OPTIMIZATION OF ANALYTICAL METHODS FOR THE DETERMINATION OF TRACE CONCENTRATIONS OF TOXIC POLLUTANTS IN DRINKING AND SURFACE WATERS

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EXTENDED ABSTRACT

Pollutants posing health risks to human health and to the aquatic environment often occur in drinking and surface waters, as a result of disinfection practices, agricultural and industrial activities, wastewater discharges. Toxic pollutants belong to different chemical categories:
- chlorination by-products
- volatile and semivolatile organic compounds
- insecticides (organochlorine and organophosphorous)
- herbicides (triazines and substituted ureas)
- metals and organotin compounds

Therefore, different analytical methods need to be developed and applied in a laboratory, for the determination of compounds belonging to these categories. Optimization of the methods regarding the recoveries and detection limits, precision and accuracy is necessary, since the pollutants mentioned have toxic effects when they are present even at trace concentrations in water.

The investigation described here includes optimization of analytical methods applied in the Water and Air Quality Laboratory of the University of the Aegean for determination of a large number of toxic pollutants in water. The analyses are performed by means of gas chromatography with ECD, NPD, FPD and MS detection, Purge and Trap concentration, high performance liquid chromatography (HPLC) with Diode Array Detection (DAD) and atomic absorption spectrometry (AAS).

Sample collection and preparation, analytical conditions and validation results for all methods are presented in this work. The methods described were selected for application to surface water and drinking water samples from Greece, after experimental modifications which resulted in the best analytical performance achievable with the particular instrumentation, expressed by the calculated recoveries and detection limits. This research is being continued, in order to expand the number of pollutants that can be monitored with the developed methods, and therefore safeguard the quality of water in Greece.

Key words: analytical methods, chlorination by-products, volatile organic compounds, insecticides, herbicides, metals, organotin compounds