



Nicotine and COD removal for Compliant Discharge and Water Reuse in the E-Cigarette and Tobacco Industry

Background

Two major tobacco processing facilities approached Arvia for water treatment support, one of whom wanted to achieve discharge compliance and the other who wanted to increase water reuse.

Tobacco processing usually results in wastewater containing COD and nicotine. Whether you want to reuse water or discharge to sewer it is necessary to reduce the overall organic loading and remove residual nicotine.

Preliminary studies show that inadequately treated wastewater containing organic compounds which eventually leaches into aquatic ecosystems, becomes acutely toxic to fish and microorganisms. This can lead to severe pollution of local waterways surrounding these facilities and negative press for the offending organisations.

An existing solution for the removal of these compounds is to collect the wastewater and truck it off-site for specialist treatment. Not only is this labour intensive for the company, it also comes with expensive recurring costs and environmental impacts.



Nyex™ containerised system

The Objectives

The two tobacco processing facilities we were working with were looking for more cost-effective and sustainable methods which were in-line with their water management plans.

Client One was a major tobacco manufacturer looking for a complete closed-loop solution in which Chemical Oxygen Demand (COD) would be reduced from 50mg/L to as close to zero as possible. This wastewater could then be reused for other purposes around the facility, including cleaning.

Client Two was looking for an on-site solution for the removal of nicotine from wash water collected from e-cigarette liquid vessels between production batches. Their existing process was to truck all wash down water off-site for specialist treatment as they are not permitted to release this water to sewer, due to the nicotine content.

The Solution

Arvia's Nyex Rosalox system combine adsorption with electrochemical oxidation in a single, scalable unit.

Contaminants are concentrated on the surface of Arvia's proprietary adsorbent media which is non-porous with high electrical conductivity.

This patented media allows for targeted and continuous oxidation using a low electrical current. Unlike Granular Activated Carbon (GAC), Nyex™ media is effectively regenerated in-situ and the process can continue without interruption or replacement.

The system provides a chemical free and environmentally sound solution, which comes in a modular design and can be integrated into an existing treatment train to improve organic removal capacities.

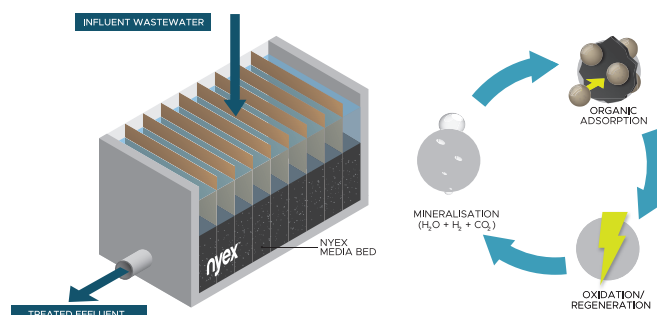


Figure 1 – Schematic of Arvia's combined adsorption and electrochemical oxidation process, Nyex™

The Results

Client One

The project involved the treatment of wastewater using a Nyex Rosalox system at the client's site on samples of wastewater taken at the final stage of their existing treatment train, for advanced 'polishing' treatment.

The inlet water was analysed at a COD level of around 50 mg/L and final samples were just above the limit of detection, as requested.

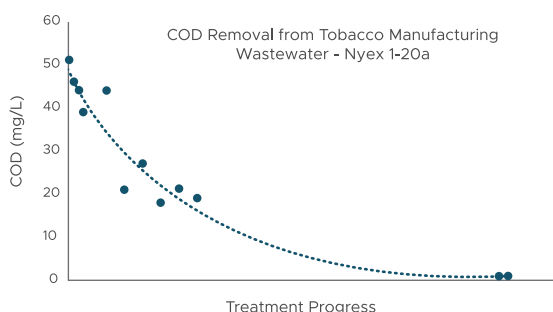


Figure 2 – On-site COD removal by Arvia's Nyex 1-20a system, against treatment progress

Client Two

This work was conducted to demonstrate the ability of the Nyex™ technology in removing nicotine from wash water, containing e-cigarette liquid.

For this study, the Nyex Rosalox was employed at Arvia's in-house laboratory facilities and results were as follows.

An inlet nicotine concentration of 9.84 mg/L was trialled, resulting in a 0.41 mg/L outlet concentration following treatment – a removal rate of 95.8%.

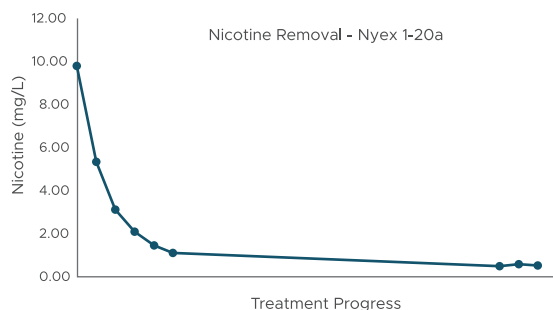


Figure 3 – Nicotine removal by Arvia's Nyex 1-20a system, against treatment progress

The above-mentioned treatments of COD for wastewater reuse and nicotine for compliant discharge to sewer, demonstrate the Nyex™ process's ability to manage recalcitrant, toxic contaminants in wastewater streams.

Arvia are continuing to work with a number of clients in the tobacco and smoke-free alternatives sectors with wastewater analysis and treatment, as well as ongoing value chain investigation to support further cost-saving and sustainable water management practices.

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