Supplementary Information for Time-Resolved and Steady-State Irradiation of Hydrophilic Sulfonated Bis-triazinyl-(bi)pyridines – Modelling Radiolytic Degradation

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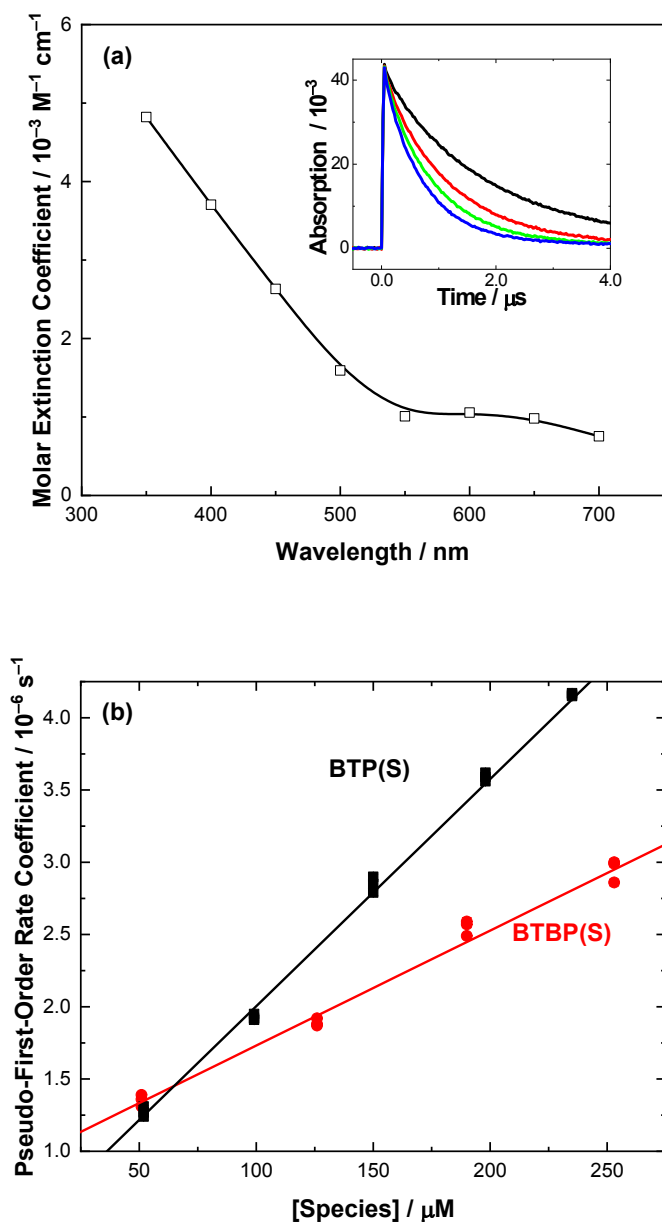**Reaction Kinetics Figures**

Figure 1. (a) Transient spectra for the reduction product of the hydrated electron reaction with BTBP(S) for 105.5 µM BTBP(S). Spectral intensity measured at end of hydrated electron decay (~5-6 µs after pulse, see *Inset*). *Inset:* Kinetic decay of the hydrated electron in pH 7.01, N$_2$-saturated, aqueous solution containing 25.0 mM tertiary butanol at 22.4 °C in the presence of 21.4 (**Black**), 42.0 (**Red**), 61.2 (**Green**) and 105.5 (**Blue**) µM BTBP(S). **(b)** Second-order determination of the rate coefficient for the hydrated

electron reaction with BTP(S)(■) BTBP(S)(●). Solid line is a weighted linear fit, with slope corresponding to the second-order rate coefficient: $k_{BTP(S)}$ = (2.74 ± 0.35) $\times$ 10^9 M^{-1} s^{-1} and $k_{BTBP(S)}$ = (7.98 ± 0.26) $\times$ 10^9 M^{-1} s^{-1}.
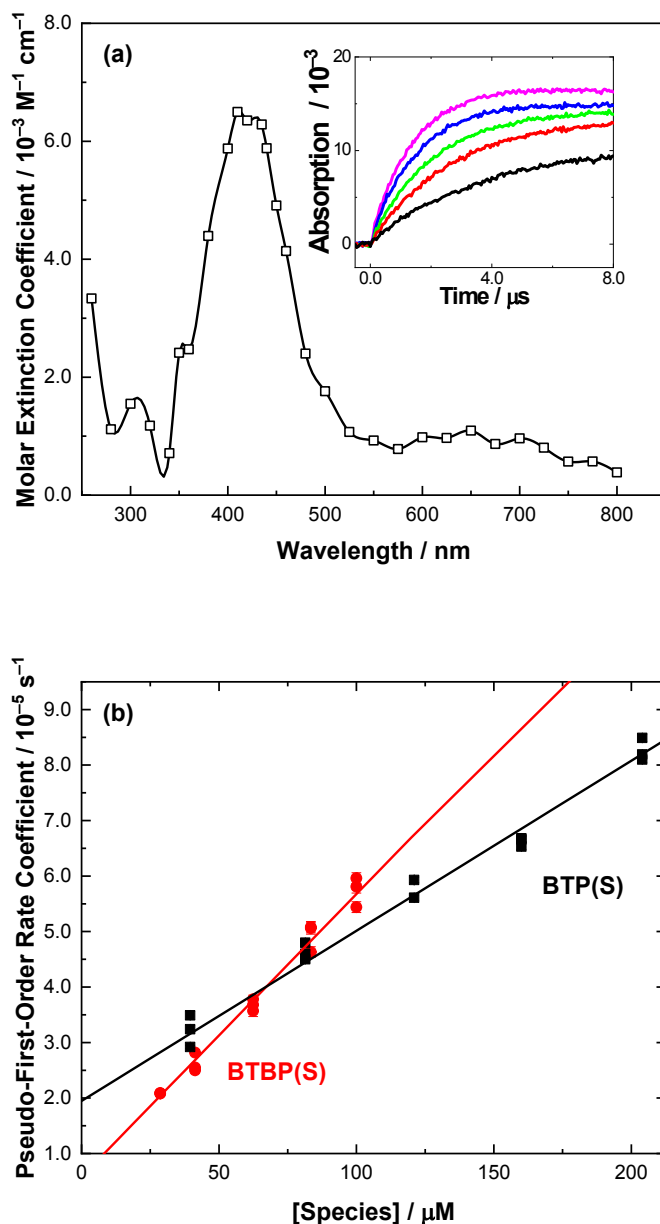

Figure 3. (a) Transient spectra for the reduction product of the hydrogen atom reaction with BTBP(S) for 146.0 µM BTBP(S). Spectral intensity measured at end of kinetic growth (~6-7 µs after pulse, see *Inset*). *Inset*: kinetic growth behavior in pH 2.00, N₂-saturated aqueous solution containing 20.0 mM tertiary butanol at 22.3 °C in the presence of 30.7 (**Black**), 56.4 (**Red**), 85.9 (**Green**), 120.6 (**Blue**), and 146.0 (**Magenta**) µM BTBP(S). **(b)** Second-order determination of the rate coefficient for the hydrogen atom reaction with BTBP(S)(■) and BTBP(S)(●), based upon pseudo-first-order exponential growth fits to raw kinetic data. Solid lines are weighted linear fits, with slopes corresponding to the second-order rate coefficient: $k_{BTP(S)}$ = (3.07 ± 0.11) $\times$ 10^9 M^{-1} s^{-1} and $k_{BTBP(S)}$ = (5.20 ± 0.18) $\times$ 10^9 M^{-1} s^{-1}.
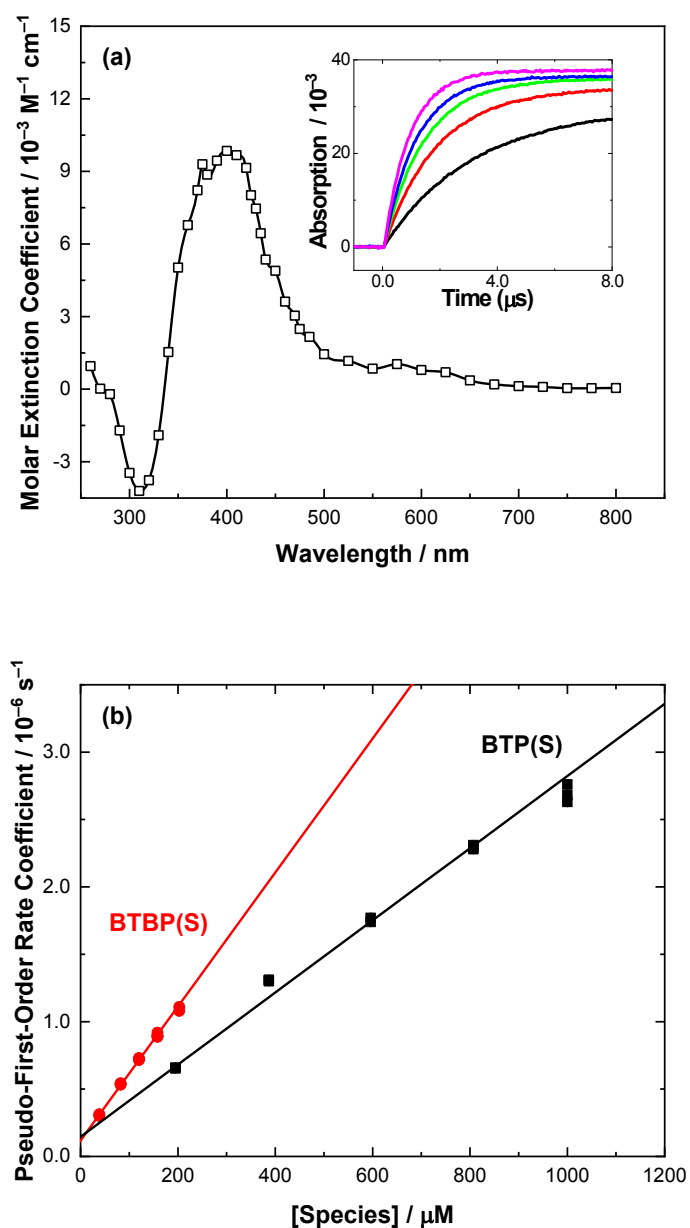
Figure 2. (a) Transient spectra for the oxidation product of the hydroxyl radical reaction with BTBP(S) for 202.6 µM BTBP(S). Spectral intensity measured at end of kinetic growth (~5-6 µs after pulse, see *Inset*). *Inset:* kinetic growth behavior in pH 7.02, N_2O-saturated aqueous solution at 22.2 °C in the presence of 38.5 (**Black**), 82.3 (**Red**), 120.3 (**Green**), 158.1 (**Blue**), and 202.6 (**Magenta**) µM BTBP(S). **(b)** Second-order determination of the rate coefficient for the hydroxyl radical reaction with BTP(S)(■) and BTBP(S)(●), based upon pseudo-first-order exponential growth fits to raw kinetic data. Solid lines are weighted linear fits, with slopes corresponding to the second-order rate coefficient: $k_{BTP(S)}$ = (2.48 ± 0.14) $\times$ 10^9 M^{-1} s^{-1} and $k_{BTBP(S)}$ = (4.24 ± 0.05) $\times$ 10^9 M^{-1} s^{-1}.
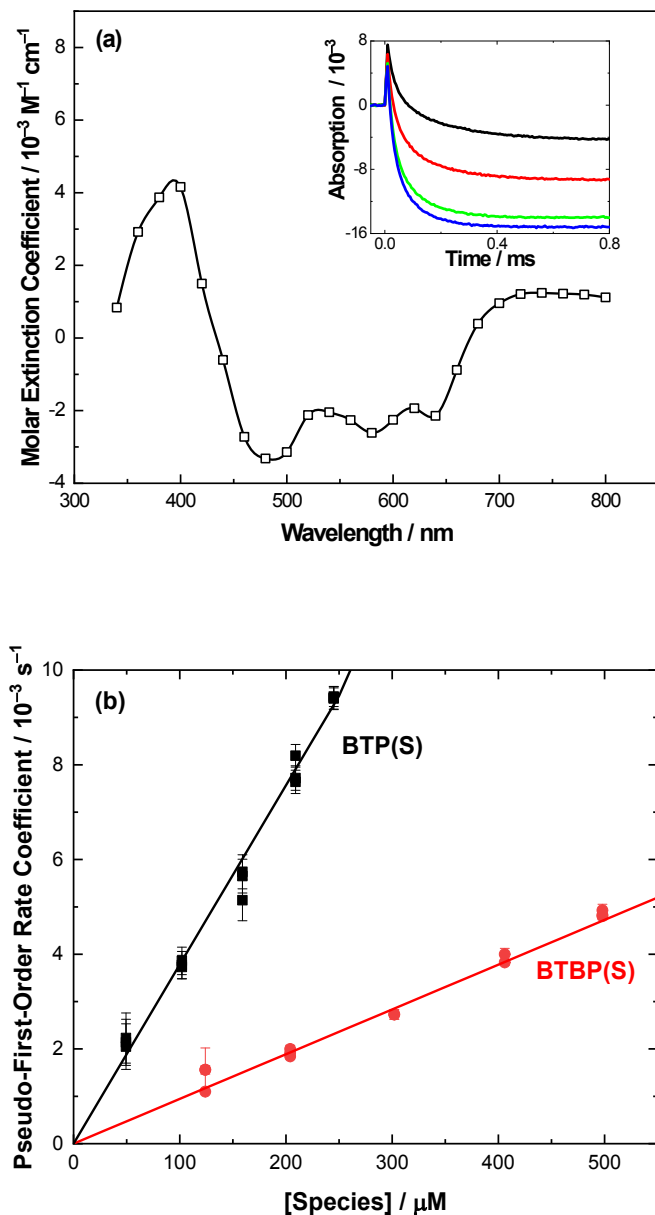
Figure 4. (a) Measured transient absorbance for the oxidation product of the nitrate radical reaction with BTBP(S) for 244.7 μM BTBP(S). Spectral intensity measured at end of kinetic growth (~600-700 μs after pulse, see *Inset*). *Inset*: Kinetic growth behavior in 6.0 M nitric acid at 22.0 °C in the presence of 49.4 (**Black**), 102.4 (**Red**), 208.7 (**Green**), and 244.7 (**Blue**) μM BTBP(S). **(b)** Second-order determination of the rate coefficient for the nitrate radical reaction with BTBP(S)(■) and BTBP(S)(●), based upon mixed first- and second-order decay fits to raw kinetic data. Solid lines are weighted linear fits, with slopes corresponding to the second-order rate coefficient: $k_{BTP(S)} = (3.72 \pm 0.13) \times 10^7$ M^{-1} s^{-1} and $k_{BTBP(S)} = (1.04 \pm 0.07) \times 10^7$ M^{-1} s^{-1}.