

11. Environmental Microbiology and Biotechnology

P94. Toxicity assessment of ibuprofen on activated sludge by respirometric technique

Antonio Melo, Jorge Padrão, Ana Nicolau, Cristina Quintelas, Eugénio Campos Ferreira, Daniela Mesquita
CEB - Centre of Biological Engineering, University of Minho

E-mail: rene.benevides@ceb.uminho.pt

Micropollutants, including pharmaceuticals, have gained wide attention and concern due to the widespread usage and growing presence in aqueous systems. Activated sludge systems are widely used for wastewater treatment, being one of the processes that present greater efficiency for the removal of pharmaceuticals. The presence of these compounds affects the performance of the biological processes in wastewater treatment plants and is very important to quantify these effects. Among the available techniques for activated sludge control, for the particular case of toxic compounds' effects in the microbial community, respirometry can be considered a relevant technique allowing the evaluation of microorganisms activity. The respirometry test is obtained through the measurement of the oxygen uptake rate (OUR) that is determined by the slope of de dissolved oxygen (DO) concentration versus time during the biodegradation of the substrate. Combining OUR and volatile suspended solids yield the specific oxygen uptake rate (SOUR).

The toxicity was determined by the relative variation of SOUR when a pulse of control substrate is added before and after a pulse of toxic compound. This study aims to assess the toxic effect of ibuprofen on activated sludge using a respirometric test. These respirometric experiments were carried out with ibuprofen concentrations of 2.5, 10, and 20 mg/L. The results indicate a reduction in the respiratory activity of 48%, 54%, and 70%, respectively for the initial ibuprofen concentrations of 2.5, 10, and 20 mg/L. It can be concluded that for the concentrations of 2.5 and 10 mg/L there was similar toxicity, although the toxicity for 10 mg/L was slightly higher than 2.5 mg/L. Furthermore, at 20 mg/L the toxicity effect was considerably higher than the toxicity caused with 10 mg/L.

The results of the respirometry tests suggest that ibuprofen presents a non-negligible level of toxicity even at the lowest concentration studied, and at highest concentration, an accentuated reduction of biomass activity was observed. Globally, results showed that ibuprofen may have an important negative impact on the activated sludge microbial community.