

# On-site Treatment of Pharmaceutical Clean-in-Place Wastewater

## Customer Pain Point

A leading pharmaceutical manufacturer operates a facility located in the Northeastern United States that uses an isopropyl alcohol-based (IPA) solvent as part of their reaction vessel wash process. Oxidation of isopropanol via biological and other processes can lead to the formation of acetone in wastewater, an EPA regulated compound under Title 40 pretreatment standards.

The customer's goal was to reduce IPA concentration by 90% in the wastewater utilizing the Axine system as a pretreatment step prior to discharge to the sewer. This would ensure their acetone discharge does not exceed the daily 20.7 mg/L or 8.2 mg/L monthly average regulatory limit at the compliance sampling point. In addition, the Axine system needed to demonstrate the capability to treat any IPA peaks while maintaining effluent within acetone limits.



Axine's on-site system installation

## Axine's Solution

Under a multi-year service agreement, Axine owns, operates, services and maintains a wastewater treatment system at the facility. The customer's capital investment is minimal and they do not have to allocate

## Axine Value Proposition



Lowest cost solution for pre-treating organics before discharge to sewer



Ensures compliance with local, state & federal discharge standards



Automates & streamlines on-site wastewater treatment system

resources to operate the system. The Axine system oxidizes the IPA and acetone to trace levels of by-product gases including hydrogen, oxygen and carbon dioxide, which are vented to the atmosphere. No solid or liquid wastes are generated, and no hazardous chemicals are utilized. Axine is responsible for complete end-to-end operation, monitoring and maintenance of the system to ensure compliance.

## Treatment Results

Axine solutions are highly versatile and capable of treating a wide range of organic contaminants such as solvents, aromatics, polymers, surfactants, pesticides, active ingredients and other similar complex organic compounds. Initial testing was conducted on the wastewater, with starting concentrations of 500 mg/L isopropanol, and 75 mg/L acetone. Over a 24-hour test period, both isopropanol and acetone were removed effectively with concentrations of both compounds

reduced to <1 mg/L by the 20-hour mark, as shown in Figure 1 below.

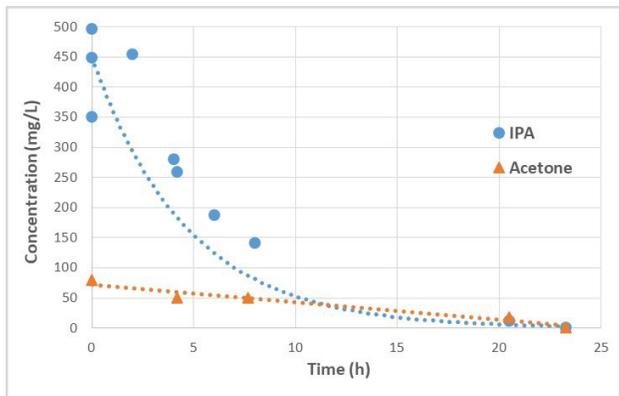


Figure 1 - Baseline Wastewater

A second round of tests was conducted on spiked wastewater, designed to mimic transient peaks of isopropanol concentrations that may occur at the facility. Starting concentrations were 900 mg/L isopropanol and 120 mg/L acetone. Over a 48-hour test period, both isopropanol and acetone were removed effectively with concentrations of both compounds reduced to <1 mg/L by the 30-hour mark, as shown in Figure 2 below.

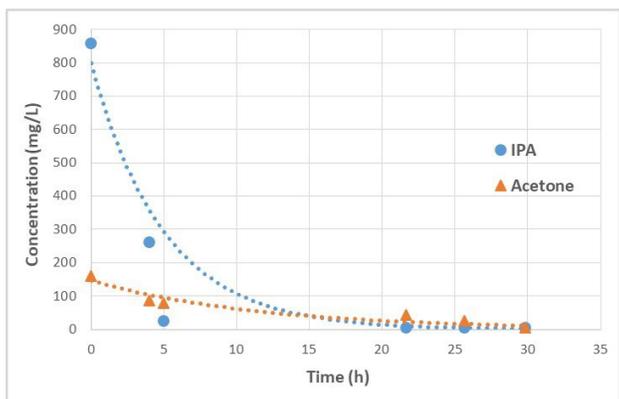


Figure 2 - Spiked Wastewater

Table 1 summarizes the wastewater composition both before and after Axine treatment. The test results were used to design the system to ensure the facility will meet all local, state and US EPA categorical discharge limits for acetone, even during transient peaks, while improving environmental performance.

Parameter	Units	Treatment Requirement	Influent	Treated Effluent
COD	mg/L	N/A	1,300	< 10
IPA	mg/L	< 5	500	< 1
Acetone	mg/L	< 2	75	< 1
pH	SU	4-12	5-6	10-11

Table 1 - Wastewater parameters and treatment results

## 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 monitors a wide range of performance metrics to enable safe and reliable operation. Customers can monitor performance on-line at any time.

*This project has been supported by the National Research Council of Canada Industrial Research Program (NRC IRAP) and Western Economic Development Canada.*

## About Axine

Axine has created a new standard for treating toxic organic pollutants in industrial wastewater to address a global problem for pharmaceutical, chemical, electronics and other manufacturing industries. Axine's breakthrough solution combines advanced electrochemical technology, modular system design and data analytics with a unique wastewater-as-a-service business model. By doing so, we enable customers to generate savings, lower risks, eliminate liabilities, streamline operations and minimize waste as well as improve safety and environmental performance. Contact us today for a solution tailored to your specific wastewater treatment needs.

### Axine Water Technologies

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

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

