Photolytic degradation of enrofloxacin in aqueous media

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Pharmaceuticals have become one of the most important new classes of environmental pollutants that have been detected in environment (wastewater, sediments, sludge). The most important sources of such compounds in the environment are households, WWTPs, hospitals, industrial units. Pharmaceuticals are metabolized in organisms and they are excreted in their parent form or as metabolites. Biodegradation and transformation of pharmaceuticals and metabolites can also occur in WWTPs, which also produce by-products that may be even more toxic than the parent compounds in some cases [1]. It is very important to consider metabolites and degradation products of such compounds when studying their presence in the environment from the points of view therapeutic and toxicological viewpoints.

Fluoroquinolones are a group of synthetic chemotherapeutic agents which are highly active against a broad range of bacteria, and hence the use of fluoroquinolones is not restricted to human medicine but is also widely applied in the treatment and prevention of veterinary diseases in food-producing animals, and even as growth-promoting agents [2]. Enrofloxacin, a member of the family of fluoroquinolones, has been widely used in veterinary clinical practice because of its broad antibiotic spectrum and excellent bactericidal activity. It also shows striking potency against both Gram-positive and Gram-negative bacteria.

In this work photolytically induced degradation of enrofloxacin in aqueous solutions has been realized. Aqueous solutions of enrofloxacin were prepared at different pH values and irradiated in photochemical Rayonet reactor at 300 nm. Photolytic degradation was monitored at defined time intervals and structures of photo-products were assessed by liquid chromatography–mass spectrometry (HPLC-MS). Possible mechanism of photo-degradation of enrofloxacin will be discussed. LC analysis was performed using an Agilent Series 1200 HPLC system (Santa Clara, CA, USA) equipped with a Synergy Fusion C18 embedded column (150 mm×2.0 mm, particle size 4 µm (Phenomenex)). The analysis was performed using gradient elution of mobile phase (0.1% formic acid in water and 0.1% formic acid in acetonitrile).

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References