

Technical University of Denmark



Decadic Delivered O3 Doses of 50 APIS from WWTP Effluents

Antoniou, Maria; Hey, G.; Spiliotopoulou, Aikaterini; Rodríguez-Vega, S.; Fick, J.; Tysklind, M.; Lind, A.; la Cour, J.; Andersen, Henrik Rasmus

Published in:
Book of Abstracts

Publication date:
2012

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Antoniou, M., Hey, G., Spiliotopoulou, A., Rodríguez-Vega, S., Fick, J., Tysklind, M., ... Andersen, H. R. (2012). Decadic Delivered O3 Doses of 50 APIS from WWTP Effluents. In Book of Abstracts: IWA Regional Conference on Wastewater Purification & Reuse Greece: IWA Publishing Company.

DTU Library

Technical Information Center of Denmark

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

DECADIC DELIVERED O₃ DOSES OF 50 APIS FROM WWTP EFFLUENTS

M. G. Antoniou (Post-doc)*, G. Hey (M.Sc.)**, A. Spiliotopoulou (BSc)*, S. Rodríguez-Vega (Assoc. Professor)***, J. Fick (Assoc. Professor)****, M. Tysklind (Professor)****, A. Ledin (Professor)**, J. la Cour Jansen (Professor)**, and H. R. Andersen (Assoc. Professor)*

*Technical University of Denmark (DTU), Department of Environmental Engineering, Miljøvej, Building 113, 2800 Kgs. Lyngby, Tel: +45 45251583; email: hran@env.dtu.dk
 **Water and Environmental Engineering at the Department of Chemical Engineering, Lund University, SE-221 00 Lund, Sweden
 ***Department Ingeniería Química, Facultad Químicas, Universidad Complutense, 28040 Madrid, Spain
 **** Department of Chemistry, Umeå University, SE-90187 Umeå, Sweden

EXECUTIVE SUMMARY

The presence of active pharmaceutical ingredients (APIs) in municipal wastewater treatment plants (WWTPs) is considered to be the main source of contamination of water resources. The potential side effects that APIs can cause to wild life and humans from chronic exposure, necessitates their efficient removal from wastewater effluents prior discharge. With APIs being found at very low levels (µg/L-ng/L) compared to the remaining matrix components, select chemical oxidation such as ozonation is currently being tested. This study determined the decadic delivered O₃ doses (mg/L O₃ per order of API removal) of 50 APIs commonly found in wastewater effluents from 5 different WWTP effluents of Sweden. The effluents were chosen so that they differ in TOC, COD, pH, and alkalinity in order to investigate the matrix effects on each API removal. Based on the results on Figure 1, the removal of APIs for a specific effluent varies significantly and it is directly related to the chemical structure of the compound. The DDO₃ of Table 1, prove that there is indeed an effect of the wastewater matrix (though previous studies have stated otherwise) and easily degraded compounds such as citalopram in one wastewater (WW3) can be difficult to remove in other (WW5).

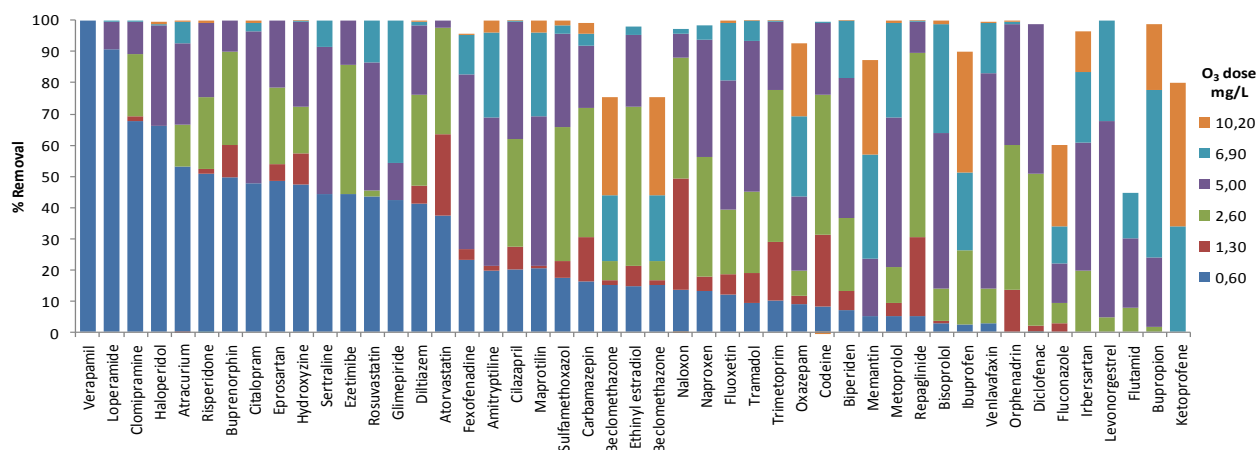


Figure 1: Removal of APIs per O₃ dose from WWTP effluent from Källby (TOC= 7.5 mg/L; COD= 29.0 mg/L; Alkalinity= 244.0 mg/L; pH= 6.6; N-NH₄⁺= 1.4 mg/L)

Table 1: Decadic delivered O₃ doses for the removal of select pharmaceuticals in 6 WWTP effluents

WWTP	DDO ₃ (mg O ₃ /L)					
	Källby 1	Källby 2	Björnstorp	Öresundsverket	Sjölunda	Nykvarnsverket
APIs	WW1	WW2	WW3	WW4	WW5	WW6
Citalopram	5.0	8.0	2.0	6.3	11.9	5.0
Diclofenac	4.7	5.9	n.d.	3.6	9.2	n.d.
Eprosartan	3.2	4.6	1.9	4.2	7.8	3.9
Ibuprofen	11.5	10.5	6.1	10.4	19.4	8.4

Levonorgestrel	6.7	7.0	6.1	5.4	16.8	7.0
-----------------------	-----	-----	-----	-----	------	-----