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**Water quality — Determination of  
glyphosate and AMPA — Method  
using high performance liquid  
chromatography (HPLC) with tandem  
mass spectrometric detection**

*Qualité de l'eau — Détermination du glyphosate et de l'AMPA —  
Méthode par chromatographie en phase liquide à haute performance  
(CLHP) avec détection par spectrométrie de masse en tandem*





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## Foreword

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The committee responsible for this document is ISO/TC 147, *Water quality*, Subcommittee SC 2, *Physical, chemical and biochemical methods*.

## Introduction

Glyphosate [*N*-(phosphonomethyl)glycine] is a non-selective broad-spectrum herbicide. The efficiency of this compound makes it a top selling and one of the most widely used herbicides in the world since it entered the market in 1974. Together with its main degradation product, aminomethylphosphonic acid (AMPA), glyphosate is one of the most detected substances in water bodies in many developed countries. Note also that AMPA can be released during sewage treatment, e.g. due to breakdown of detergent formulations for textiles.

Glyphosate and AMPA belong to the aminophosphonate family and have specific physico-chemical properties that require the development of complex analytical methods for analysis and detection. The difficulty in analysis is mainly linked to the high solubility of glyphosate and AMPA and their chelating nature. To solve these problems, their pre-column derivatization with 9-fluorenylmethylchloroformate (FMOCCl) to form less polar derivatives allows a better separation using liquid chromatography.

Gluphosinate, another aminophosphonate, is less commonly subject to regulation and can be determined simultaneously, provided it can be demonstrated that there is no interference with the sample under analysis.

There is currently an International Standard for the determination by liquid chromatography and fluorometric detection; however, the determination by HPLC-ESI-MS/MS can be much more specific (unambiguous identification) and more sensitive (limits of quantification of approximately 30 ng/l for both glyphosate and AMPA). This International Standard is based on this analytical technique and is intended for laboratories involved in the regulatory control of the aquatic environment. Many such laboratories are now equipped with this kind of apparatus.

