Solutionwerks Project Overview
Adam Plucinski, Sampath Kethavarapu, Chris Wulderk, Will Atcheson

The objective of the project is to evaluate the feasibility of substituting oxygen for air in those municipal water treatment systems, which use fine bubble dispersion systems without having to alter the current configuration or the design of the treatment basins. The report first introduces the two main technologies being used in today’s wastewater treatment plants i.e. fine bubble dispersion systems which use air and surface aeration systems which use oxygen. Later tests will be shown to determine the material compatibility of fine bubble systems for pure oxygen, its dissolution efficiency and energy efficiency.

Design criteria include:

1) Ensure compatibility between oxygen and diffuser disk.
2) Obtain correct change in dissolved oxygen for prime bacterial growth (around 3-5 ppm).
3) Test and calculate energy efficiency of air against pure oxygen.
4) Mimic the existing basins that are used in treatment facilities.

To satisfy criteria number 1, an extensive journal search was conducted to find compatibilities. The testing of our final apparatus also showed that the ceramic disk was not affected by the pure oxygen source.

For criteria number 2 and 3, we tested air versus pure oxygen at two different pressures to show that oxygen can yield the change of 3 ppm quicker than air and at lower pressures. These results can be seen below:

For criteria 4, we used a 16 foot PVC column to hold 15 feet of water to mimic the standing water height that is practiced in industry. The entire prototype can be seen below: