

Treatment of Solvent-Laden Clean-in-Place (CIP) Pharmaceutical Wastewater

Customer Pain Point

A US pharmaceutical manufacturing facility generates CIP wastewater contaminated with organic solvents including acetonitrile, isopropyl alcohol (IPA) and methylene chloride. The total volume is approximately 50,000 gallons per year. It is currently drummed and trucked off-site for incineration. The plant wants to treat the wastewater on-site to reduce costs and risks by eliminating off-site trucking and incineration. In order to treat the stream on-site and discharge it to sewer, the methylene chloride and acetone need to be treated to meet EPA categorical limits of <0.7 mg/L and <8.2 mg/L, respectively. Axine was selected to perform treatability testing to verify the cost and performance of its technology to treat the solvents so the treated water can be safely discharged to sewer.



Axine pilot system at a customer site

Treatability Methodology

The facility shipped samples of CIP wastewater to Axine’s test facility. Axine technicians analyzed samples to establish the concentration of solvents, TDS, TSS and other parameters. Each sample was processed in Axine’s pilot system and the treated water was analyzed. Table 1 shows the wastewater composition before and after Axine treatment.

Axine Value Proposition



Generates immediate opex savings via Axine’s service model



Eliminates off-site trucking & incineration of wastewater



Eliminates ~400,000 lbs/yr of waste trucked off-site for disposal



Automates & streamlines waste treatment system

Treatment Results

As shown in Table 1, the starting concentration of IPA was 1,000 mg/L, acetonitrile was 660 mg/L, methylene chloride was 1,700 mg/L and acetone was 2 mg/L. Treatability testing verified successful oxidation and treatment of methylene chloride and acetone to the required levels necessary for discharge to sewer. Figure 1 below shows treatment reduction curves for COD, methylene chloride, IPA and acetone. As shown in the graph, the concentration of acetone initially increases and then decreases. This is because acetone is an intermediate by-product of IPA oxidation. As the IPA is oxidized, acetone is generated and subsequently eliminated via further oxidation of the wastewater. The ability of Axine’s technology to completely oxidize

Parameter	Units	Treatment Requirement	Influent	Treated Effluent
COD	mg/L	N/A	4,700	< 30
IPA	mg/L	N/A	1,000	< 10
Acetonitrile	mg/L	N/A	660	< 10
Methylene Chloride	mg/L	< 0.7	1,700	< 0.1
Acetone	mg/L	< 8.2	2	< 8.2
pH	SU	4-12	5-6	10-11

Table 1 - Wastewater parameters and treatment results

organic contaminants like IPA to trace gases is what differentiates it from other traditional oxidation approaches that only deliver partial oxidation.

Conclusion

The treatability test successfully verified Axine's capability to treat methylene chloride, acetonitrile, IPA and acetone in pharmaceutical CIP wastewater, so the treated water can safely be discharged to sewer. Adoption of Axine's on-site treatment solution will enable the customer to generate immediate savings, streamline operations and eliminate off-site trucking and incineration.

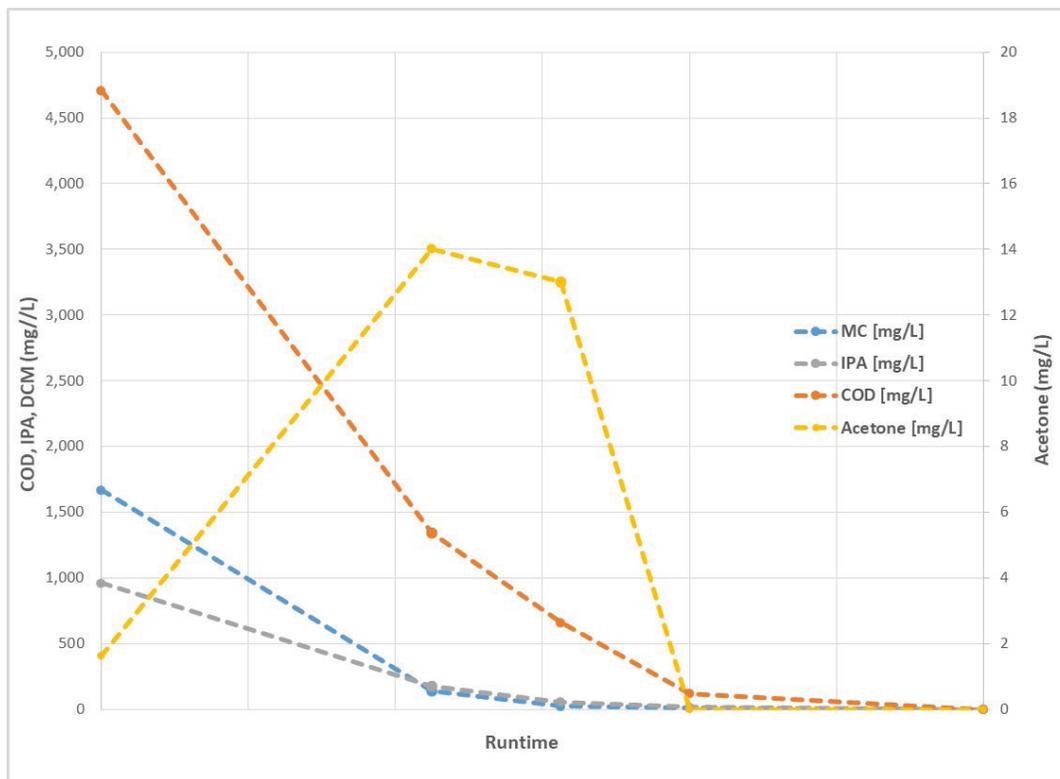


Figure 1 - Axine treatment performance over time

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.

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