

# Preventing the Global Reproductive Failure of Aquatic Life through the Catalytic Treatment of Endocrine Disrupting Compounds in Municipal Waste Water

Loeb, Zachary (School: No. 6 High School)

Endocrine Disrupting Compounds (EDCs) have a profound impact on aquatic reproductive processes. Current municipal waste water treatment plants (MWTP) do not eliminate highly persistent EDC's such as Atrazine, Estradiol (E2), and Ethinyl estradiol (EE2). This project's goal is to see if catalytic municipal waste water treatment will eliminate these persistent EDCs. Water samples were collected at the MWTP's pre-chlorination and post-chlorination points. Samples of E2, EE2 and Atrazine in distilled water were prepared. Catalytic Treatment using Fe-TAML was performed on all samples. Concentration testing for E2, EE2 and Atrazine using enzyme linked immunosorbent assays was performed. E. coli membrane filtration testing was performed to determine total coliform for Fe-TAML treated pre-chlorinated municipal waste water and post chlorinated municipal waste water. For each EDC type (E2 EE2, Atrazine and municipal waste water effluent) three control groups (Untreated, Partially Treated, and FE-TAML treated) were created. For each group, 6 Medaka fish eggs were labeled, photographed and measured to determine the growth rate every 24 hours. EDC exposed untreated Medaka eggs developed at a reduced rate of more than 31%. EDC exposed Medaka eggs treated with Fe-TAML developed at the same rates as Medaka Eggs in distilled water within 5 percent. Atrazine was detected at 2 ug/Liter in the post chlorinated municipal waste water sample. After Fe-TAML treatment, the Atrazine was degraded to the point that it was below detection limits. Fe-TAML treatment degraded EE2, E2 and Atrazine by greater than 93% within 30 minutes according to the reaction kinetics study. Fe-TAML treatment was also 25 times more effective than the MWTP's chlorination process at removing E. coli.

## Awards Won:

Third Award of \$1,000