

On-Site Electrochemical Treatment of An Antimicrobial API in Pharmaceutical CIP Rinse Water

Customer Pain Point

A US pharmaceutical manufacturing facility is adding a new production line that will produce more than 1.25 million gallons per year of clean-in-place (CIP) rinse water contaminated with an antimicrobial active pharmaceutical ingredient (API) in a background water matrix of USP grade oil, other organic compounds, suspended solids and fluoride.

The site wanted to achieve PNEC for this API in the receiving water body. To achieve this objective, on-site treatment of the rinse stream is required to reduce the concentration of API from a maximum of 4,000 µg/L to < 300 µg/L. Several options were evaluated, and Axine was selected for a multi-year service agreement to design, build, own and operate a turnkey wastewater treatment system to treat and destroy the API in the rinse water to meet the treatment objective.



Axine system loaded for shipment to customer site.

Axine Value Proposition



Provide on-site treatment & destruction of the API



Enables the site to safely discharge treated rinse water to sewer



Eliminates the requirement for high cost off-site trucking and disposal



Provides operational flexibility to accommodate future expansion

Test Methodology

Before entering into a service agreement, Axine and the site collaborated on treatability and pilot testing of model and validation batch rinse water to verify the performance and cost of Axine's solution. Samples of rinse water were shipped to Axine for testing. The rinse water was analyzed before and after treatment for APIs, COD, TOC, TSS, TDS and other parameters. API analysis was conducted by an independent lab using an analytical method developed specifically for the API in a wastewater matrix.

Axine Treatment Results

Multiple tests verified that Axine successfully oxidized and destroyed the API to sub-ppb (parts per billion) or < 1 µg/L, which is below the detection limit for this API and below the site requirement of < 300 µg/L for discharge to sewer. Table 1 shows the concentration of API, COD and TOC before and after treatment by Axine from one example test. The API was reduced by > 99.9% from 3,910 µg/L to < 1 µg/L; COD was reduced by > 98.9% from 822 mg/L to < 10 mg/L; and TOC was reduced by > 99.9% from 248 mg/L to < 1 mg/L.

Figure 1 shows the treatment reduction curves for COD and the API for the example test. The objective for API reduction is met when COD is reduced to < 225 mg/L, which corresponds to approximately 70% COD reduction.

System Design & Operation

Axine's turnkey, containerized treatment system for this application includes pretreatment (oil and grease removal and pH adjustment), membrane concentration, wastewater receiving tanks, electrochemical reactors, power supply, controls and instrumentation, trace by-product gas management and flow management systems.

Axine's services include 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. Proprietary data analytics provide a wide range of performance metrics to enable safe and reliable operation.

Parameter	Units	Treatment Requirement	Before Treatment	Axine Treated	% Reduction
API	µg/L	< 300	3,910	< 1*	> 99.9%
COD	mg/L	N/A	822	< 10*	> 98.9%
TOC	mg/L	N/A	248	< 1*	> 99.9%
pH	SU	N/A	12	7	N/A

Table 1 - Wastewater parameters before and after Axine treatment.

*Values indicate the analytical detection limits of these compounds

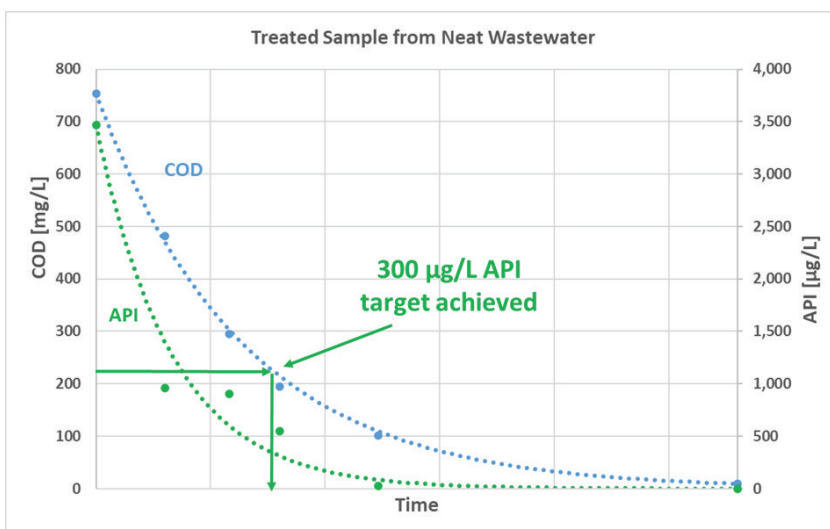


Figure 1 – Treatment reduction curves for API and COD concentrations before, during and after Axine treatment of an antiparasitic API.

About Axine

Axine has created a new standard for treating APIs, solvents and other organic pollutants in pharmaceutical wastewater. Axine's on-site solutions combine its electrochemical oxidation technology with a flexible, modular system design and a service business model. This provides customers with a robust, versatile solution capable of treating virtually any organic pollutant to achieve the most stringent regulatory and/or PNEC requirements. Axine's service model enables customers to achieve their wastewater and sustainability goals with minimal capital investment or operational risk. For more information, please visit www.axinewater.com

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