nyex™
An Arvia Solution

Removal of Cetylpyridinium Chloride (CPC) from Personal Care Product Wastewater by Nyex™

Equipment Capacity/Flow Rate	Compounds of Concern	Influent Concentration	Treatment Targets	Unit Energy Consumption
Low Flow	CPC	202 mg/L	<50 mg/L	tbc

Background

A manufacturer of Personal Care Products approached Arvia looking for a solution to bolt-on to their existing wastewater treatment train for the targeted reduction of Cetylpyridinium Chloride (CPC).

The chemical is commonly found in mouthwashes, toothpastes, lozenges, throat sprays, nasal sprays and as an ingredient in certain pesticide formulations.

CPC has antiseptic properties which are used to kill bacteria and other microorganisms. Investigations have been carried out on microbial communities exposed to CPC in order to evaluate the chemical's impact on antimicrobial resistance (AMR). After 10 weeks of exposure, the microbial community tested was found to be less susceptible to CPC. This indicates the chemical's ability to alter the behaviour of microbial communities, leaving them resistant to its antiseptic properties.

The results of Arvia's project will have important implications in propelling further studies on how the exposure of CPC can contribute to AMR, as this could affect both aquatic species and human health.

Full scale Nyex™ containerised system

The Objectives

The aim of this trial was to demonstrate and evaluate the effectiveness of the Nyex™ process in the reduction of CPC levels in wastewater.

The manufacturer wanted to reduce CPC to below 50 mg/L from a complex wastewater for discharge in-line with their local regulation. The client had recently upgraded their product manufacturing portfolio and needed to upgrade their wastewater treatment facility in order for their wastewater to continue to be compliant and avoid regulatory fines.

Successful removal of CPC will prevent the need for transporting wastewater off-site to achieve the required treatment levels. The ongoing process of trucking wastewater off-site is not only costly but also and has negative environmental implications.

The Solution

Arvia's Nyex Rosalox system combines adsorption with electrochemical oxidation in a single, scalable unit. Organic contaminants are concentrated on the surface of Arvia's proprietary adsorption media, which is non-porous with high electrical conductivity.

This patented adsorbent media allows for targeted and continuous oxidation. Unlike granular activated carbon, Nyex™ media is effectively regenerated in-situ and the process can continue without interruption or replacement.

Results are achieved without chemical dosing or the generation of sludge, reducing costs in terms of transport of chemicals and specialist waste disposal. Nyex™ treated wastewater can also be reused in-process or in other areas of the business, such as for cleaning and toilet flushing to reduce utility costs.

The system provides a chemical free and environmentally sound solution, which comes in a modular design and can be bolted onto an existing treatment process. The Nyex™ process parameters are easily adjusted to suit amends to production outputs and seasonality, ensuring wastewater treatment remains effective despite these changes.

The trials were carried out on Arvia's laboratory scale Nyex 1-20a system.

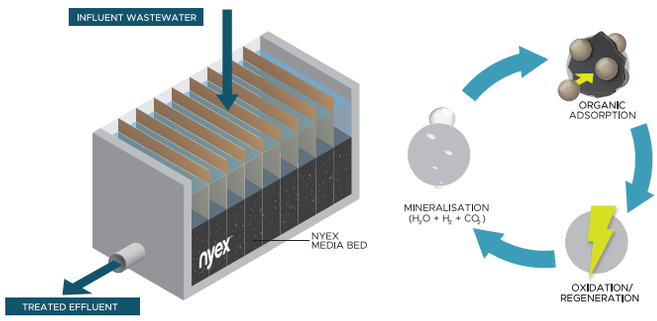

Figure 1 – Schematic of Arvia's Nyex™ Technology

The Results

The Nyex Rosalox system successfully removed CPC to exceed the requirement of 50 mg/L, achieving 16mg/L COD, as shown in Figure 2.

Client target - below 50 mg/L CPC

- **Influent water - 202 mg/L CPC**
- **Nyex™ Treated Water:**

- 16 mg/L CPC

- 90% CPC removal

- 90% COD removal

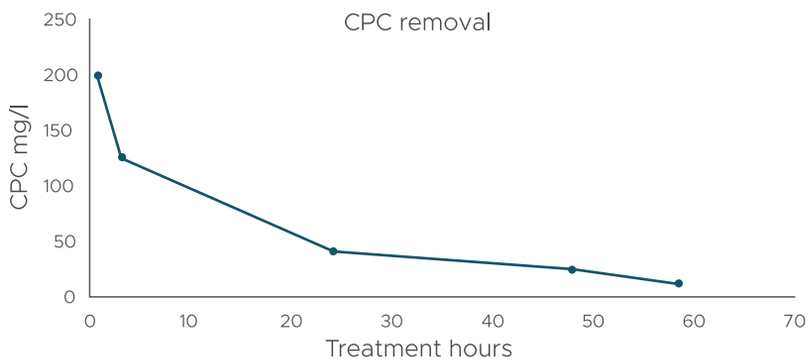

Figure 2 – CPC Removal by Arvia's laboratory Nyex 1-20a system, against treatment time.

Recommendations

These results demonstrate the capability of the Nyex™ process to deal with a range of CPC concentrations to provide removal exceeding the requirements of the client.

Arvia's recommended next steps are the installation of a Nyex™ treatment system to 'polish' the final effluent at the manufacturing facility to ensure compliant levels of <50 mg/L CPC.

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Get in touch to discuss your company's treatment challenges and arrange a treatability trial on your wastewater today.