Atlantium
Illuminating Water Technologies

APPLICATION BRIEF

Advanced Oxidation Process (AOP)
Hydro-Optic™ Technology

NDMA Removal with Atlantium's Hydro-Optic™ UV AOP Technology

UV-photolysis is the most common method to treat N-nitrosodimethylamine (NDMA)[1] which are considered carcinogenic at extremely low concentrations in the sub-micromolar range (sub-ppb). Conventional remediation technologies such as activated carbon, air stripping, and reverse osmosis struggle to remove NDMA, while the photochemical reaction of UV-photolysis is extremely effective at degrading the compound and its precursors.

In UV-photolysis, chemical contaminants such as NDMA, are exposed to direct ultraviolet (UV) light and are broken down into harmless constituents. NDMA is photolyzed by UV light at a wavelength of approximately 228 nanometers (nm) (Mitch and others 2003b).

Atlantium offers a novel UV-photolysis advanced oxidation process (AOP) based on its Hydro-Optic™ (HOD) UV technology that uses proprietary medium pressure (MP) lamps that provide polychromatic UV light (200–410nm). The HOD UV technology offers improved efficiency for organic reduction with superior monitoring capabilities over other AOP technologies to assure compliance.

HOD UV systems require less lamps to achieve the same UV dose as low pressure (LP) UV systems. This significantly reduces the maintenance requirements of the HOD UV technology compared to complex LP systems that use ten times more the number of lamps.

Most importantly, when a UV system has a small number of lamps they can be monitored individually and increase reliability. Chemical contaminants are not monitored continuously or even daily so choosing a system that reliably delivers and monitors the required UV dose is critical.

Figure 1:
Hydro-Optic™ (HOD) UV system offers improved efficiency for organic reduction with superior monitoring capabilities over other AOP technologies to ensure compliance.

Atlantium uses an advanced and proprietary control system, featuring real-time water quality and lamp performance monitoring to ensure treatment efficacy. The HOD UV technology measures %UVT, flow rate, and UV lamp intensity (kW) in real time to maintain the minimum required UV dose. UVT is an indicator of water quality and designates the percentage of UV light that passes through the water.

Atlantium's HOD UV systems (Figure 1) monitor each MP lamp individually to make sure that— "what you see is what you get". As UVT and lamp output are measured separately, the HOD UV system automatically adjusts lamp power when conditions fluctuate so that the minimum required dose set by the user is guaranteed to be delivered.

In a pilot test in North America, the HOD UV technology demonstrated a high removal efficiency for NDMA. The HOD UV technology treated influent NDMA concentrations of 10,000 ppt to 2ppt. Data from this pilot is shown in Figure 2.

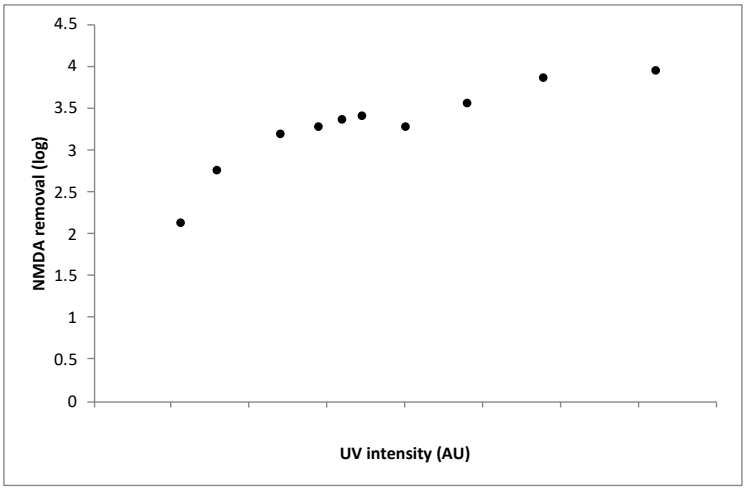

Figure 2:
Results of HOD UV AOP degradation of NDMA from an initial concentration of 10,000 ppt to below a discharge detection limit of 2 ppt at a pilot site in North America.

[1} Mitch, W.A., Sharp, J.O, Trussell, R.R., Valentine, R.L., Alvarez-Cohen, L., and D.L. Sedlack. 2003b. "N-Nitrosodimethylamine (NDMA) as a Drinking Water Contaminant: A Review." Environmental Engineering Science. Volume 20 (5). Pages 389 to 404. superfund.berkeley.edu/pdf/231.pdf

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