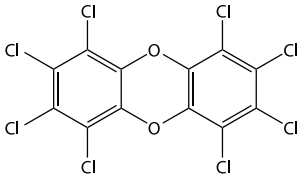
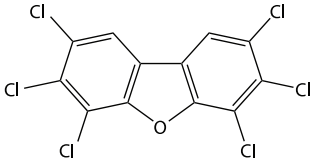
SERVICES SUMMARY TOXIC EQUIVALENCY FACTORS (TEF)

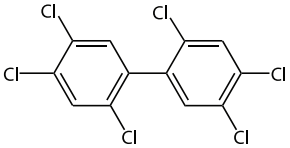
A toxicity equivalence procedure for determination of Polychlorinated Dibenzo-p-Dioxins, Dibenzofurans, and "Dioxin-like" PCB Congeners



Polychlorinated Dibenzo-p-dioxin



Polychlorinated Dibenzofuran



Polychlorinated Biphenyl

Application Overview

For risk assessment purposes, toxicity equivalence factors have been developed to describe the cumulative toxicity of dioxins/furans and "dioxin-like PCBs," when encountered in the environment. The procedure involves assigning individual toxicity equivalency factors (TEF's) to PCDD, PCDF, and select PCB congeners (12 WHO) and report the mixture in terms of their relative toxicity to 2,3,7,8-TCDD. The toxic equivalency (TEQ) is calculated by multiplying the concentrations of individual congeners, by their respective TEF, then summing those individual TEQ's to obtain the Total 2,3,7,8-TCDD equivalent concentration of a mixture.

TEF Schemes

International Toxic Equivalent (ITE) or World Health Organization (WHO) are two sets of generally accepted TEF values, both endorsed and accepted by the USEPA or World Health Organization (WHO); however, certain US States or regulatory agencies may have their own TEF schemes to reference. Pace Analytical will default to using 1989 ITE toxicity equivalence factors for PCDD/PDCF, and 2005 WHO toxicity equivalence factors for "dioxin-like PCBs," on all final deliverables. Specific TEF schemes could be substituted upon request.

	Specific Congener	Compound Name	ITE/89 List	WHO/2005
Dioxins (PCDD)	2378-TCDD	Tetrachlorodibenzo-p-dioxin	1	1
	12378-PeCDD	Pentachlorodibenzo-p-dioxin	0.5	1
	123678-HxCDD	Hexachlorodibenzo-p-dioxin	0.1	0.1
	123478-HxCDD	Hexachlorodibenzo-p-dioxin	0.1	0.1
	123789-HxCDD	Hexachlorodibenzo-p-dioxin	0.1	0.1
	1234678-HpCDD	Heptachlorodibenzo-p-dioxin	0.01	0.01
	12346789-OCDD	Octachlorodibenzo-p-dioxin	0.001	0.0003
Furans (PCDF)	2378-TCDF	Tetrachlorodibenzofuran	0.1	0.1
	12378-PeCDF	Pentachlorodibenzofuran	0.05	0.03
	23478-PeCDF	Pentachlorodibenzofuran	0.5	0.3
	123678-HxCDF	Hexachlorodibenzofuran	0.1	0.1
	123789-HxCDF	Hexachlorodibenzofuran	0.1	0.1
	123478-HxCDF	Hexachlorodibenzofuran	0.1	0.1
	234678-HxCDF	Hexachlorodibenzofuran	0.1	0.1
	1234678-HpCDF	Heptachlorodibenzofuran	0.01	0.01
	1234789-HpCDF	Heptachlorodibenzofuran	0.01	0.01
	12346789-OCDF	Octachlorodibenzofuran	0.001	0.0003

	Specific Congener	Compound Name	ITE/89 List	WHO/2005
PCBs (WHO / "Dioxin-Like")	33'44'-TeCB	Tetrachlorobiphenyl (PCB 77)	0.0005	0.0001
	344'5-TCB	Tetrachlorobiphenyl (PCB 81)	-	0.0003
	233'44'-PeCB	Pentachlorobiphenyl (PCB 105)	0.0001	0.00003
	2344'5-PeCB	Pentachlorobiphenyl (PCB 114)	0.0005	0.00003
	23'44'5-PeCB	Pentachlorobiphenyl (PCB 118)	0.0001	0.00003
	2'344'5-PeCB	Pentachlorobiphenyl (PCB 123)	0.0001	0.00003
	33'44'5-PeCB	Pentachlorobiphenyl (PCB 126)	0.1	0.1
	233'44'5-HxCB	Hexachlorobiphenyl (PCB 156)	0.0005	0.00003
	233'44'5'-HxCB	Hexachlorobiphenyl (PCB 157)	0.0005	0.00003
	23'44'55'-HxCB	Hexachlorobiphenyl (PCB 167)	0.00001	0.00003
	33'44'55'-HxCB	Hexachlorobiphenyl (PCB 169)	0.01	0.03
	22'33'44'5-HpCB	Heptachlorobiphenyl (PCB 170)	0.0001	-
	22'344'55'-HpCB	Heptachlorobiphenyl (PCB 180)	0.00001	-
	233'44'55'-HpCB	Heptachlorobiphenyl (PCB 189)	0.0001	0.00003