

Emerging pollutants and managing wastewater and waste

INTRODUCTION & AIM

- The discharge of domestic, municipal and industrial effluents is usually the main source of aquatic toxicity observed in surface waters. One way to evaluate the quality of those effluents is to evaluate them using aquatic species. The objective of this work was to compare the acute toxicity of effluents from four Wastewater Treatment Plants (WWTPs) with different levels of treatment.

MATERIAL AND METHODS

- Effluent samples were collected from three of Wastewater Treatment Plants (WWTPs) with secondary treatment (named, A, B and C) and one (named, D) with tertiary treatment (Table I);
- Six monthly campaigns were carried and samples were collected before and after chlorination, when applicable;
- Acute test tests were performed with *Daphnia similis* (OECD 202 and ABNT NBR 12713).

Table I. WWTPs whose final effluents were sampled and types of treatment used.

WWTPs	TYPE OF TREATMENT
A	Reactors as treatment followed by activated sludge and decantation
B	Biological treatment (batch activated sludge) and disinfection with sodium hypochlorite
C	Reactors followed by anoxic chamber, submerged aerated biological filter, secondary decanter and disinfection with sodium hypochlorite
D (RWPS^a)	Biological reactors with membranes (Membrane Bio Reactor, MBR) with nitrogen and phosphorus removal followed by filter membrane

^a reuse water production station

Source: Personal Communication from WWTPS technicians.



Photo: Amanda dos Santos

Picture 1. *D. similis*

RESULTS

- The only treatment that provided non toxic effluents to *D. similis* was WWTP D which applies tertiary treatment. The worst scenario was the WWTP B, which uses batch activated sludge (Table II).

Table II. Results of acute toxicity tests with *D. similis* in collection campaigns.

WWTPs	EC50, 48H EXPRESS % (CONFIDENCE INTERVAL)					
	CAMPAINGS					
	1	2	3	4	5	6
A	Not toxic	77% (60,56-97,99)	Not toxic	Not toxic	Not toxic	Not toxic
B (pre-chlorination)	93,5% (86,84-100,63)	91,8% (86,25-97,77)	62,7% (58,11-67,78)	100% (not calculated)	90% (83,01-97,73)	60,8% (55,22-67,04)
(post-chlorination)	95,1% (not calculated)	Toxic 25% effect at maximum concentration	63,8% (58,83-69,31)	- ^b	88% (84,80-91,69)	75,4% (69,88-81,34)
C (pre-chlorination)	Not toxic	Toxic 25% effect at maximum concentration	Not toxic	Not toxic	Not toxic	Not toxic
(post-chlorination)	Not toxic	Toxic (<6,75%)	Not toxic	Not toxic	Not toxic	Not toxic
D (RWPS^a)	Not toxic	Not toxic	Not toxic	Not toxic	Not toxic	Not toxic

^a reuse water production station

^b sample not collected

- The results showed that applicability of aquatic bioassays to evaluate the quality of effluents generated by different treatment technologies.

KNOWLEDGEMENTS

