TOXICOLOGICAL EVALUATION OF UASB REACTOR EFFLUENT TREATED BY ADVANCED OXIDATION PROCESS

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INTRODUCTION: Upflow Anaerobic Sludge Blanket (UASB) reactors are widely used in municipal wastewater treatment in developing countries due to their good performance and low operating costs. However, the resulting effluent still contains organic matter, inorganic ions and persistent organic microcontaminants. To overcome this limitation, a complementary process using hydrogen peroxide (H_2O_2), hypochlorite (OCl^-) and UVC radiation was developed, which showed high efficiency, removing 92 % of model microcontaminants (colchicine, nitazoxanide and sulfamethoxazole) in 30 minutes, reducing their concentration from 325 μM to 26 μM. **OBJECTIVE:** Phytotoxicity, oxidative stress, cytotoxicity and genotoxicity tests were performed to evaluate the quality of the effluent after treatment. **MATERIALS AND METHODS:** For phytotoxicity tests, lettuce seeds (*Lactuca sativa*) were exposed to the effluent and incubated for 7 days, and the growth index (GI) was calculated in comparison with the negative control (NC). For cytotoxicity and genotoxicity, onion seeds (*Allium cepa*) were analyzed microscopically, quantifying cellular (MI) and chromosomal (GEN) alterations in 5000 cells. Earthworms (*Eisenia andrei*) were exposed for 72 h to assess oxidative stress by analyzing lipid peroxidation (LPO) and protein carbonylation (PTC). **RESULTS AND DISCUSSION:** In the phytotoxicity test, NC showed total germination with radicles between 0.8 and 4.5 cm. The effluent with microcontaminants drastically inhibited growth (GI = 56 ± 2 %), but after treatment the GI exceeded 80 %, indicating no phytotoxicity. In terms of cytotoxicity, the treated effluent reduced the MI, approaching that of the positive control (PC), suggesting possible residual toxicity. In terms of genotoxicity, the treated effluent was the same as the NC, indicating elimination of genetic damage. In the earthworm tests, LPO increased after treatment, suggesting the generation of oxidative compounds, while PTC remained unchanged. **CONCLUSION:** The study shows that in addition to the efficiency of microcontaminant degradation, the toxicity of the final effluent must be considered to ensure environmental benefits. The proposed treatment significantly reduced the toxicity compared to the initial effluent, but chronic studies are needed for a more comprehensive evaluation.

KEYWORDS: UV-C radiation; hydrogen peroxide; hypochlorite; *Lactuca sativa*; *Allium cepa*; *Eisenia andrei*.

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