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Congener-specific determination of chlorobiphenyls in biological tissues using an aroclor-based secondary calibration standard

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ABSTRACT

A secondary calibration standard was developed from a mixture of Aroclors 1242, 1248, 1254 and 1260. The composition of this standard (≤130 components) was established by high resolution gas chromatographic retention time and mass spectral data supplemented by coinjection of individual congeners. Hydrogen flame ionization detection (FID) and electron impact mass spectrometry (MS) were used for independent quantitation of the mixture. Total chlorobiphenyl concentrations measured in the Aroclor mixture were in both cases within 7% of the gravimetrically determined concentration. However, discrepancies were found between results obtained with the two methods for individual chromatographic peaks. These discrepancies were largely restricted to minor constituents of the Aroclor mixture. Variations for major peaks are attributable to deviations of individual congener response factors from those representative of the corresponding isomer group.

The secondary calibration standard was used to determine chlorobiphenyl concentrations in tissues of two marine organisms by high resolution gas chromatography with electron capture detection. Estimated limits of detection and quantitation for total chlorobiphenyls were 2.1 and 2.9 ng/wet g, respectively. The precision (RSD) of the method for total chlorobiphenyls in soft-shelled clam *(Mya arenaria)* and lobster *(Homarus americanus)* was estimated at 4.5% and *11.4%,* respectively. Quantitation of individual Aroclors yielded average concentrations ranging from 86 to 91 % of the gravimetrically determined amounts. Advantages and limitations of the secondary calibration standard approach are discussed in light of recent advances in the analytical chemistry of chlorobiphenyls.