Ultrasound-assisted temperature-controlled ionic liquid dispersive liquid-phase microextraction combined with reversed-phase liquid chromatography for determination of organophosphorus pesticides in water samples

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Abstract
A rapid and sensitive ultrasound-assisted temperature-controlled ionic liquid (IL) dispersive liquid-phase microextraction (ULTILDPEME) combined with reversed-phase liquid chromatography-ultraviolet (RPLC-UV) was developed for the determination of five organophosphorus pesticides (OPPs; azinphos-methyl, chlorpyrifos, parathion-methyl, diazinon, and phosphatase) in water samples. Parameters including IL type, IL volume, ion strength, sonication time, heating/cooling temperature, centrifugal time, and speed were investigated. The extraction procedure was induced by the formation of cloudy solution, which was composed of 75 μL of 1-butyl-3-methylimidazolium hexafluorophosphate ([C4MIM] PF6) dispersed entirely into 5 mL sample solution with the assistance of ultrasound for 3 min and temperature at 40 degrees C. Under optimal conditions, linearity of the five OPPs was obtained in the range of 0.09-200 ng/mL with correlation coefficients of 0.998 or more. Limits of detection and limits of quantitation ranged from 0.01 to 0.1 ng/mL and from 0.05 to 0.4 ng/mL, respectively. Compared with conventional microextraction techniques, the proposed ULTILDPEME exhibited the highest extraction efficiency ranging between 90 and 98% for targeted OPPs. Furthermore, the proposed ULTILDPEME/RPLC was successfully applied to different water samples (tap, well, and lake water) showing relative recoveries ranging from 96.9 to 103.2%. Therefore, ULTILDPEME/RPLC-UV could be a simple, rapid, sensitive, and efficient routine technique for determination of OPPs in water.

Keywords
Author Keywords: HPLC, Ionic liquids, Microextraction; Organophosphorus pesticides, Ultrasound
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