SUPPLEMENTAL DATA

Manuscript title: **Persulfate-Based Photodegradation of a Beta-Lactam Antibiotic Amoxicillin in Various Water Matrices**

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The efficacy of the AMX degradation was studied in the UVC/H2O2 system by using 100, 200, 400 and 800 µM of [H2O2]0, whereas the corresponding molar ratios of AMX/H2O2 varied from 1/2.5 to 1/20. The UVC/H2O2/Fe2+ system was applied to study the effect of Fe2+ addition by using a [Fe2+]0 of 10, 20, 40 and 80 µM at a constant [H2O2]0 = 400 µM corresponding to H2O2/Fe2+ molar ratios of 10/0.25, 10/0.5, 10/1 and 10/2. The degradation of AMX in the investigated systems also proved to follow pseudo-first-order reaction kinetics. The calculated *kobs* for the H2O2-based systems were expectedly higher and it was proved that also [H2O2]0 = 400 µM indicated significantly higher degradation rate (*kobs* = 0.394 ± 0.017 min-1) of AMX compared to lower concentrations, however, the [H2O2]0 = 800 µM still increases the reaction rate (*kobs* = 0.626 ± 0.026 min-1) (Figure S1).

**Figure S1.** Pseudo-first-order rate constants (*kobs*) of AMX degradation by the UVC/H2O2 process at different [H2O2]0 at unadjusted pH ([AMX]0 = 40 µM).

The addition of Fe2+ to the oxidation system was inhibiting the AMX degradation at smaller concentrations and therefore, over a 2-fold increase in *kobs* (0.633 ± 0.028 min-1) resulted by the addition of [Fe2+]0 = 40 µM (Figure S2). Subsequent increase of [Fe2+]0 to 80 µM resulted in 1.6-fold higher reaction rate (0.987 ± 0.044 min-1) leading to a conclusion that the process conditions to UVC-activated H2O2-based treatment could be further optimised.

**Figure S2.** Pseudo-first-order rate constants (*kobs*) of AMX degradation by the UVC/H2O2/Fe2+ process at different [Fe2+]0 at unadjusted pH ([AMX]0 = 40 µM; [H2O2]0 = 400 µM).

Also, a blank trial of H2O2/Fe2+ ([H2O2]0 = 400 µM, [Fe2+]0 = 40 µM) was conducted to examine the target compound degradation without UVC radiation. The results showed 31% of residual AMX and negligible mineralisation in 2-h treatment and, thus, the use of UVC irradiation is justified to achieve higher mineralisation at shorter oxidation time.