



HUMAN BIOMONITORING OF ORGANOCHLORINE PESTICIDES AND POLYCHLORINATED BIPHENYLS IN BREAST MILK: OPTIMIZATION OF ANALYTICAL PROCEDURES AND TRACE-LEVEL DETERMINATION

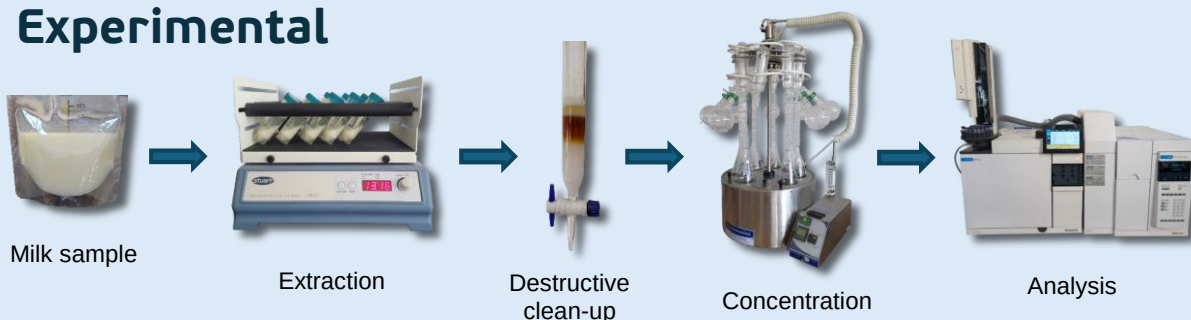
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Introduction & Aim

Human biomonitoring provides an important tool for evaluating internal exposure to persistent organic pollutants (POPs). Organochlorine pesticides (OCPs) and polychlorinated biphenyls (PCBs) are persistent, bioaccumulative contaminants that may be transferred through breastfeeding. This study focused on the optimization of an analytical procedure for their determination in breast milk and its application to samples from breastfeeding mothers in North Macedonia.

Experimental



The determination of OCPs and PCBs was performed using gas chromatography coupled with an electron capture detector (GC-ECD).

- For chromatographic separation - HP-5 column (30 m × 0.25 mm × 0.25 μm)
- Mobile phase - Nitrogen (N₂), with a gas flow rate of 0.5 mL/min.
- Injection volume - 2 μL with a splitless, pulsed injection mode (injector temperature - 210 °C).
- Temperature - programmed
- Detector temperature - 350 °C

Conclusions

The preliminary findings demonstrate the presence of multiple OCPs and PCBs in breast milk samples from North Macedonia. The results will be quantitatively evaluated, and further statistical analysis will assess correlation between POPs concentrations and demographic, dietary, lifestyle, and potential exposure-related factors.

Results and discussion

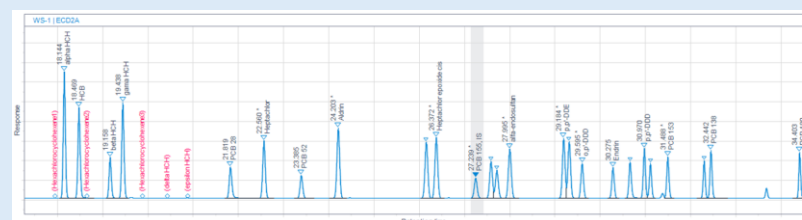
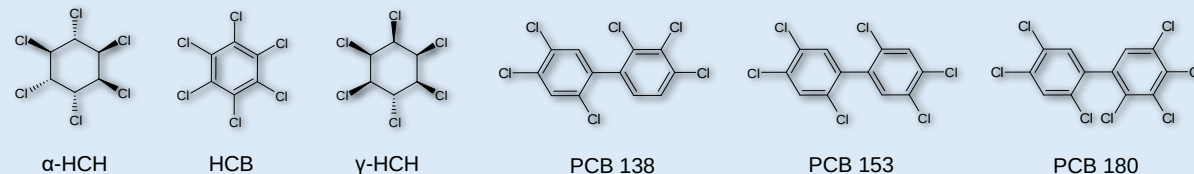


Fig. 1 Chromatogram of the working standard solution (WS), showing the order and retention times (t_R) of the peaks of the different analytes and the internal standard (IS PCB-155).



Accuracy

Recovery/% = 54.9 -121.0
for most of the analytes

Instrumental precision

RSD/% = 0.39 – 9.51
for most of the analytes

Linearity in matrix

R² = 0.9960 – 0.9977

The concentrations of OCPs and PCBs were determined in 30 human milk samples. The preliminary results indicated considerable variation in the occurrence and concentrations of individual POPs among the analyzed samples. Several compounds, including α-HCH, HCB and γ-HCH, were detected in all analyzed samples, while PCB 138, PCB 153 and PCB 180 were also detected in a high proportion of samples. Other target compounds were detected less frequently or were not detected in the analyzed samples.