

## Simultaneous extraction and determination of four different groups of pharmaceuticals in compost using optimized ultrasonic extraction and ultrahigh pressure liquid chromatography-mass spectrometry

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### Abstract

An analytical method for the simultaneous extraction and determination of four different groups of pharmaceuticals in compost from the biodegradation of biological infectious hazardous wastes (BIHW) was developed and successfully validated. Compost samples were spiked with known concentrations of the pharmaceuticals of interest. Ultrasonic extraction with an ethyl acetate and methanol solution (1:1) resulted to be effective for the extraction of eight target compounds. All the compounds were separated in a single gradient run by UHPLC using a Zorbax SB C18 Agilent (2.1×50mm, 1.8µm) column. Analytes were detected and quantified via multiple reaction monitoring (MRM) using an AB SCIEX API-5000TM triple quadrupole with electrospray ionization (ESI) in positive mode. The optimum mobile phase consisted of ammonium formate (2mM, pH 3): MeOH (50:50). Recovery values of the ultrasonic extraction for all compounds were on the order of 87% to 113% with absolute deviations lower than 11%. The limits of detection and quantification for the eight pharmaceuticals were on the order of 0.66ngg<sup>-1</sup> and 2ngg<sup>-1</sup> respectively for all the pharmaceuticals analyzed. These values are lower than those values reported in the literature. Suitable level of linearity, acceptable limits of detection and quantification, good repeatability and inter-day precision, non-ion interference, and low matrix effect resulted from the validation of the analytical method. Implementation of the analytical procedure proposed in this research will contribute in having shorter analysis time and lower costs when working with complex matrices such as compost. © 2015 The Authors.

### SciVal Topic Prominence

Topic: [drug](#) | [Drug products](#) | [products PPCPs](#)

Prominence percentile: 99.961

### Reaxys Database Information

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### Author keywords

Compost; Pharmaceuticals; UHPLC-MS/MS; Ultrasonic extraction (USE)

### Indexed keywords

Engineering controlled terms:	Biodegradation; Biohazards; Drug products; Electrospray ionization; Extraction; Liquid chromatography; Mass spectrometry; Sonochemistry; Ultrasonic applications
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Engineering uncontrolled terms	Absolute deviations; Analytical procedur; Electrospray ionization (ESI); Multiple reaction monitoring; Simultaneous extractions; U-HPLC-MS; Ultra-high-pressure liquid chromatography; Ultrasonic extraction
Engineering main heading:	Composting
EMTREE drug terms:	acetic acid ethyl ester; ammonium formate; antiinflammatory agent; antineoplastic agent; atenolol; beta adrenergic receptor blocking agent; ciprofloxacin; cyclophosphamide; ifosfamide; ketorolac; metanol; naproxen; ofloxacin; propranolol; quinoline derived antiinfective agent; drug; soil
EMTREE medical terms:	analysis time; analytical parameters; Article; chromatography by mobile phase; compost; drug determination; electrospray; extraction; hazardous waste; limit of detection; limit of quantitation; mass spectrometry; matrix effect; measurement precision; measurement repeatability; Mexico; non ion interference; priority journal; process development; process optimization; ultra performance liquid chromatography; ultrasonic extraction; validation study; chemical analysis; chemistry; high performance liquid chromatography; procedures; reproducibility; soil; ultrasound
MeSH:	Chemistry Techniques, Analytical; Chromatography, High Pressure Liquid; Limit of Detection; Mass Spectrometry; Pharmaceutical Preparations; Reproducibility of Results; Soil; Ultrasonics

#### Chemicals and CAS Registry Numbers:

acetic acid ethyl ester, 141-78-6; ammonium formate, 540-69-2; atenolol, 29122-68-7, 93379-54-5; ciprofloxacin, 85721-33-1; cyclophosphamide, 50-18-0; ifosfamide, 3778-73-2; ketorolac, 74103-06-3; methanol, 67-56-1; naproxen, 22204-53-1, 26159-34-2; ofloxacin, 82419-36-1; propranolol, 13013-17-7, 318-98-9, 3506-09-0, 4199-09-1, 525-66-6; Pharmaceutical Preparations; Soil

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