

LC/UV and LC/MS Quantification of Organic Contaminants following Photo-oxidation in Natural Waters and Riverine Biofilms.

Advanced oxidation technologies (AOTs) are receiving increasing attention as methods for the destruction of organic contaminants in air and water. These involve the production of a reactive transient species (usually hydroxyl radical) which promotes oxidation of the contaminant. Commonly, photolytic processes such as TiO₂ photo-oxidation are employed for the generation of hydroxyl radicals. Analytical methods are critical for monitoring degradation efficiency and for the detection and quantification of recalcitrant or toxic intermediates which can be generated by AOTs. This talk illustrates the use of LC/UV and LC/MS for the quantification of trace amounts of N-methylpyrrolidinone (NMP, a common industrial solvent) and resulting TiO₂ photo-oxidation intermediates in water. Liquid chromatography (C₁₈ stationary phase, isocratic elution with 5/95 acetonitrile/water) with UV absorbance detection at 202 nm was found to be satisfactory for the detection of NMP and NMS (N-methylsuccinimide, a primary photo-oxidation intermediate) in water with a detection limit of 100 ppb (NMS) and 200 ppb (NMP). A combined process employing TiO₂ photo-oxidation followed by biofilm uptake was also investigated. In this case, methanol extraction followed by LC/MS (with an electrospray interface in the positive ion mode) was required to detect the presence of NMP in the biofilm.