

# Electrochemical synthesis of hydrogen peroxide coupled with UV-C for the oxidation of endocrine disruptor compounds

R.J.M. Bisselink, L.Feenstra  
TNO dept. of Water Treatment  
Utrechtseweg 48, 3704 HE Zeist, the Netherlands  
Roel.Bisselink@tno.nl

Hydrogen peroxide ( $\text{H}_2\text{O}_2$ ) can be applied in various markets (e.g. disinfection, waste water treatment and the pulp & paper industry). The current application of hydrogen peroxide however still requires shipment, handling and storage and therefore sufficient safety precautions. On-site or in-situ production of hydrogen peroxide therefore has clear advantages. Another attractive benefit is that only oxygen (or air) and electricity is needed for the electrochemical production of hydrogen peroxide. Within our laboratory we achieved concentrations up 10% hydrogen peroxide using a plate-and-frame electrolyser. This setup showed with previous research that efficient indirect oxidation of various reactive dyes could be achieved [1]. The same setup was used in this research in which we investigated the indirect oxidation of endocrine disruptor compounds (EDCs) originating from hospital waste waters. Eight compounds being caffeine, diclofenac, ifosfamide, ( $\pm$ )-metoprolol, naproxene, pentoxifylline, ( $\pm$ )-sotalol and trimethoprim were selected due to their presence in the hospital waste water. Hydrogen peroxide was produced under constant current and two types of UV-C lamps were employed to assess its effect on the oxidation. Characterisation of the system indicated that hydrogen peroxide was produced with near to 100% current efficiency.

## References

[1] Jerič et al., *Acta Chim. Slov.* **60** (2013), 666-672.