Determination of glyphosate and aminomethylphosphonic acid in aqueous soil matrices: A critical analysis of the 9-fluorenylmethyl chloroformate derivatization reaction and application to adsorption studies

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The assessment of the environmental fate of glyphosate and its degradation product (aminomethylphosphonic acid) is of great interest given the widespread use of the herbicide. Studies of adsorption-desorption and transport processes in soils require analytical methods with sensitivity, accuracy, and precision suitable for determining the analytes in aqueous equilibrium solutions of varied complexity. In this work, the effect of factors on the yield of the derivatization of both compounds with 9-fluorenylmethyl chloroformate for applying in aqueous solutions derived from soils was evaluated through factorial experimental designs. Interference effects coming from background electrolytes and soilmatrices were established. The whole method had a linear response up to 640 ng/mL ($R^2 > 0.999$) under optimized conditions for high-performance liquid chromatography with fluorescence detection. Limits of detection were 0.6 and 0.4 ng/mL for glyphos