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Synthetic hospital wastewater treatment by coupling submerged membrane bioreactor and electrochemical advanced oxidation process: Kinetic study and toxicity assessment

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1 **Synthetic hospital wastewater treatment by coupling submerged**
2 **membrane bioreactor and electrochemical advanced oxidation process:**
3 **kinetic study and toxicity assessment.**

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20 **Keywords:** Hospital wastewaters; Pharmaceutical pollutants; Electrochemical advanced
21 oxidation process; Membrane bioreactor; *Daphnia* toxicity test.

22
23 **Abstract:** In this work, the combination of membrane bioreactor (MBR) and electro-oxidation
24 (EO) process was studied for the treatment of a synthetic hospital wastewater fortified with four
25 pharmaceutical pollutants namely carbamazepine (CBZ), ibuprofen (IBU), estradiol (E-E) at a
26 concentration of 10 µg L⁻¹ venlafaxine (VEN) at 0.2 µg L⁻¹. Two treatment configurations were
27 studied: EO process as pre-treatment and post-treatment. Wastewater treatment with MBR alone
28 shows high removal percentages of IBU and E-E (~ 90%). Unlikely for CBZ and VEN, a low
29 elimination percentage (~ 10%) was observed. The hydraulic and the solid retention times (HRT
30 and SRT) were 18 hours and 140 d respectively, while the biomass concentration in the MBR was
31 16.5 g L⁻¹. To enhance pharmaceuticals elimination, an EO pretreatment was conducted during 40
32 min at 2 A. This configuration allowed a 92% removal for VEN, which was far greater than both
33 treatments alone, with lower than 30% and 50% for MBR and EO, respectively. The MBR-EO

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