat	5mg
REPCB1051	2,2',3,4,5,6'-Hexachlorobiphenyl (PCB-143)	100µg/mL in Isooctane	1ml
REPCB1051N	2,2',3,4,5,6'-Hexachlorobiphenyl (PCB-143)	Neat	5mg
REPCB1052	2,2',3,4,5,6-Hexachlorobiphenyl (PCB-149)	100µg/mL in Isooctane	1ml
REPCB1052N	2,2',3,4,5,6-Hexachlorobiphenyl (PCB-149)	Neat	5mg
REPET199	2,2',4,4',5,5'-Hexachlorobiphenyl (PCB-153)	100µg/mL in Isooctane	1ml
REPET199N	2,2',4,4',5,5'-Hexachlorobiphenyl (PCB-153)	Neat	5mg
REPCB1054	2,2',4,4',6,6'-Hexachlorobiphenyl (PCB-155)	100µg/mL in Isooctane	1ml
REPCB1054N	2,2',4,4',6,6'-Hexachlorobiphenyl (PCB-155)	Neat	5mg
REPCB1055	2,3,3',4,4',5-Hexachlorobiphenyl (PCB-156)	100µg/mL in Isooctane	1ml
REPCB1055N	2,3,3',4,4',5-Hexachlorobiphenyl (PCB-156)	Neat	5mg
REPCB1056	2,3,3',4,4',5'-Hexachlorobiphenyl (PCB-157)	100µg/mL in Isooctane	1ml
REPCB1056N	2,3,3',4,4',5'-Hexachlorobiphenyl (PCB-157)	Neat	5mg
REPCB1057	2,3,3',4,5,6-Hexachlorobiphenyl (PCB-160)	100µg/mL in Isooctane	1ml
REPCB1057N	2,3,3',4,5,6-Hexachlorobiphenyl (PCB-160)	Neat	5mg

Product No.	Description	Concentration in Matrix	Pack Size
REPCB1058	2,3,3',4',5,6-Hexachlorobiphenyl (PCB-163)	100µg/mL in Isooctane	1ml
REPCB1058N	2,3,3',4',5,6-Hexachlorobiphenyl (PCB-163)	Neat	5mg
REPCB1059	2,3,3',5,5',6-Hexachlorobiphenyl (PCB-165)	100µg/mL in Isooctane	1ml
REPCB1059N	2,3,3',5,5',6-Hexachlorobiphenyl (PCB-165)	Neat	5mg
REPCB1060	2,3,4,4',5,6-Hexachlorobiphenyl (PCB-166)	100µg/mL in Isooctane	1ml
REPCB1060N	2,3,4,4',5,6-Hexachlorobiphenyl (PCB-166)	Neat	5mg
REPCB1061	2,3',4,4',5,5'-Hexachlorobiphenyl (PCB-167)	100µg/mL in Isooctane	1ml
REPCB1061N	2,3',4,4',5,5'-Hexachlorobiphenyl (PCB-167)	Neat	5mg
REPCB1062	3,3',4,4',5,5'-Hexachlorobiphenyl (PCB-169)	100µg/mL in Isooctane	1ml
REPCB1062N	3,3',4,4',5,5'-Hexachlorobiphenyl (PCB-169)	Neat	5mg
REPCB1063	2,2',3,3',4,4',5-Heptachlorobiphenyl (PCB-170)	100µg/mL in Isooctane	1ml
REPCB1063N	2,2',3,3',4,4',5-Heptachlorobiphenyl (PCB-170)	Neat	5mg
REPCB1064	2,2',3,3',4',5,6-Heptachlorobiphenyl (PCB-177)	100µg/mL in Isooctane	1ml
REPCB1064N	2,2',3,3',4',5,6-Heptachlorobiphenyl (PCB-177)	Neat	5mg
REPCB1065	2,2',3,3',4',5,6-Heptachlorobiphenyl (PCB-178)	100µg/mL in Isooctane	1ml
REPCB1065N	2,2',3,3',4',5,6-Heptachlorobiphenyl (PCB-178)	Neat	5mg
REPET200	2,2',3,4,4',5,5'-Heptachlorobiphenyl (PCB-180)	100µg/mL in Isooctane	1ml
REPET200N	2,2',3,4,4',5,5'-Heptachlorobiphenyl (PCB-180)	Neat	5mg
REPCB1067	2,2',3,4,4',5',6-Heptachlorobiphenyl (PCB-183)	100µg/mL in Isooctane	1ml
REPCB1067N	2,2',3,4,4',5',6-Heptachlorobiphenyl (PCB-183)	Neat	5mg
REPCB1068	2,2',3,4',5,5',6-Heptachlorobiphenyl (PCB-187)	100µg/mL in Isooctane	1ml
REPCB1068N	2,2',3,4',5,5',6-Heptachlorobiphenyl (PCB-187)	Neat	5mg

Product No.	Description	Concentration in Matrix	Pack Size
REPCB1069	2,3,3',4,4',5,5'-Heptachlorobiphenyl (PCB-189)	100µg/mL in Isooctane	1ml
REPCB1069N	2,3,3',4,4',5,5'-Heptachlorobiphenyl (PCB-189)	Neat	5mg
REPCB1070	2,3,3',4,4',5,6-Heptachlorobiphenyl (PCB-190)	100µg/mL in Isooctane	1ml
REPCB1070N	2,3,3',4,4',5,6-Heptachlorobiphenyl (PCB-190)	Neat	5mg
REPCB1071	2,2',3,3',4,4',5,5'-Octachlorobiphenyl (PCB-194)	100µg/mL in Isooctane	1ml
REPCB1071N	2,2',3,3',4,4',5,5'-Octachlorobiphenyl (PCB-194)	Neat	5mg
REPCB1072	2,2',3,3',4,4',5,6-Octachlorobiphenyl (PCB-196)	100µg/mL in Isooctane	1ml
REPCB1072N	2,2',3,3',4,4',5,6-Octachlorobiphenyl (PCB-196)	Neat	5mg
REPET201	2,2',3,3',4,5,5',6-Octachlorobiphenyl (PCB-198)	100µg/mL in Isooctane	1ml
REPET201N	2,2',3,3',4,5,5',6-Octachlorobiphenyl (PCB-198)	Neat	5mg
REPCB1074	2,2',3,3',4',5,5',6-Octachlorobiphenyl (PCB-199)	100µg/mL in Isooctane	1ml
REPCB1074N	2,2',3,3',4',5,5',6-Octachlorobiphenyl (PCB-199)	Neat	5mg
REPCB1075	2,2',3,4,4',5,6,6'-Octachlorobiphenyl (PCB-204)	100 µg/mL in isooctane	1ml
REPCB1075N	2,2',3,4,4',5,6,6'-Octachlorobiphenyl (PCB-204)	Neat	5mg
REPCB1076	2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl (PCB-207)	100 µg/mL in isooctane	1ml
REPCB1076N	2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl (PCB-207)	Neat	5mg
REPET202	Decachlorobiphenyl (PCB-209)	100µg/mL in cyclohexane	1ml
REPET202N	Decachlorobiphenyl (PCB-209)	Neat	5mg

## Aroclor Standards

Product No.	Description	Concentration in Matrix	US EPA Methods	Pack Size
REA1016-H	Aroclor 1016	1,000ug/ml in high purity Hexane	625,8270C	1ml
REA1016-I	Aroclor 1016	1000ug/ml in high purity Isooctane	625,8270C	1ml
REA1221	Aroclor 1221	200ug/ml in high purity Hexane	625,8270C	1ml
REA1221-H	Aroclor 1221	1,000ug/ml in high purity Hexane	625,8270C	1ml
REA1221-I	Aroclor 1221	1000ug/ml in high purity Isooctane	625,8270C	1ml
REA1232	Aroclor 1232	200ug/ml in high purity Hexane	625,8270C	1ml
REA1232-H	Aroclor 1232	1,000ug/ml in high purity Hexane	625,8270C	1ml
REA1232-I	Aroclor 1232	1000ug/ml in high purity Isooctane	625,8270C	1ml
REA1242	Aroclor 1242	200ug/ml in high purity Hexane	625,8270C	1ml
REA1242-H	Aroclor 1242	1,000ug/ml in high purity Hexane	625,8270C	1ml
REA1242-I	Aroclor 1242	1000ug/ml in high purity Isooctane	625,8270C	1ml
REA1248	Aroclor 1248	200ug/ml in high purity Hexane	625,8270C	1ml
REA1248-H	Aroclor 1248	1,000ug/ml in high purity Hexane	625,8270C	1ml
REA1248-I	Aroclor 1248	1000ug/ml in high purity Isooctane	625,8270C	1ml
REA1254	Aroclor 1254	200ug/ml in high purity Hexane	625,8270C	1ml
REA1254-H	Aroclor 1254	1,000ug/ml in high purity Hexane	625,8270C	1ml
REA1254-I	Aroclor 1254	1000ug/ml in high purity Isooctane	625,8270C	1ml
REA1260	Aroclor 1260	200ug/ml in high purity Hexane	625,8270C	1ml
REA1260-H	Aroclor 1260	1,000ug/ml in high purity Hexane	625,8270C	1ml
REA1260-I	Aroclor 1260	1000ug/ml in high purity Isooctane	625,8270C	1ml
REA1262	Aroclor 1262	200ug/ml in high purity Hexane	625,8270C	1ml
REA1262-H	Aroclor 1262	1,000ug/ml in high purity Hexane	625,8270C	1ml
REA1262-I	Aroclor 1262	1000ug/ml in high purity Isooctane	625,8270C	1ml
REA1268	Aroclor 1268	200ug/ml in high purity Hexane	625,8270C	1ml
REA1268-H	Aroclor 1268	1000ug/ml in high purity Hexane	625,8270C	1ml
REA1268-I	Aroclor 1268	1000ug/ml in high purity Isooctane	625,8270C	1ml