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Mid-year report
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By the end of this past summer, my lab partner, Amber Hiranaka, and I completed a little over 400 hours of laboratory research on the photolysis of bisphenols. Under the mentorship of Dr. Latch, I focused my research to the degradation kinetics of bisphenol S (BPS) and bisphenol F (BPF), two of the more commonly used substitutes for BPA in the plastics and paper manufacturing industries. We sought to determine the rate at which these bisphenols degraded under direct UV light, and then to elucidate the mechanism by which they degraded. Earlier, it had been determined that BPS undergoes direct photolysis, meaning that the molecule itself interacts with photons to degrade and produce photolytic by-products. Increasing the concentration of natural organic matter (NOM), which is chiefly composed of concentrated fulvic acids from terrestrial and microbial sources, was found to act as a filter for sunlight, thus decreasing the rate of degradation. BPF, on the other hand, was hypothesized to degrade indirectly – through reaction with photolytically-produced intermediates (PPRIs). We sought to determine the particular intermediates involved and the mechanism of reaction.

By altering the pH of the BPF solutions and either removing PPRIs or incorporating quenchers into solution, we were able to determine the most probable mechanism of degradation of BPF. We tested for the involvement of singlet oxygen ($^1O_2$), a PPRI, by removing oxygen from the sealed tube system all together and infusing it with pure N_2. It has been demonstrated that $^1O_2$ in turn quenches another significant PPRI, triplet state (photolytically excited) organic matter (^{3}NOM). Our results showed that removing oxygen and infusing N_2 increased the rate of degradation at pH 7, leading us to speculate that ^{3}NOM is a significant reaction intermediate for the degradation of BPF. This hypothesis was further confirmed when photolytic degradation accelerated after the addition of the ^{3}NOM quencher, sorbic acid.

Currently, Dr. Latch and I are working to draft a paper on this subject for publishing. This past fall I completed the introduction section for the paper as part of my senior synthesis project and am at this moment working to revise it to include the latest findings published in *Environmental Science Technology.* I plan to discuss and attempt to draft a Discussion section for the paper with Dr. Latch at the end of this quarter or the beginning of the next. Personally, I have goals to distill our analysis, determine any practical applications for the information, and broaden its scope for discussion with a more general audience by the time I present at the end of spring quarter.