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***Miguel Ángel López Zavala***

Tecnológico de Monterrey, Mexico

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

The simultaneous extraction and determination of different groups of pharmaceuticals in complex environmental matrices such as compost is particularly challenging because of the low detection limits required, the complex nature of the samples, the different chemical characteristics of the pharmaceuticals, and the difficulty in extracting and separating these compounds from interference. Thus, the aim of this study was to develop and validate a reliable and affordable analytical method for the simultaneous extraction and determination of four different groups of pharmaceuticals in compost obtained from the thermophilic aerobic treatment of placenta. The pharmaceuticals were two non-steroidal anti-inflammatory drugs, ketorolac and naproxen, usually administered to humans; two fluoroquinolones, ofloxacin and ciprofloxacin (which are among the most commonly prescribed class of antibiotics in Mexico); two anti-cancer (antineoplastic or cytotoxic) chemotherapy drugs, ifosfamide and cyclophosphamide; and two β -blockers, atenolol and propranolol, also called β -adrenergic blocking agents, which treat a variety of conditions, such as high blood pressure, glaucoma and migraines. The pharmaceuticals of each group were selected because they are commonly used in Mexico and environmental and health impacts has been reported. The clustering was based on the use of the drug and not on the similarity of the structure. Recovery values of the ultrasonic extraction for all compounds were on the order of 87% to 113%. The limits of detection and quantification for the eight pharmaceuticals were on the order of 0.66 ng g⁻¹ and 2 ng g⁻¹ respectively for all the pharmaceuticals analyzed. These values are lower than those values reported in the literature.

Biography

Miguel Ángel López Zavala has completed his PhD and Post-doctoral studies at the Hokkaido University, Japan, in the field of Urban and Environmental Engineering. He is Professor at the Tecnológico de Monterrey, Mexico. He is member and evaluator of the National Research System of the National Council of Science and Technology. He was researcher of the Japan Science and Technology Agency at Hokkaido University, Japan. He is the author of more than 55 scientific papers published in international journals and proceedings of international conferences and congresses. He is active member of the International Water Association and Treasurer of IWA-Mexico from 2010-2011.

miganloza@itesm.mx

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