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EHT

Judging Dept.

Fu Fang

Student

EHT

>6

Chia-Swee Hong

Dept or Program Years in program

Mentor

Method Development for Comprehensive Analysis of PCBs, chlorinated pesticides, Toxaphenes, PBDEs, PCNs and PCDD/Fs in Seal Blubber Samples Using GC-MSD or GC-ECD by an Isotopic Dilution Technique

Author (s)

Fu Fang

An analytical method is developed for 146 polychlorinated biphenyls (PCBs, including 8 mono-ortho and 4 non-ortho substituted congeners), 28 organic chlorinated pesticides (OCPs), 22 toxaphenes (5 Camphenes and 17 Bornanes), 40 polybrominated diphenyl ethers (PBDEs), 8 polychlorinated naphthalenes (PCNs), 7 polychlorinated dibenzo-p-dioxines (PCDDs) and 10 polychlorinated dibenzofurans (PCDFs) in seal blubbers. The method consists of homogenization/extraction, silica-alumina-carbon-DIOL column or florisil cleanup, and final determination by GC-MSD or GC-ECD. Fourteen $^{13}\text{C}_{12}$ -labeled PCB congeners, nine $^{13}\text{C}_{12}$ -labeled PBDE congeners, nine $^{13}\text{C}_{12}$ -labeled PCN congeners, five $^{13}\text{C}_{12}$ -labeled dioxin congeners and five $^{13}\text{C}_{12}$ -labeled furan congeners were used as surrogate internal standards to evaluate the analytical efficiency. Four PCB congeners (PCB30, 80, 159 and 204), two polybromobiphenyls (3,3',4,4'-tetraBB and 2,2',4,4',6,6'-hexaBB) and $^{13}\text{C}_{12}$ -labeled 1234-TCDD were used as injection standards to monitor GC performance and to calibrate the recoveries of the surrogates. The elution profiles of these targeted compounds on the silica-alumina-carbon-DIOL column were investigated. Method detection limits (MDLs) were determined from standard deviations of 7 spikings with the targeted compounds in Norwegian fish oil. One matrix spike was analyzed per batch (10 real samples) to validate the accuracy of the method. Within-batch variations (precisions) were determined from standard deviations of duplicate analyses of real samples. The method has been successfully applied to analyze chemicals of interest in seal blubbers. This method can effectively eliminate matrix interferences and handle high lipid-content samples. Therefore, with little modification, this method can be used to analyze all these persistent pollutants in most matrixes.