

Simplified method for derivatization of extractable glyphosate and aminomethylphosphonic acid and their determination by high performance liquid chromatography

ABSTRACT

This work presents a simple procedure for pre-column derivatization of glyphosate and aminomethylphosphonic acid (AMPA) and their determination by high-performance liquid chromatography (HPLC). Derivatization was achieved by mixing a solution of 0.02 M FMOC-Cl, 0.05 M borate buffer and glyphosate or AMPA, then shaken for 1 hour, later washed with diethyl ether and ready for analysis. The quantification was performed by HPLC with fluorescent (FLD) or diode array detector (DAD). The result of the HPLC-FLD/DAD showed high linearity ($R^2 \geq 0.995$) of both compounds over eight point's concentration range and their high recovery from water compared to soil matrixes. The relative standard deviation (RSD) range from 0.1 to 30 % from the aforementioned matrixes. The limit of detection of HPLC-FLD for glyphosate from water, sandy and clay soil was 0.008 mg L⁻¹, 0.021 and 0.132 mg kg⁻¹ respectively while that of AMPA was 0.004 mg L⁻¹, 0.74 and 0.224 mg kg⁻¹. Meanwhile, the limit of detection of HPLC-DAD for glyphosate from water, sandy and clay soils was 0.024 mg L⁻¹, 0.731 and 0.122 mg kg⁻¹ respectively while that of AMPA for water sample was 0.076 mg L⁻¹. This study was unable to determine lower detection limit for AMPA from soil matrixes by HPLC-DAD thus suggested for more repeated extraction for increasing quantification of the compound.

Keyword: Glyphosate; Aminomethylphosphonic acid; Derivatization; Analytical method; Water