

On-site Treatment & Destruction of an Antimicrobial API in Pharmaceutical Rinse Water to Eliminate Off-Site Trucking and Incineration

Customer Pain Point

A US pharmaceutical manufacturing facility generates several hundred thousand gallons per year of clean-in-place rinse water contaminated with an antimicrobial active pharmaceutical ingredient (API) and organic solvents. The stream has historically been trucked off-site for incineration. The facility wanted to treat the stream on-site to eliminate off-site trucking and incineration to reduce cost and risk, streamline operations and align sustainability performance with corporate goals. In order to treat the stream on-site and discharge the treated water to sewer, the API needs to be reduced to < 0.07 mg/L.



Axine technical team reviewing results

Axine's Solution

Axine electrochemical oxidation solutions are highly versatile and capable of treating a broad range of organic pollutants including APIs to very low levels to meet stringent discharge requirements. The ability to completely mineralize APIs in highly contaminated wastewater provides pharmaceutical manufacturers

Axine Value Proposition



Generates opex savings via Axine's service model



Eliminates ~20,000 miles/yr of off-site wastewater trucking



Eliminates 1.7 million lbs/yr of waste incinerated off-site



Aligns site performance with corporate sustainability goals

with a robust tool to achieve risk quotients less than 1 and extremely low Predicted No Effect Concentration (PNEC) values for their most ecotoxic APIs.

Under a multiyear service agreement, Axine owns, operates, services and maintains a wastewater treatment system on-site at the customer facility. The Axine system oxidizes and destroys the API to non-detect without generating solid or liquid wastes. Axine is responsible for complete end-to-end operation, monitoring and maintenance of the system to ensure treatment compliance. The customer's

Parameter	Units	Treatment Required	Untreated Water	Axine Treated	% Reduction
API	mg/L	< 0.07	up to 7	< 0.05*	> 99.2%
COD	mg/L	N/A	up to 4,000	< 50*	> 98.7%

Table 1 - Wastewater parameters and treatment results

*Values indicate the analytical detection limits of these compounds

capital investment is minimal, and they do not have to allocate resources to operate the system. By implementing an Axine solution, the customer eliminates off-site disposal of 1.7 million lbs/yr of waste, eliminates > 20,000 waste trucking miles/yr, reduces greenhouse gas emissions, stabilizes costs and generates opex savings.

Treatment Results

Before entering into a commercial service agreement, Axine and the customer collaborated on treatability and pilot testing to verify the performance and cost of Axine's solution. Multiple tests verified successful oxidation and destruction of the API to < 0.05 mg/L, which is below the detection limit for this API and below the site requirement of < 0.07 mg/L for discharge to sewer, as shown in Table 1 and Figure 1.

System Design & Operation

Axine's fully automated turnkey system includes wastewater receiving tanks, electrochemical reactors, power supply, controls and instrumentation, trace by-product gas management and flow management systems. Axine's wastewater treatment "as-a-service" package includes 24x7 remote system monitoring, routine and preventative maintenance, all consumables and replacement parts, rapid-response field service support, on-line system monitoring and monthly KPI reporting. Operational and performance data is collected wirelessly. Our proprietary data analytics monitor a wide range of performance metrics to enable safe and reliable operation. Customers can monitor performance on-line at any time.

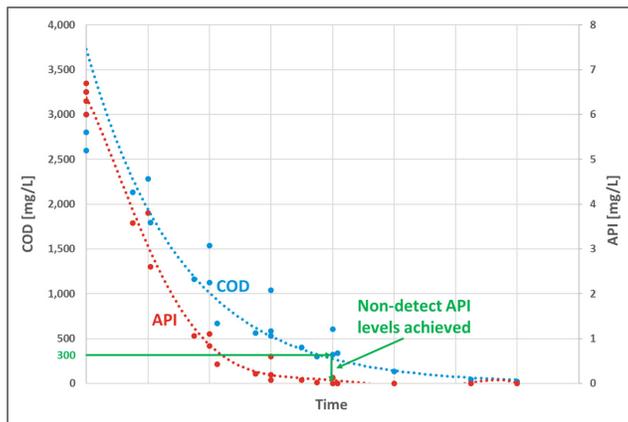


Figure 1 - Treatment reduction curves for API and COD concentrations before, during and after Axine treatment of an antimicrobial API

About Axine

Axine has created a new standard for treating toxic, recalcitrant organic pollutants in pharmaceutical, chemical and other industrial wastewater to address a global problem. Axine's breakthrough solution combines advanced electrochemical oxidation technology with a flexible, modular system design and a unique wastewater-as-a-service business model. Axine provides customers with a robust, versatile solution capable of treating all types of organics to meet the most stringent treatment requirements without using hazardous chemicals. Axine's service model enables customers to achieve wastewater and sustainability goals with minimal capital investment and technology risk. For more information, please visit www.axinewater.com

Axine Water Technologies

108 - 2386 E. Mall
Vancouver, BC V6T 1Z3

T: 604-336-8900
E: info@axinewater.com
www.axinewater.com

axine
WATER TECHNOLOGIES