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Environmental Chemistry

Supplementary Material

Enhanced formation of bromophenols by anthraquinone-2-sulfonate and benzophenone: implications for photochemical production of organobromine compounds by dissolved organic matter in a marine environment*

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Text S1

Sample preparation:

The concentrations of bromophenols were analyzed by gas chromatography mass spectrometry (GC–MS). The sample solution (100 mL) was spiked with 2-hydroxy-5-chlorobiphenyl (100 μg L^{-1}) as the internal standard, and then acidified to pH ~2 using 2.5 mol L^{-1} H_2SO_4, followed by extraction with dichloromethane (15 mL, 2x). After dehydration using an anhydrous sodium sulfate column, the extract was concentrated to 500 μL for direct analysis by GC–MS.

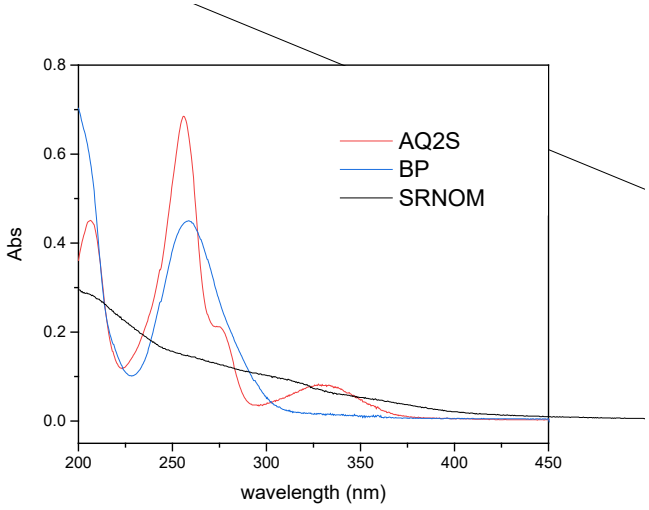

Fig. S1 UV-vis spectra of 10 μmol L^{-1} AQ2S, BP and 5 mg L^{-1} SRNOM

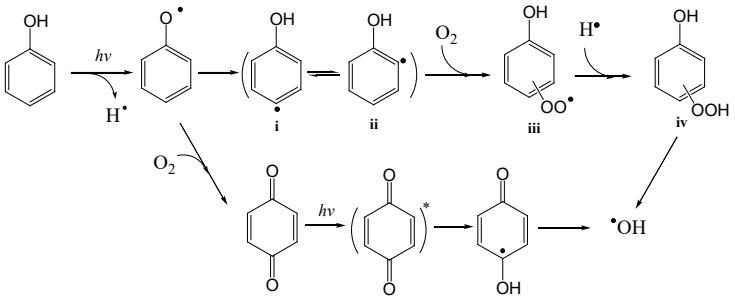

Fig. S2 Possible formation pathways of •OH from the photochemical reaction of phenol after irradiation.

Direct excitation of phenol by light leads to the formation of phenoxyl radical (ArO•) and H radical (Dzengel et al. 1999). The single electron on phenoxyl vibrates onto aromatic carbon resulting **i** and **ii** which react with molecular oxygen forming aryldioxyl radical (ArOO•)**, iii** (Li and Chignell 1987). Jiang et al. (2020) have also demonstrated that the ArOO• radical is one of a source of •OH via the intermediate **iv**. Another pathway for •OH is a secondary photochemical reaction of phenol, p-benzoquinone was the main photoproduct of phenol and its excited state would attack water to produce p-benzosemiquinone and •OH. (Ononye and Bolton 1986; Ononye et al. 1986).

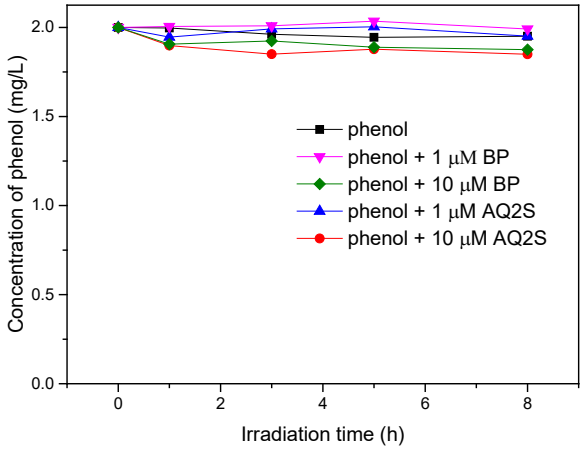

Fig. S3 The photodegradation of phenol in the presence of 8 mmol L^{-1} bromide under different conditions.

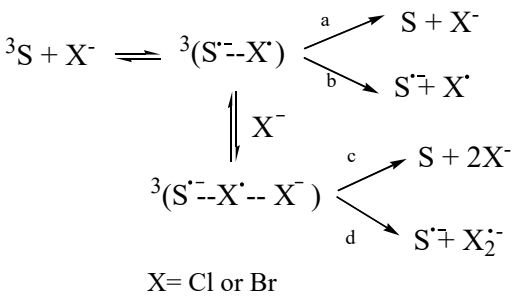

Fig. S4 Proposed pathways of sensitized oxidation of halide ions in aqueous solutions.

References:

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