Supporting Information: *Prediction of organic contaminants degradation during medium pressure UV/NO_3 treatment of groundwater*

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This PDF file has 6 pages and includes 1 text and 4 figures.

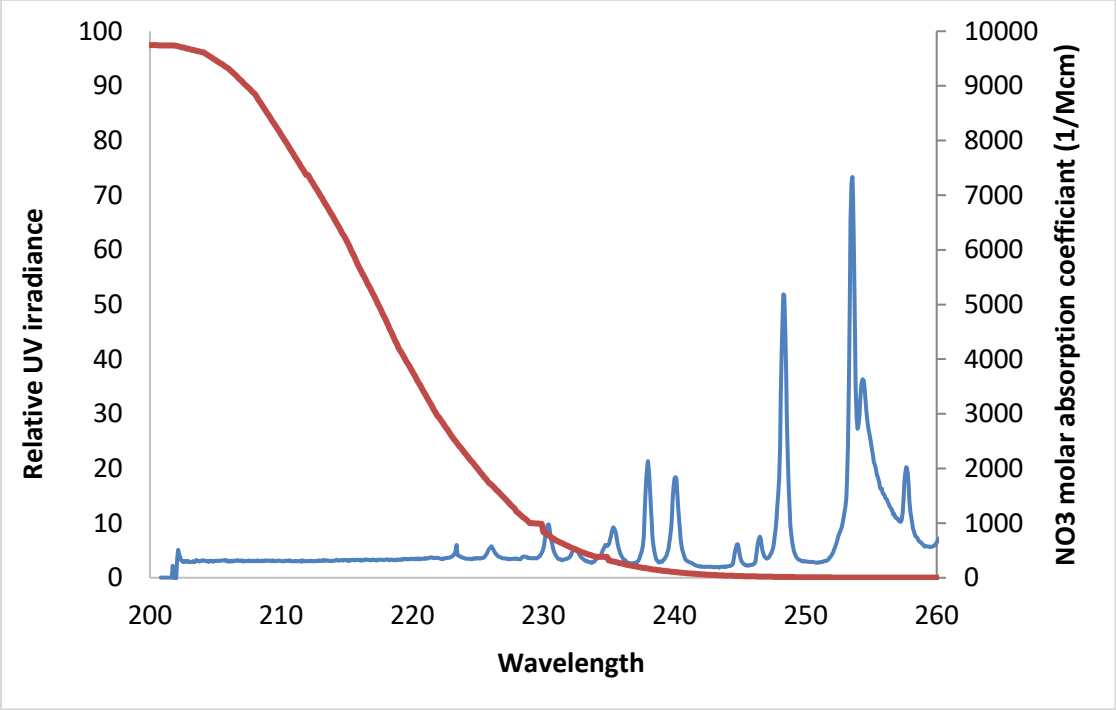

Figure S1. Relative spectral irradiance of the medium-pressure mercury UV lamp and molar absorption coefficient of NO_3^-

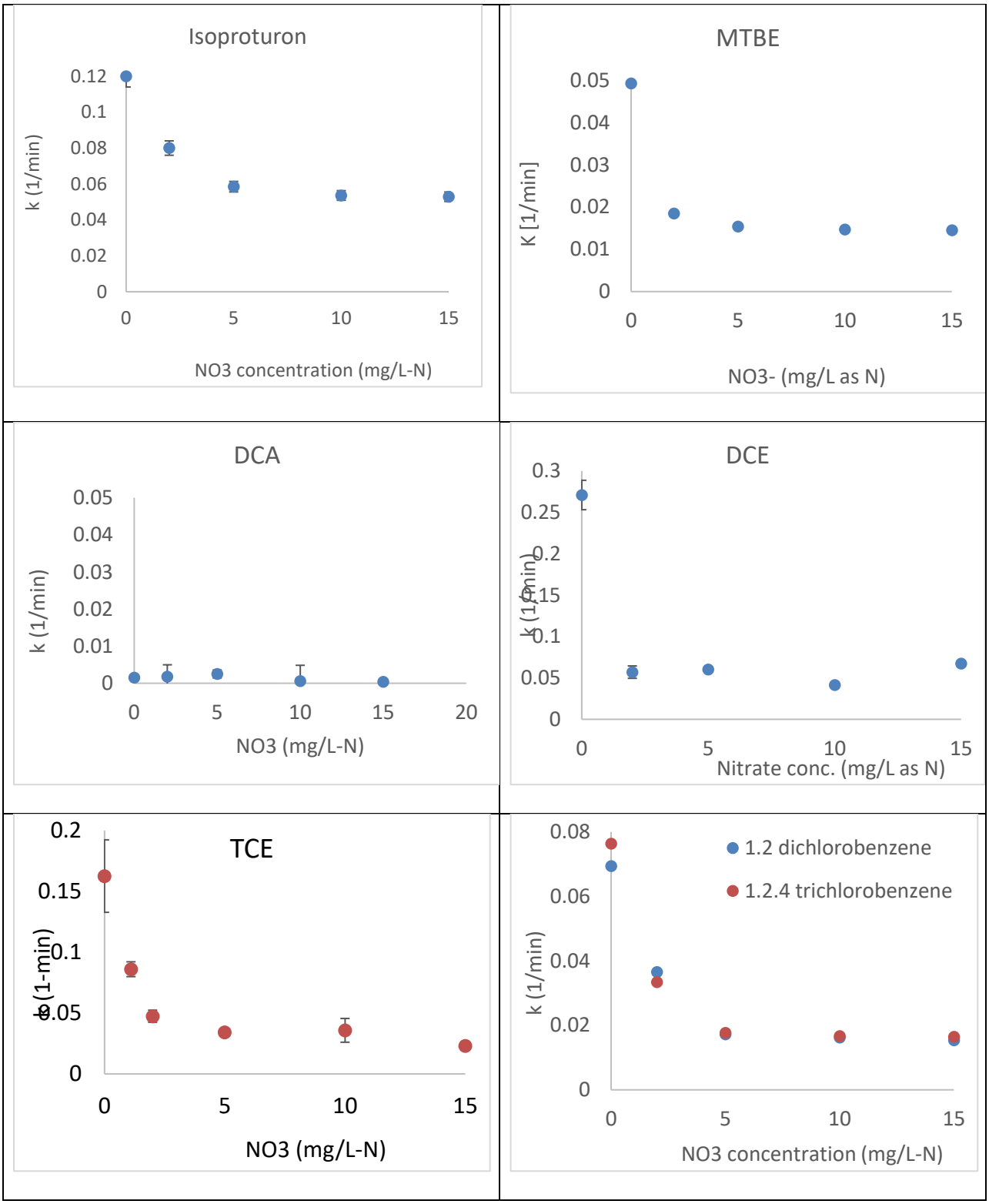

Figure S2. First order degradation rate constant *vs*. NO_3 concentration for the tested compounds.

Text S1. Modeling the impact of NO3- on UV degradation of Group II contaminants

Compounds belonging to Group II are characterized by high direct photolysis (k_{UV} > 2x10^{-4} cm^2/mJ) and high reaction rate with •OH ($k_{\bullet OH,C}$ > 1x10^9 1/Ms). To model their degradation kinetics, we used the general equations below:

$$-\frac{d[C]}{dt} = k'_d[C] + k'_{\bullet OH}[C] \Rightarrow k_{tot} = k'_d + k'_{\bullet OH} \quad \text{(S1)}$$

$$k'_d = \sum_\lambda E^P_{avg}(\lambda)\varepsilon(\lambda)\Phi(\lambda) \times 1000 \quad \text{(S2)}$$

$$k'_{OH} = [\bullet OH]_{ss} k_{\bullet OH,C} \quad \text{(S3)}$$

$$E^P_{avg}(\lambda) = E^P_0 \times \frac{1-10^{-\varepsilon_{NO3}\times[NO3]\times z}}{\varepsilon_{NO3}\times[NO3]\times z\times ln(10)} \quad \text{(S4)}$$

Here, k_{tot} and k'_d are the total and photolysis pseudo first-order degradation rate constants (1/s), $k_{\bullet OH,C}$ is the second-order reaction rate constant of the compound with •OH (1/Ms), $E^P{}_0$ and $E^P{}_{avg}$ are the average photonic fluence rate inside the reactor without and with NO_3 respectively (E/s/cm^2), ε molar absorption coefficient (1/Mcm) and Φ is the quantum yield for direct photolysis (mol/E).

Total time-based degradation rate constant (k_{tot}) of contaminants was calculated for two relevant values of $k_{\bullet OH,C}$ (8x10^9 and 1x10^{10} 1/Ms), over a wide range of k_{UV} and NO_3^- concentrations (Figure S3). Steady state •OH concentration was taken from Keen et al.

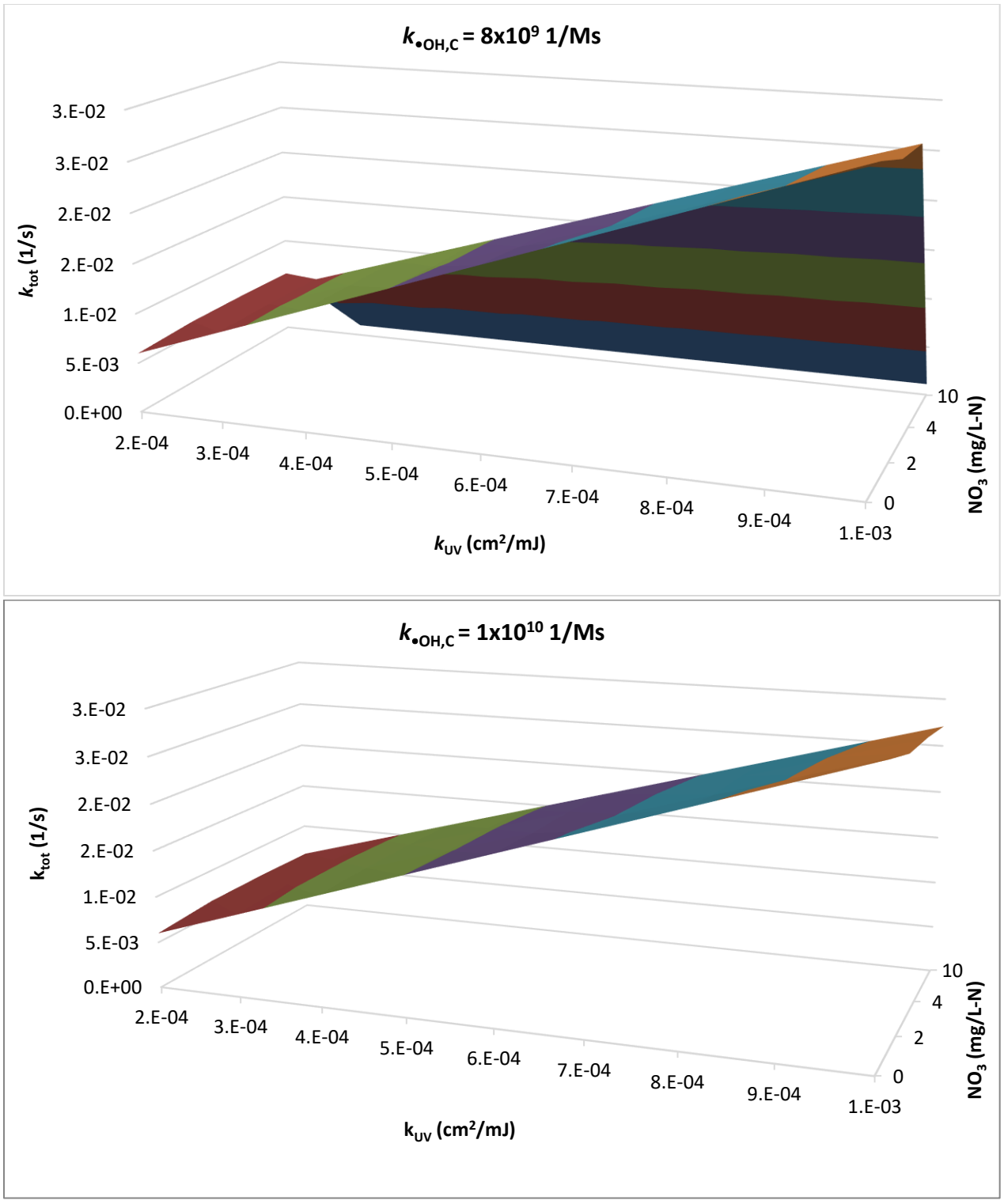

Figure S3. Total time-based degradation rate constants (k_{tot}) of Group II contaminants as function of their k_{UV} and NO_3^- concentration, for $k_{\bullet OH,C}$ of 8x10^9 (upper graph) and 1x10^{10} 1/Ms (lower graph).

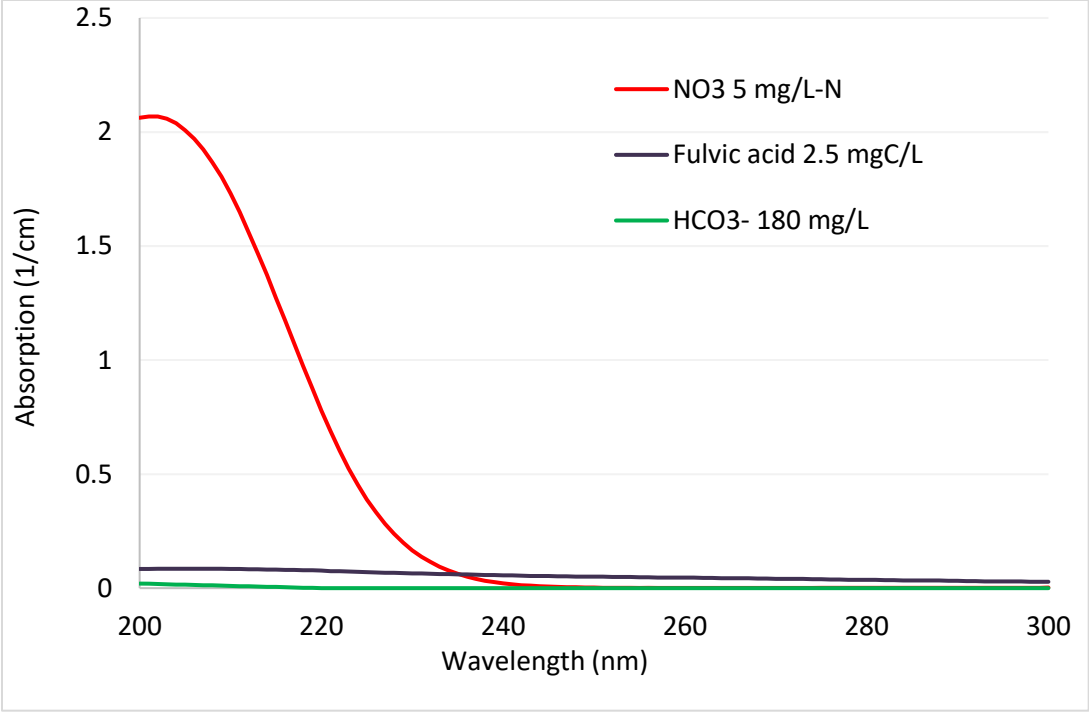

Figure S4. Light absorption spectrum of NO_3^- (5 mg/L-N), fulvic acid (2.5 mgC/L) and HCO_3^- (180 mg/L)