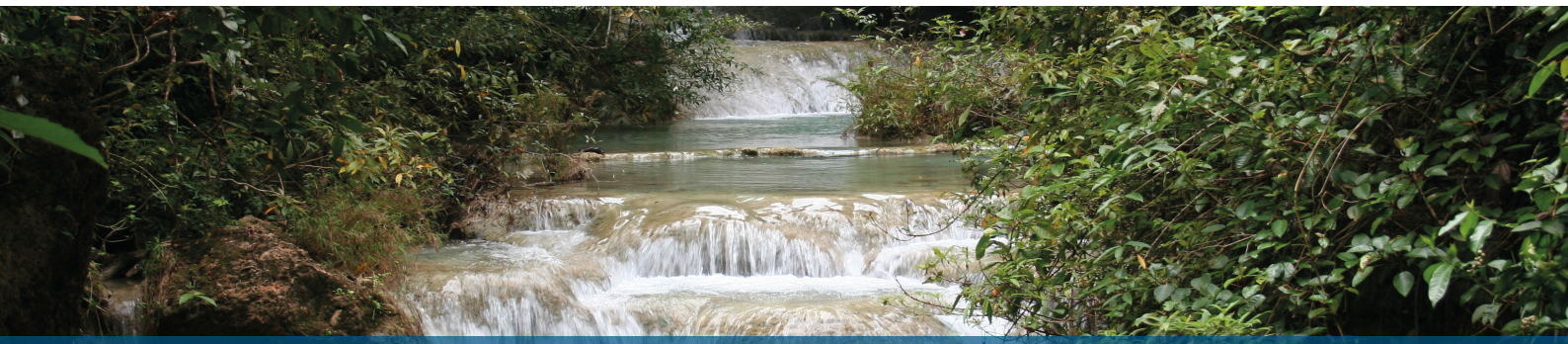


TECHNICAL DATASHEET

Analysis of Glyphosate and AMPA in Water

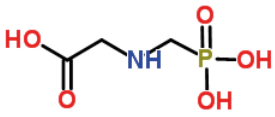
Overview

ALS Environmental can provide analytical testing for glyphosate, [N-(phosphono methyl)glycine], and AMPA, (aminomethyl) phosphonic acid, in water with reporting limits of less than 5ng/l. Glyphosate contamination of the environment is growing due to the increasing use of glyphosate-based herbicides (GBHs). In response to this issue, ALS Environmental has developed, validated and accredited a method capable of analysing glyphosate and ampa in water at ultra-trace levels using state of the art instrumentation.

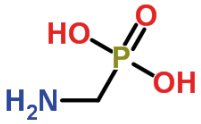
Glyphosate and AMPA Background

Glyphosate, [N-(phosphonomethyl) glycine], is a non-selective broad spectrum systemic herbicide and an organophosphorus compound, specifically a phosphonate. It is used to kill weeds, especially annual broadleaf weeds and grasses that compete with crops The efficiency of this compound makes it a top selling and most widely used herbicide in the world since it has entered the market in 1974. Together with its main degradation product, (aminomethyl)phosphonic acid or AMPA, glyphosate is one of the most detected substances in water bodies in many developed countries. It is nevertheless noted that the AMPA can also come from releases of sewage treatment (due to use in detergent formulations for textiles, for example).

Glyphosate is absorbed through foliage, and minimally through roots, and transported to growing points. It inhibits a plant enzyme involved in the synthesis of three aromatic amino acids: tyrosine, tryptophan and phenylalanine. Therefore, it is effective only on actively growing plants and is not effective as a pre-emergence herbicide.



Structure of Glyphosate



Structure of AMPA

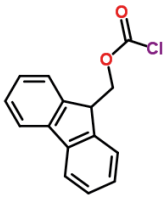
Glyphosate adsorbs strongly to soil, and residues are expected to generally be immobile in soil. Ground and surface water pollution is limited. Glyphosate is readily degraded by soil microbes to AMPA. Glyphosate and AMPA are not likely to move to ground water due to their strong adsorptive characteristics. Glyphosate does have the potential to contaminate surface waters due to erosion, as it adsorbs to soil particles suspended in runoff. Limited leaching can also occur after high rainfall after application. In many cities, glyphosate is sprayed along the pavements and streets, as well as crevices in between pavement where weeds often grow. Up to a quarter of glyphosate applied to hard surfaces can be run off by water. Glyphosate contamination of surface water is attributed to urban and agricultural use. If glyphosate reaches surface water, it is not broken down readily by water or sunlight.

Glyphosate and AMPA Regulatory Guidelines

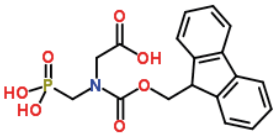
Glyphosate and formulations such as Roundup have been approved by regulatory bodies worldwide; however concerns about their effects on humans and the environment persist. The United States Environmental Protection Agency's (EPA) has placed glyphosate in Toxicity Category III. The World Health Organization's International Agency for Research on Cancer have classified glyphosate as "probably carcinogenic in humans", category 2A. The European Union directive (98/83/EC) on the quality of water intended for human consumption declares maximal acceptable concentrations for individual pesticides and their metabolites of 0.1µg/L while the sum of all pesticides and metabolites must not exceed the value of 0.5 µg/L.

Analysis of Glyphosate and AMPA

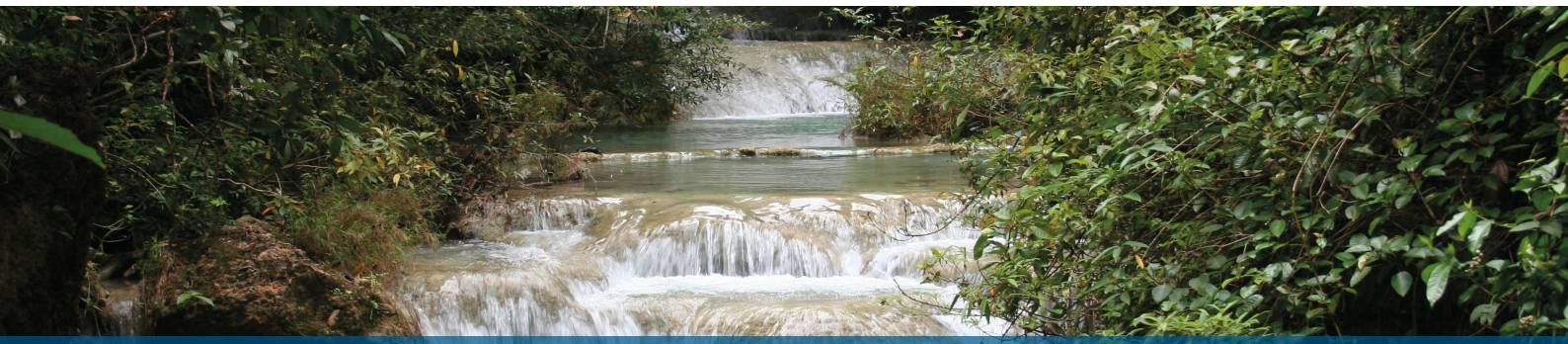
Glyphosate and the AMPA belong to the family of the aminophosphonates and have specific physico-chemical properties that require the development of complex analytical methods for trace level analysis. The difficulty of their analysis is mainly linked to the high solubility of glyphosate and the AMPA and their chelating nature. To solve these problems, they are derivatised with 9 –fluorenylmethyl chloroformate (FMOC-Cl) to form less polar derivatives. High performance liquid chromatography (HPLC) and fluorescence (Fl) detection has been the quantitative method of choice for these analytes in the past. However, fluorescence detection lacks the detection specificity to provide unequivocal analyte identification.



Structure of FMOC-Cl



Structure of Glyphosate-FMOC



TECHNICAL DATASHEET

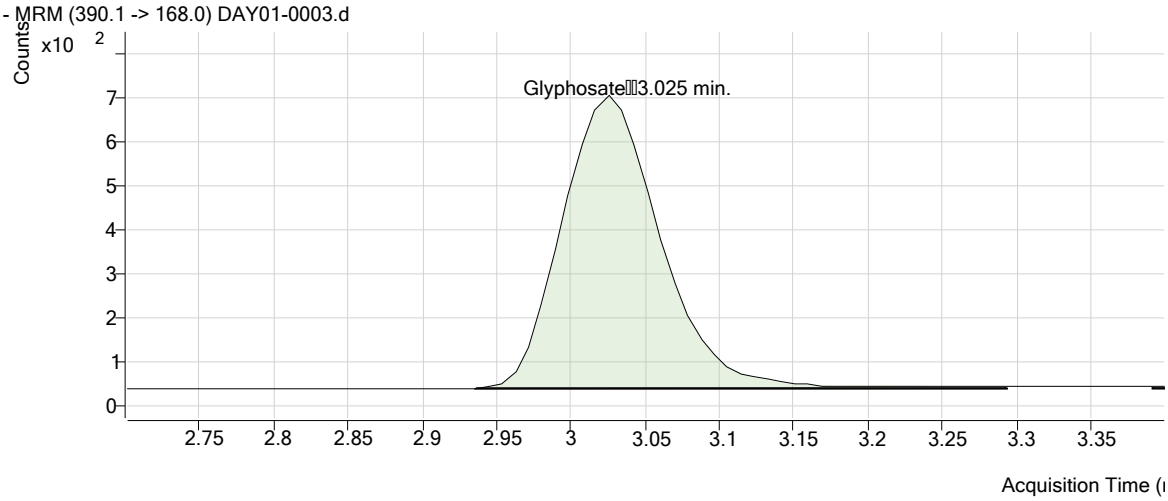
Analysis of Glyphosate and AMPA in Water

To overcome the problems of quantification and identification ALS have developed a solid phase extraction HPLC-triple quadrupole tandem mass spectrometry (MS/MS) method for the simultaneous determination of glyphosate and ampa. Use of this sensitive and selective instrumentation enables ALS to achieve detection limits (LODs) of less than 5ng/L for glyphosate and ampa in treated and raw water. The range of application for this method is up to 250 ng/L.

Glyphosate and AMPA Performance Summary for ALS Method WPC52

Compound	CAS Number	Recovery from Water at 100ng/L	Limit of Detection (LOD)
AMPA	1066-51-9	104.1%	4ng/L
Glyphosate	1071-63-6	101.1%	3ng/L

Chromatogram of a Glyphosate calibration standard at 100ng/L.



Accreditation

ALS glyphosate and ampa analysis in treated and raw water is UKAS accredited under ISO\IEC 17025:2005 to the Drinking Water Testing specification (DWTS) to provide our customers with additional confidence in the analytical data provided.

General Sampling & Preservative Requirements

Bottle: 125ml PE/HD bottle preserved with ascorbic acid.
Storage: Stored at 5°C.
Holding Time: Samples are stable for 21 days under these storage conditions.

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