

Evaluation of triclosan's photodegradation under day-night shifts using carbon-chlorine CSIA and isotope model

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Sunlight induced degradation plays a significant role to eliminate organic pollutants such as triclosan (TCS) in streams. Our study conducted laboratory experiments to simulate photodegradation of TCS under natural day-night shifts. Compound-specific carbon and chlorine isotope analysis were applied to characterize different bond-cleavage pathways at different reaction stages. TCS reaction products were characterized by using Fourier transform ion cyclotron resonance mass spectrometry. Moreover, a numerical model was developed to simultaneously describe concentration and stable isotope variations of TCS. Temporal variations of isotopic patterns were observed for TCS at different light conditions, specially, in presence of sulfate ions, indicating that day-night alternations could lead to different predominant bond-cleavage pathways. To end, we proposed a realistic framework for sunlight-induced natural attenuation of TCS in water, and our findings also provided mechanistic understanding of the bond-cleavage pathways.