

Cloud Point Pre-concentration Coupled With Ultrasound-assisted Back Extraction of Permethrin and α -Cypermethrin for GC-FID Determination in Waters and Foods

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A new method of cloud point extraction coupled with ultrasound-assisted back extraction that is followed by GC-FID determination of permethrin and α -cypermethrin in waters, vegetables, and fruits was developed. The effect of several parameters on the extraction process, such as the concentration of Triton X-114, pH, incubation time, equilibration temperature and centrifuging parameters were studied and optimized. The complete extraction of pesticides with using 0.5 % solution of Triton X-114 at phase separation temperature of 40 °C is observed in the pH range from 2.0 to 9.0 when both analytes are present in the solution in electroneutral form. The surfactant-rich phases were formed by centrifuging solutions at 4000 rpm for 10 min. The method was validated and characterized by the following metrological parameters: for permethrin LOD (3σ) - 0.12 $\mu\text{g/ml}$, LOQ (10σ) - 0.38 $\mu\text{g/ml}$, working range 0.38 - 2.0 $\mu\text{g/ml}$; for α -cypermethrin LOD (3σ) - 0.04 $\mu\text{g/ml}$, LOQ (10σ) - 0.13 $\mu\text{g/ml}$, working range - 0.13 - 2.0 $\mu\text{g/ml}$. The procedure was used to determine permethrin and α -cypermethrin in potatoes, cabbage, pepper, table beets and apples after their treatment with commercial preparations of pesticides. The obtained results show that the sensitivity, metrological characteristics, ecological safety, simplicity and convenience of the suggested procedure exceed published methods that are based on pesticides extraction using organic solvents.

Keywords: cloud point extraction, gas chromatography, permethrin, α -cypermethrin, non-ionic surfactants
