

A quick and inexpensive method to determine 2,4-dichlorophenoxyacetic acid residues in water samples by HPLC

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ABSTRACT

This study aimed to develop and validate salting-out assisted liquid–liquid extraction (SALLE) with high accuracy for measuring 2,4-dichlorophenoxyacetic acid (2,4-D) in water samples. Several parameters affecting the extraction, including the volume of salting-out solvent, type, and the amount of extracting solvent, pH and the volume of sample solution were optimized. Then, to validate the proposed method, a high-performance liquid chromatography equipped with a C18 column with a UV detector at 283 nm was applied. The optimal salting-out parameters were obtained as follows: 1 mL of acetonitrile was added to 4 mL of sample solution with pH = 2 and 5 mL salting-out solvent containing 5% w/v sodium chloride. Under optimal SALLE conditions, the extraction efficiency was obtained 99.69 % in a calibration curve of 0.01–50 µg/L with $R^2 = 0.9999$, and the limits of detection and quantification were 0.004 and 0.01 µg/L, respectively. The recovery percentage of 2,4-D in real samples via the SALLE method was obtained between 95.98 and 115%, confirming the sample's insignificant effect on extraction efficiency. The method was successfully used for the determination of 2,4-dichlorophenoxyacetic acid in water samples containing incurred residue. The procedure proved to be quick, accurate, precise, sensitive, and selective.

Keywords: 2,4-dichlorophenoxyacetic acid; Salting-out assisted liquid–liquid extraction; Water; Ahvaz

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