

PRO₃MIX Advanced Oxidation Process Eliminates Metaldehyde

Anglian Water UK

Project Background

Like many water companies operating in agricultural regions, Anglian Water in the UK is challenged by a potable raw water supply that can have occurrences of pesticides. Since the early 1990's, conventional treatment for surface water plants relies upon the combination of ozone and granular activated carbon (GAC) to achieve the EU legislated pesticide compliance levels of 0.1 µg/l.

Recalcitrant pesticides and competing regulations requires an innovative solution. Treatment has become more challenging in recent years due to an increase in pesticides that are more difficult to treat, requiring increased ozone dosage for significant reduction. Especially prevalent, although not exclusively in the Anglian Water region, is Metaldehyde. However, increasing ozone dosage to achieve pesticide compliance, utilizing conventional ozone contactor designs, would almost certainly result in breaching the legislated bromate levels of 10 µg/l.

The solution? An innovative reactor design developed by Xylem called Pro₃mix. Pro₃mix uses ozone and hydrogen peroxide to oxidize difficult organics while reducing bromate formation. To test this system, Anglian Water evaluated the Pro₃mix system for its ability to remove Metaldehyde while mitigating bromate formation over a variety of operational configurations.

“PRO₃MIX is designed to mitigate Bromate formation.”



END USER:	Anglian Water Services
FLOW RATE:	40 m ³ /h
OZONE CAPACITY:	400 g/h
H ₂ O ₂ DOSE:	5 - 25 g/m ³
METALDEHYDE REMOVAL:	0.5 LOG
BROMIDE:	80 µg/L



Test set-up

Anglian Water installed a containerised 40m³ hr Pro₃mix pilot plant at one of its surface water treatment works. The plant comprised a Pro₃mix reactor, hydrogen peroxide dosing unit and an ozone generation system (using oxygen as feedgas). To simulate the typical water quality envelope, the influent stream of water to the pilot plant was fed from a post rapid gravity filtered supply. The piloting campaign was operated from May to November 2013, to evaluate the effects of seasonal variation, including the impact of water temperature on bromate formation.

“PRO₃MIX efficiently removes the Metaldehyde and keeps Bromate formation below 5 µg/L.”

Results of the pilot study

The Pro₃mix system reduced the Metaldehyde levels by up to 0.7 LOG, with an applied maximum ozone dose of 10 g/m³. Simultaneously the bromate formation was always safely kept below 5 µg/L. The ideal set point for this application at the Anglian Water site was an ozone dosage of 8g /m³, resulting in the required 0.5 LOG reduction of Metaldehyde. The optimum H₂O₂ dose of 16 - 22 ppm kept the Bromate levels below 3 µg/L.

Conclusions

- PRO₃MIX is capable to remove up to 80% of the Metaldehyde whilst simultaneously controlling Bromate formation to below 5µg/L.
- It was demonstrated that compared with other AOP processes PRO₃MIX can provide the lowest operational costs.

