

## OH formation from excited triplet states

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The oxidation pathways in aerosols are to this day not fully understood. Oxidation by the OH radical is a major route for many organic compounds in the aqueous phase<sup>1</sup>. Though, it has been proposed recently that the excited triplet states of a range of organic molecules might also be influential in the oxidative capacity of aerosol chemistry<sup>2</sup>.

In this study we have investigated the ability of excited triplet states to produce OH in the aqueous phase. We compared two model photosensitizers, vanillin (VL) and 4-benzylbenzoic acid (4-BBA) with two known OH sources, NO<sub>3</sub><sup>-</sup> and H<sub>2</sub>O<sub>2</sub>. The OH formation was followed by the probe terephthalic acid (TA), that gives the fluorescent TAOH<sup>3</sup>. These results showed that the two photosensitizers were able to produce OH radicals, with OH formation rates of  $(1.1 \pm 0.19) \cdot 10^{-5} \text{ M s}^{-1} \text{ M(VL)}^{-1}$  and  $(2.56 \pm 0.47) \cdot 10^{-6} \text{ M s}^{-1} \text{ M(4-BBA)}^{-1}$ .

To estimate the effect these triplet states have in aerosol conditions, we assume that humic-like substances (HULIS) act similar to VL and 4-BBA. Using concentrations of HULIS, nitrate, and hydrogen peroxide in aerosols, we can estimate and compare OH formation rates of the different sources. In urban aerosol conditions, we estimate OH formation rates of excited triplet states that are a few orders of magnitude larger than those of nitrate or hydrogen peroxide, hereby showing an overlooked source of OH in aerosols.

The present study helps emphasize that excited triplet states play a significant role in aerosol chemistry.

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