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Determination of acid herbicides in water by LC/MS/MS

E. Sklivagou*, K. Papadopoulou, A. Bakoulis

General Chemical State Lab, 3rd Chemical division of Athens, Laboratory of Surface Water, A.Tsocha 16, 115 21, Greece
Tel. +30 210 6479453; 210-6479274; Fax +30 210 6431587; email: cxyath@ath.forthnet.gr

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ABSTRACT

This work describes the evaluation of a method using solid-phase extraction (SPE) followed by high performance liquid chromatography coupled to electrospray ionization (ESI) tandem mass spectrometry, LC-MS/MS to screen traces of acid herbicides from water samples. Calibration conditions of LC-MS/MS in MRM mode, showed excellent linearity for the six herbicides studied (2,4-D, 2,4,5-T, 2,4-DP, MPCA, MCPP and bentazone) in the range from 1 to 50 μg/l. Instrumental precision, expressed as relative standard deviation (RSD), was below 3.4%, while sensitivity ranged from 2 to 4 pg on-column for all herbicides. Good average recoveries of the analytes were obtained from three spiked water matrices at two concentration levels 0.1 and 0.01 μg/l, namely ultra pure water (75–88%),mineral water (61–103%) and surface water (70–120%). The method limit of detection (0.003 μg/l) and the above performance characteristics guaranty the correct determination of acid herbicides at low concentrations, much lower than the maximum concentration (0.1 μg/l) admissible for pesticides in drinking water samples, established by the European Union directive. Furthermore, application of this method to surface and coastal water samples from Greece has shown that, in most cases the water samples were free from acid herbicides. MPCA and 2,4-D were detected once, while low levels of bentazone (less than 0.1 μg/l) occurred only in two samples.

Keywords: Acid herbicides; Priority substances; Water quality; LC/MS/MS

* Corresponding author.

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