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A rapid and easy method based on hydrophilic interaction chromatography coupled with tandem mass spectrometry (HILIC-MS/MS/MS) to quantify iodinated X-ray contrast in wastewaters

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Abstract

This work proposes the first method based on hydrophilic interaction liquid chromatography coupled to multiple reaction monitoring with triple stage fragmentation (HILIC-MRM³) to quantify polar organic micropollutants in complex sewage waters. A fast HILIC-MRM³ analytical method, without sample preparation except a dilution step, was developed and validated to quantify seven iodinated contrast media (ICMs) in sewage waters, namely iohexol, iomeprol, iopromide, ioversol, iopamidol, diatrizoic acid, iopromide and iopentol. Several chromatographic columns and mobile phase conditions were investigated and a good separation of the ICMs was obtained with a mixed-mode column (Acclaim Mixed-mode WAX) used in HILIC conditions. The validation was performed using a synthetic matrix: the limits of quantification (LOQ) were inferior to 1 µg/L and the linearity of each compound was comprised within the [0.5 - 50] µg/L range. The applicability of the HILIC-MRM³ method was assessed by the analysis of several raw waters. The results highlighted the presence of ICMs in most samples, at concentrations up to several mg/L in hospital sewage waters.

Keywords: HILIC; MRM³; contrast agent; sewage; quantification

1. INTRODUCTION

Among the so-called emerging pollutants, may be included iodinated contrast media (ICMs). Used for diagnostic purposes, they have been widely deployed since the 1950s in medical X-ray imaging in order to artificially increase contrast for a better visualization of organs, tissues, tumors, etc. In order to reduce their harmful effects on health and a quick elimination by the body (in less than 24 hours), ICMs have been designed to be as inert and stable as

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