1   **Supplementary Notes** (supporting information to the full text paper)

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3   **Investigation on UV degradation and mechanism of 6:2 fluorotelomer**

4   **sulfonamide alkyl betaine based on model compound perfluorooctanoic acid**

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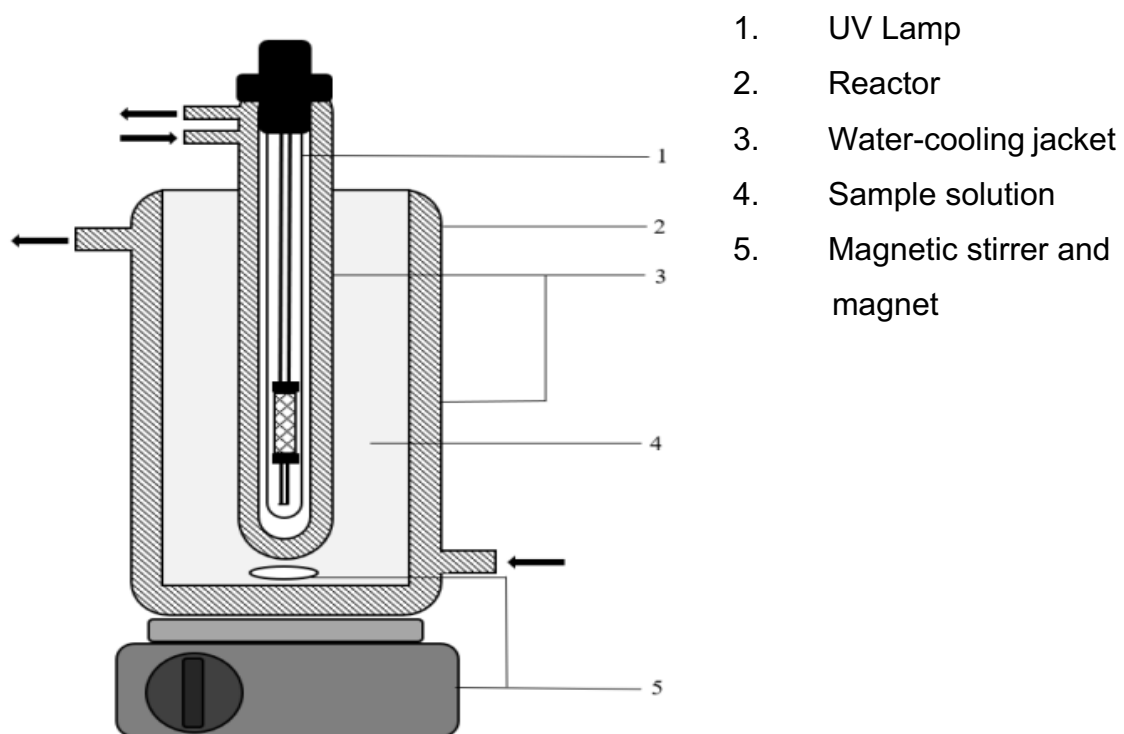
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16   **Table of content**

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1. UV Lamp
2. Reactor
3. Water-cooling jacket
4. Sample solution
5. Magnetic stirrer and
    magnet

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39 **Fig. S1.** System Configuration 1 with outer cooling jacket.

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2. Actinometry: Determination of Iron (II) and total Iron content:

The determination of the iron (II) and the total iron concentration was based on the House method according to Balcke (cf. Jensch, 2015 according to UFZ Leipzig). The basic principle of iron (II) determination is based on the selective reaction of dissolved Iron (II) ions with complexing agents such as ferrozine to form a violet complex. The addition of ascorbic acid reduces the iron (II) contained in the sample so that further total iron determination is made possible. The difference in the amount of absorption with and without the addition of ascorbic acid is proportional to the content of iron (III) ions and can be calculated accordingly:

$$C_{(Fe^{3+})} = C_{(Fe\ total)} - C_{(Fe^{2+})}$$

To determine the iron (II) concentration, 2 mL of a sample solution is mixed with 2 mL of the required detection reagent added. This is achieved by adding 50 mg of 3-(2-pyridyl)-5,6-diphenyl-1,2,4-triazine-4',4''-disulfonic acid monosodium salt to a buffer solution of 200 mM (citric acid and 200 mM trisodium citrate under acidic pH conditions (pH=4.6). As mentioned above, the total iron content of a sample is determined by the additional addition of 100 µl of 10% ascorbic acid solution. The measurement is made after 90 Minutes photometrically at a wavelength of 562 nm. The measuring range is in the interval of 0.1-5 mg/L. Because of higher iron contents, the sample volume was diluted.
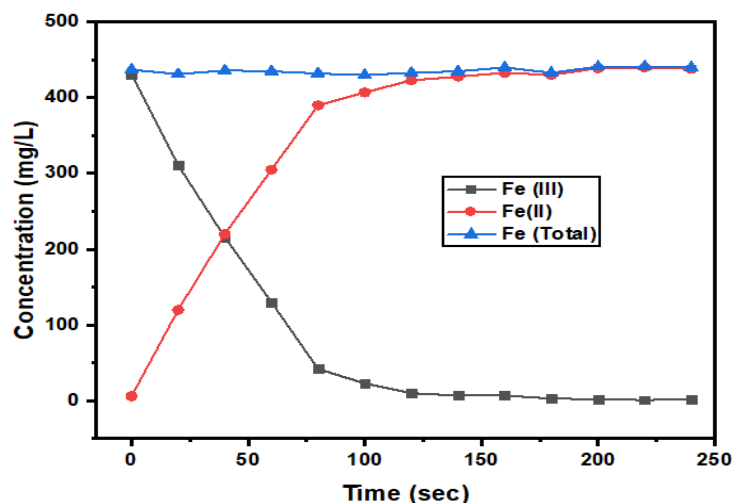

Figure S2. Concentration of Fe (II), Fe (III), and Fe (total).

3. Data evaluation

we assumed the degradation is pseudo-first order reaction of the parent compound by the following equation (1), where k is the rate constant (s⁻¹ or min⁻¹, depending on the time units used), t is the time (in seconds or minutes, depending on the time units used), In represents the natural logarithm, A_0 is the initial concentration of the PFOA or 6:2FTAB in mg/L, A_t is the concentration of the PFOA or 6:2 FTAB at time interval t.

$$k= 1/t \cdot \ln(A_0/A_t) \qquad (1)$$

The half-life of the reaction has been calculated by the following equation (2).

$$t_{1/2}=\ln2/k \qquad (2)$$

where $t_{1/2}$ is the half of the reaction and k is the rate of reaction according to the time units used.

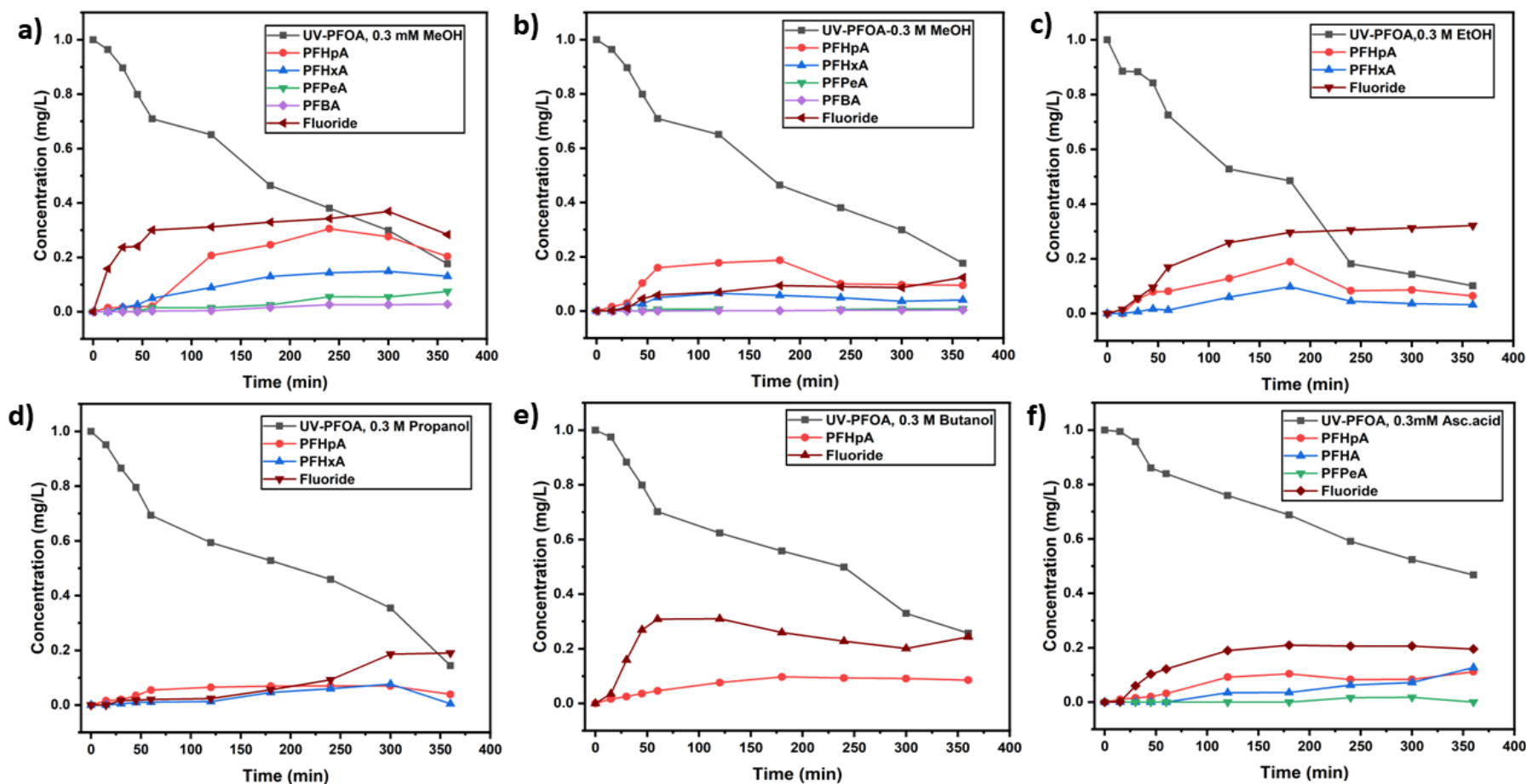The percentage degradation efficiency has been calculated by the following equation (3).
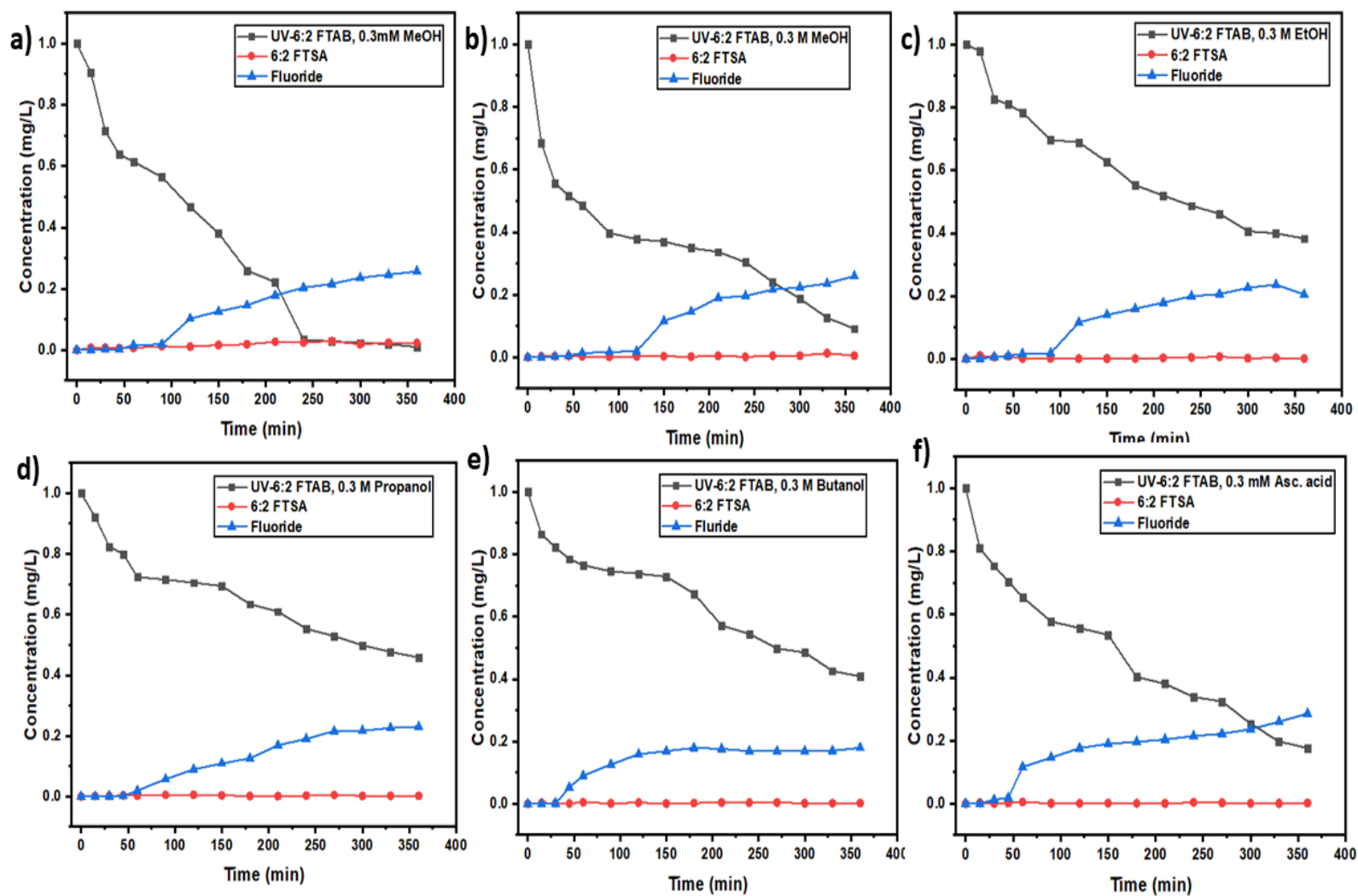
$$\%age\ Degradation= C_t/C_o \times 100 \qquad (3)$$

For Fluoride release measurements, the percentage was calculated by using the formula given below in equation (4).

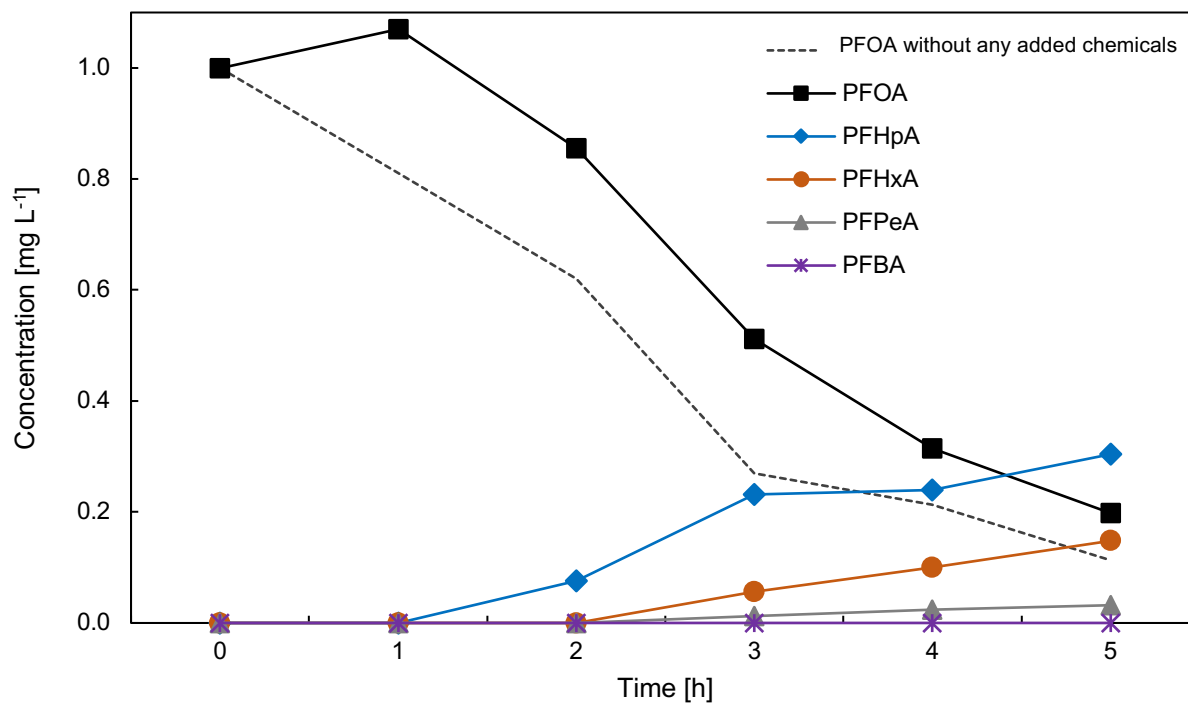$$\%age\ fluoride\ release =C_{(t)}/C_{max} \times 100 \qquad (4)$$

8. Further result of scavenger experiment with PFOA and 6:2 FTAB
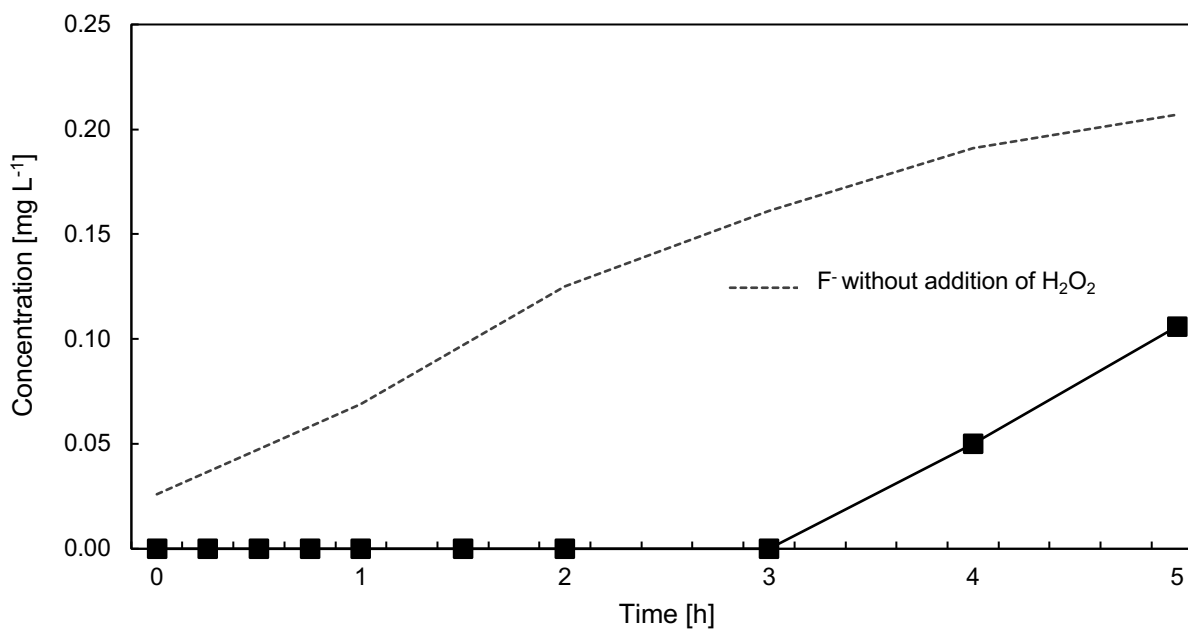

Figure S3. PFOA degradation, major transformation products and defluorination in the presence of different scavengers, 0.3 mM MeOH at t=0 (a), 0.3 M MeOH at t=0 (b), 0.3 M EtOH at t=0 (c), 0.3 M Propanol at t=0 (d), 0.3 M Butanol at t=0 (e) and 0.3 mM Ascorbic acid at t=0 and t=1 h (f).
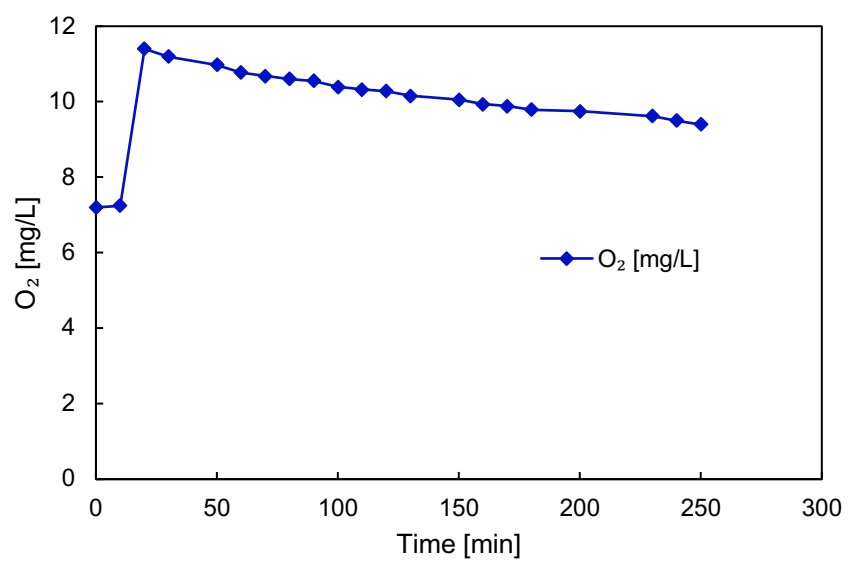
Figure S4. 6:2 FTAB decomposition, major transformation products, and fluoride release in the presence of different scavengers 0.3 mM MeOH at t=0 (a), 0.3 M MeOH at t=0 (b), 0.3 M EtOH at t=0 (c), 0.3 M Propanol at t=0 (d), 0.3 M Butanol at t=0 (e) and 0.3 mM Ascorbic acid (f) at t=0 and t=1 h.

Figure S5: UV photolysis of 1 mg L^{-1} PFOA in the presence of 1% H_2O_2

Figure S6: Fluoride measurement during UV treatment with 1% H_2O_2 addition.

Figure S7: O_2 measurement during UV treatment of 1 mg L^{-1} PFOA (original pH).