

## Referee 1:

We thank the reviewer for the detailed review, the corrections and suggestions. We took all comments into consideration and give below our corrections and/or answers to your general and specific comments.

**P7686:** The reviewer is correct equation (2) needs to be corrected and will be replaced by:

The combination of the Beer-Lambert law with (1) leads to the following equation:

$$A_e = \ln\left(\frac{I_0}{I}\right) = \varepsilon_e l [{}^3BP]_0 e^{-k_1 t} \text{ or } \ln(A_e) = \text{const} - k_1 t \quad (2)$$

where  $A_e$  is the base-e absorbance,  $\varepsilon_e$  the corresponding extinction coefficient,  $l$  the optical pathway and  $[{}^3BP]_0$  the initial concentration of the triplet state.

**P7686.23:** The acidic conditions used only in the flow tube experiment were chosen to increase the  $Br_2$  yield as stated by [Frinak and Abbatt, 2006]. These authors found that from both pure NaBr and mixed NaCl/NaBr solutions, the amount of  $Br_2$  released was increased with increasing acidity, whereas it was observed to vary little with increasing concentration of bromide ions in the sample.

Blank experiments (in darkness) were made to assess the quantity of HCl degassing out of the film under these acidic condition. The corresponding  $Cl^-$  concentration is indicated in figure 6 at residence time 0 s.

This will be clearly indicated in the revised manuscript.

**P7687:** We will include the BP ground state spectrum in fig2. This spectrum has been observed in aqueous solution containing  $10^{-4}$  M of BP.

**P7688 Eq. (3):** This is correct; we will replace the term “cte” by “const”, and  $k_2$  by  $k_q$ .

**P7688:** We think that there is no difference between BP and benzophenone carboxylate, but in alkaline media (pH=11), Hurley et al studies involve only the benzophenone 4 carboxylate anion (BC). Then, the redox potentiel of BC (-1.13V) is less negative than the one of BP (-1.33V).

**P7688, 18:** This is correct; we will replace “rate diffusion constant” by “diffusion limited rate constant”.

**P7689:** We will add the electron transfer reaction diagram.

**P7692:** The value of 6 s is in fact corresponding to the gas phase residence time while the liquid films stays for longer times (up to 42 seconds). As the results in figure 6 are displayed the data as a function of liquid (aqueous salt solution of benzophenone) residence time, the value in P7692, line 16 should be 42 s which correspond the residence time of liquid at 40 cm of injector position. We will correct also the same error in P7693, line 7.

**P7693, line 7:** We observed that the BP amount decreased by approximately 45% without irradiation. This is mainly due to the volatility and low solubility of BP in water. On the

other hand, in presence of UV irradiation, the BP acts as a photosensitizer and forms the halogenated species by an electron transfer mechanism. The reduction of BP with irradiation is due to the reaction with reactive halogenated radicals. However, the total percentage of BP reduction (60%) is due to volatility and reactivity.

**P7692**, bottom paragraph, and Figure 6: the measurements indicated in Figure 6 correspond to the  $\text{Cl}^-$  concentration alone as the measured  $\text{Br}^-$  concentration was much smaller.

**Table 1:** Table 1 will be modified.

**Figure 4:** we will add in the figure legend the description of top and bottom axis. The top axis corresponds to scaling of transient decay obtained at 385 nm representing by the solid line. The bottom axis is the scale for transient decay obtained at 525 nm and configured by the dotted line.

The reviewer is right, the signal of transient does not to go up at  $t = 0$ , the time-shift in the signals is a consequence of scale. The top scale goes from 0 to 300  $\mu\text{s}$ , and bottom scale from 0 to 6  $\mu\text{s}$ .

All typos will be corrected in the revised version of the manuscript.