

HPLC-FD Method Validation for Determination of Several Fluoroquinolones in Biodegradation Assays

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The present concern in pharmaceuticals in the environment is well known and research studies in this area have been regularly reported [1]. Pharmaceuticals reach the environment by several ways but mostly due to their incorrect disposal and the incomplete elimination during the treatment processes in Wastewater Treatment Plants (WWTP). These residues continuously enter aquatic environments and many of them are resistant to degradation, being so called as pseudo-persistent pollutants [2]. In aquatic compartments, pharmaceutical residues reach concentrations in the ng/L to µg/L range [3]. Antibiotics are a class extensively studied due to its implications on development of multi-resistant bacteria.

This work describes a validated HPLC (High Performance Liquid Chromatography) method with Fluorescence Detection for monitorization of biodegradation of four fluoroquinolones: Ofloxacin (OFL), Norfloxacin (NOR), Ciprofloxacin (CPF) and Moxifloxacin (MOX).

The separation of the target pharmaceuticals was performed at 38 °C using a Luna 3µ PFP(2) 100 A (150 × 4.60 mm) column in isocratic mode with a mixture of 0.1% triethylamine (TEA) in water acidified to pH = 2.2 with trifluoroacetic acid (TFA) and ethanol as mobile phase. The validated method demonstrated selectivity, linearity ($r^2 > 0.999$) and precision (intra-day: $0.71 > RSD > 2.51$; inter-day: $1.11 > RSD > 2.74$) in the range of 0.5 µg/mL – 12 µg/mL. The quantification limits were 5 ng/mL for OFL, NOR and CPF and 20 ng/mL for MOX. The biodegradation study was performed during 15 days using a microbial consortia constituted by three bacterial species known to degrade fluorinated compounds. The OFL presented higher extent of degradation than CPF and MOX.

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