



CIL

Cambridge Isotope Laboratories, Inc
www.isotope.com

ENVIRONMENTAL STANDARDS

High Purity PCB Standards

- >98% Chemical Purity
- <0.1% Native Content
- <0.05% Non-ortho DL PCB Impurities
- <0.05% PCDD/F Impurities
- Calculated Uncertainties conforming to Eurachem/ CITAC Guidelines

For more than 20 years CIL has been a pioneer in developing high quality PCB standards, introducing the first ¹³C-labeled PCBs used in the earliest IDMS methods, and more recently developing the first PCB standards formulated under the "Certified Standards" protocol.

CIL is once again responding to the needs of the analytical community by providing **High Purity PCB standards**. As new instrumentation and methodologies drive detection limits lower, the presence of even very low levels of impurities in the labeled standards by other PCB congeners or polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/F), become a hindrance to the laboratories minimum detection capabilities.

CIL has developed aggressive cleanup procedures, and adopted much tighter quality control specifications for the eight mono-ortho substituted "dioxin-like" PCBs (DL-PCBs). These new specifications include extremely low allowances for ¹³C-non-ortho DL-PCBs, native content, other PCB congeners and PCDD/Fs.

QC Specifications for High Purity PCBs

Chemical Identity: Unambiguous identity by GC/MS, ¹H-NMR, ¹³C-NMR, and MP determination

Isotopic Enrichment: 99% by GC/MS

Chemical Purity: >98% by GC/MS, GC/ECD, and ¹H-NMR

- *Native Content:* <0.1% by GC/MS SI
- *¹³C-non-ortho DL-PCBs:* <0.05% by GC/ECD vs. cal-curve, or HRGC/MS
- *17 (2,3,7,8) Containing PCDD/Fs:* <0.05% for each compound by HRGC/MS

Concentration: 40±2 ug/mL by comparison assay vs. native "Certified Standard"

Uncertainty: Conforming to Eurachem/CITAC Guide "Quantifying Uncertainty in Analytical Measurement"

High Purity PCBs Standards

Cat #	Description	Concentration	Size
EC-1420	2,3,3',4,4'-PentaCB (PCB-105) (¹³C₁₂, 99%)	40+/-2 µg/mL in Nonane	1.2 or 3 mL
EC-4902	2,3,4,4',5-PentaCB (PCB-114) (¹³C₁₂, 99%)	40+/-2 µg/mL in Nonane	1.2 or 3 mL
EC-1435	2,3',4,4',5-PentaCB (PCB-118) (¹³C₁₂, 99%)	40+/-2 µg/mL in Nonane	1.2 or 3 mL
EC-4904	2',3,4,4',5-PentaCB (PCB-123) (¹³C₁₂, 99%)	40+/-2 µg/mL in Nonane	1.2 or 3 mL
EC-1422	2,3,3',4,4',5-HexaCB (PCB-156) (¹³C₁₂, 99%)	40+/-2 ug/mL in Nonane	1.2 or 3 mL
EC-4051	2,3,3',4,4',5'-HexaCB (PCB-157) (¹³C₁₂, 99%)	40+/-2 µg/mL in Nonane	1.2 or 3 mL
EC-4050	2,3',4,4',5,5'-HexaCB (PCB-167) (¹³C₁₂, 99%)	40+/-2 µg/mL in Nonane	1.2 or 3 mL
EC-1409	2,3,3',4,4',5,5'-HeptaCB (PCB-189) (¹³C₁₂, 99%)	40+/-2 µg/mL in Nonane	1.2 or 3 mL

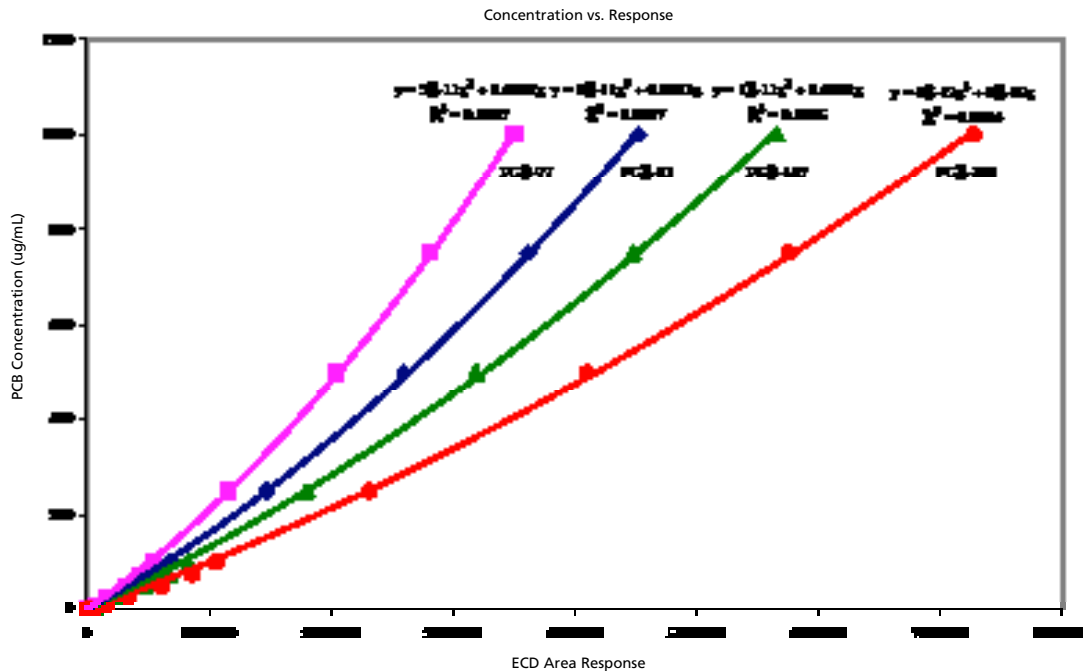
High Purity PCB Mix

Cat #	Description	Concentration	Size
EC-4188	¹³C-Labeled Mono-Ortho PCB Mix (PCBs-105,114,118,123,156,157,167,189)	1 µg/mL in Nonane	3 mL

Analytical Results

Although contaminant PCBs at levels below 0.05% are frequently below the detection limit for many GC/MS systems, GC with Electron Capture Detection is exquisitely sensitive to chlorinated compounds of this type. However at these low levels, the GC/ECD response becomes non-linear, requiring a carefully prepared calibration series against

which to determine the actual concentration of contaminant PCBs. Each of the mono-ortho PCBs was co-injected against the calibration series of coplanar PCBs to demonstrate that they met the exacting standard described above.



Relative Coplanar PCB Amounts (Calculated vs. Calibration Curve)

	3,4,4',5-Tetrachlorobiphenyl PCB-81	3,3',4,4'-Tetrachlorobiphenyl PCB-77	3,3',4,4',5-Pentachlorobiphenyl PCB-126	3,3',4,4',5,5'-Hexachlorobiphenyl PCB-169
EC-1420-HP-0 2,3,3',4,4 -Pentachlorobiphenyl (PCB-105) ($^{13}\text{C}_{12}$, 99%)	0.0042%	0.0679%	0.0180%	0.0034%
EC-4902-HP-0 2,3,4,4',5-Pentachlorobiphenyl (PCB-114) ($^{13}\text{C}_{12}$, 99%)	0.0165%	0.0056%	0.0036%	0.0023%
EC-1435-HP-0 2,3,4,4',5-Pentachlorobiphenyl (PCB-118) ($^{13}\text{C}_{12}$, 99%)	0.0006%	0.0349%	0.0404%	0.0019%
EC-4904-HP-0 2,3,4,4',5-Pentachlorobiphenyl (PCB-123) ($^{13}\text{C}_{12}$, 99%)	0.0174%	0.0024%	0.0078%	0.0014%
EC-1442-HP-0 2,3,3,4,4',5-Hexachlorobiphenyl (PCB-156) ($^{13}\text{C}_{12}$, 99%)	0.0020%	0.0149%	0.0331%	0.0012%
EC-4051-HP-0 2,3,3,4,4',5-Hexachlorobiphenyl (PCB-157) ($^{13}\text{C}_{12}$, 99%)	0.0122%	0.0098%	0.0303%	0.0012%
EC-4050-HP-0 2,3,4,4',5,5'-Hexachlorobiphenyl (PCB-167) ($^{13}\text{C}_{12}$, 99%)	0.0294%	0.0082%	0.0318%	0.0313%
EC-1409-HP-0 2,3,4,4',5,5'-Heptachlorobiphenyl (PCB-189) ($^{13}\text{C}_{12}$, 99%)	0.0012%	0.0072%	0.0167%	0.0257%



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