Navigating Tradeoffs between Energy Efficiency and Micropollutant Removal to Advance Sustainable Wastewater Treatment

Wednesday, January 28, 2015, 4:30 – 5:30 PM
1670 Beyster Building (North Campus), University of Michigan

Abstract: Wastewater treatment plants (WWTPs) are an entry point for pharmaceuticals in the environment, yet also a last line of defense against this chemical pollution. We lack a clear understanding of how WWTP process parameters, such as dissolved oxygen (DO) concentration, impact pharmaceutical fate. This study examined how reducing aeration, one strategy used to achieve energy savings at the WWTP, impacts pharmaceutical removal. We found that DO concentration both (1) directly impacts pharmaceutical removal because it influences the physiology of the microbes involved in biodegradation; and (2) indirectly impacts pharmaceutical removal by shaping the wastewater microbial community. We observed a more diverse microbial community grown under low DO (~0.3 mg/L) than high DO (> 4 mg/L) conditions. Further, we found a positive association between pharmaceutical loss and microbial biodiversity for many of the pharmaceuticals studied. This research combines environmental microbiology and chemistry to improve our understanding of trade-offs between energy efficiency and pharmaceutical removal with low DO treatment.