

AOP (UV/H₂O₂) & MIEX[®] Treatment Case Study

Dairy Wastewater Treatment / Recycling September 2007

BACKGROUND:

The dairy processing industry produces large quantities of milk powders, cheese, whey and lactose products, generating considerable amounts of wastewater due to the large volume of water present in raw milk (approximately 80-90%).

The MIEX[®] Technology can be used in combination with advanced oxidation processes (AOPs) to remove DOC from dairy wastewaters that can cause fouling or promote biological growth in downstream process equipment if it is recycled without prior treatment.

Pre-treating wastewater with AOPs acidifies the organic contaminants, making them more amenable to removal via MIEX[®] Treatment. Combining these technologies allows for each process to be optimized, thus keeping capital and operating costs to a minimum. This case study demonstrates the synergy between AOPs and MIEX[®] Treatment for removing DOC from dairy wastewater.

AOP TREATMENT (UV/H₂O₂):

UV-Peroxide treatment is based on the combined use of UV light and H₂O₂. The application of H₂O₂ causes the degradation of organic micro-contaminants and the UV light acts as an energy source which catalyses the degradation.

MIEX[®] TECHNOLOGY:

MIEX[®] (Magnetic Ion EXchange) Resin is an anion exchange resin, where a chloride ion exchanges with contaminant ions (i.e. DOC) that occupy the active site on the resin bead. The MIEX[®] Resin is known to remove colour from industrial effluents. The resin is applied in a mixed contact vessel with very high water velocities, up to 30 m/hr. The process is continuous, where fresh resin is constantly fed into the process while a side stream is simultaneously removed for regeneration. Therefore, the process never reaches exhaustion and the treated water quality remains consistent. Resin is regenerated with a brine (NaCl) solution, which removes the contaminants from the resin bead and replaces the chloride ions.

TESTS: UV/PEROXIDE & MIEX[®] TREATMENT

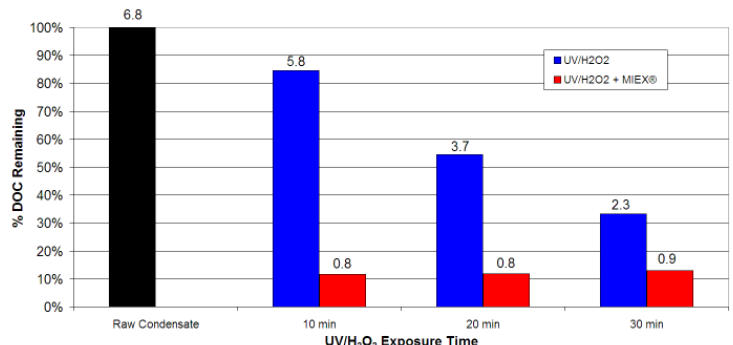
A combination of the two treatment processes significantly reduced DOC levels from condensate. When the raw condensate was exposed to

UV/Peroxide treatment for 10 minutes followed by MIEX[®] Treatment (200BV), DOC levels were reduced from 6.8mg/L in the raw effluent to 0.8 mg/L. This corresponds to a reduction of 88% in DOC, which is significantly better than treatment by UV/H₂O₂ alone.

Table 1: DOC Results for Combined UV/H₂O₂ & MIEX[®] Treatment

UV/H ₂ O ₂ & MIEX [®] Treatment	DOC (mg/L)	DOC Reduction %
Raw Condensate	6.8	-
10mins UV/H ₂ O ₂	5.8	15%
10mins UV/H ₂ O ₂ + MIEX [®]	0.8	88%
20mins UV/H ₂ O ₂ + MIEX [®]	0.8	88%
30mins UV/H ₂ O ₂ + MIEX [®]	0.9	87%

Figure 1: DOC Results for Combined UV/H₂O₂ & MIEX[®] Treatment



The application of UV/Peroxide before MIEX[®] Treatment resulted in the breakdown of organic matter in water which caused the production of carboxylic groups. These carboxylic compounds lead to the formation of anionic products that enabled removal by the MIEX[®] Resin.

SUMMARY:

UV/Peroxide as a pre-treatment to the MIEX[®] Technology has shown to significantly improve the removal of dissolved organic carbon (DOC) from condensate water produced from dairy processing. The results indicate that combination of AOP & MIEX[®] Technology is suitable to treatment of dairy wastewaters to assist with wastewater treatment and recycling/reuse initiatives.