P-131 - CHARACTERIZATION OF THE EFFECTS OF PHARMACEUTICALS IN ACTIVATED SLUDGE USING QUANTITATIVE IMAGE ANALYSIS

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Background

The extensive use of personal care products and pharmaceuticals for human consumption and veterinary usage led to the detection of these products in wastewater effluents and aqueous systems as rivers, surface waters and others. The ecotoxicology of pharmaceuticals was well studied by Backhaus [1]. The effect of these compounds on microorganisms is also an important study that should be taken into account when biological processes are used to remove these compounds from aqueous systems. Quantitative image analysis (QIA) is considered a useful technique for biological processes monitoring when combined to microscopy. The aim of this study was to analyze the effects of ibuprofen (IBU), paracetamol (PARA), and ethynylestradiol (EE2) on the biomass morphology using QIA.

Method

To analyze biomass morphological changes due to IBU, PARA, and EE2, four identical batch reactors were used during 24h. The reactors were inoculated with activated sludge and initial concentrations of pharmaceuticals of 1 and 10 mg L^{-1} were used. A control batch was also performed. Aggregated and filamentous biomass contents and structure were assessed by images acquired through bright-field microscopy. Aggregates were classified according to their size in two classes and for each studied class the aggregates area percentage was calculated. The aggregates total area per volume (TA/Vol) and filaments total length per volume (TL/Vol) were also determined [2].

Results & Conclusions

During the experiments with PARA, in spite of a slight variation, the results showed no significant effects in each class studied. The biomass structure was clearly affected by the addition of EE2. A deflocculation was observed which is corroborated by the sharp decrease on the intermediate aggregates area. With IBU, the effect of aggregates fragmentation is extensively higher than with EE2. It seems therefore clear that IBU presents substantial effect in bacterial biomass leading a deflocculating phenomenon with higher impact for 10 mg L^{-1}. QIA studies showed that IBU favors the growth of aggregated biomass (TA/Vol). For experiments with PARA and EE2, 10 mg L^{-1} just slightly favored the growth of filamentous bacteria (TL/Vol).

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[2] doi: 10.1017/S1431927609991358

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