Master's Degree

Applied Chromatographic Techniques

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Development of a multiresidue methods for pesticides, pharmaceuticals and organophosphorus flame retardantsin biological samples

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Nowadays many habitats are strongly affected by anthropogenic pressures which can affect the wellbeing of many species. Pharmaceuticals, pesticides and organophosphorus flame retardants (OPFRs) are compounds that are used in large quantities and released to the environment and pose wildlife at risk, especially the most persistent and bioaccumulative compounds.

Pharmaceuticals are introduced to environment via wastewater effluents, urban and industrial discharges and run-off from agriculture and livestock areas and despite some of them are rapidly degraded, its continuous discharge to environment, has recently attained increasing attention.

The determination of organophosphorus pesticides is of concern since their extensive use in the elimination of pests or use as insecticide in different types of cultivation has led to their widespread presence, especially in agricultural areas. They enter the environment via run-off from agriculture and livestock areas. These compounds can persist in the environment for several days, but some can undergo biotic and abiotic degradation.

OPFRs are defined as chemicals that are incorporated into different materials as plasticizers and as flame retardants to inhibit or slow down the growth of fire. They are harmful to public health and the environment because of their toxicity and are considered emerging pollutants. Their concentration will depend on their production/use/discharge, their persistence, and their partitioning properties. They also enter the environment via wastewater effluents.

Pharmaceuticals, pesticides, and organophosphorus flame retardants are compound continually discharged to the receiving waters that have become a threat to the environment and wildlife. The objective of the present study was to optimize the extraction and analytical conditions to determine 37 contaminants in avian blood. The extraction conditions were optimized by testing the extraction solvents (methanol and acetonitrile) and the clean-up procedure. Analysis was performed by liquid chromatography coupled to tandem mass spectrometry (LC-MS/MS) with an electrospray ionisation (ESI) working in positive and negative mode (ESI+ and ESI-). The mobile phase, the chromatographic gradient using a BEH C18 column (2.1 × 100 mm, 1.7 μm) and the injection conditions were optimized.