HTC-11

Bruges, Belgium, January 27th - 29th, 2010
Eleventh International Symposium on Hyphenated Techniques
in Chromatography and Hyphenated Chromatographic Analyzers

HTSP

Bruges, Belgium, January 26th – 27th, 2010
International Symposium on Hyphenated Techniques
for Sample Preparation

BOOK OF ABSTRACTS

Symposia organized by the Royal Flemish Chemical Society (KVCV),
Catholic University College Bruges - Ostend in Bruges

Site Catholic University College Bruges - Ostend KHBO, Bruges
Belgium

CIP Koninklijke Bibliotheek van België (Royal Library Albert I), Brussels, Belgium
Book of Abstracts - Eleventh International Symposium on Hyphenated Techniques in Chromatography and Hyphenated Chromatographic Analyzers (HTC-11) and International Symposium on Hyphenated Techniques for Sample Preparation (HTSP)
Catholic University College Bruges-Ostend, Brugge, Belgium, January 26th - January 29th, 2010
Royal Flemish Chemical Society (KVCV)
ISBN 9789081124836 (EAN 9789081124836)
Editor: Ordibo bvba

DETERMINATION OF BISPHENOL A IN A POTABLE WATER PRODUCING PLANT

R. Amery (1), E. Jooken (1,2), E. Van Houtte (3) and B. Meesschaert (1,2)

(1) KHBO, Department of Industrial Sciences and Technology, Zeedijk 101, B-8400 Oostende, Belgium
(2) K.U. Leuven, Department of Molecular and Microbial Sciences, Centre for Surface Chemistry and Catalysis Arenberg Park 20, B-3001 Leuven, Belgium
(3) IWVA, Doornpannestraat 1, 8670 Koksijde, Belgium

1. Introduction

Due to increased potable water consumption, continuing to pump up ever larger amounts of ground water is hardly an option in the future. An interesting option is to reuse the effluent of a waste water treatment plant (WWTP). The major advantage of this approach is that over a year, the supply of waste water and demand of potable water are more or less in equilibrium. With ground water supply, this is usually not the case. Moreover, nowadays the quality of wastewater treatment is such that the effluent can be reused (Van Houtte & Verbauwhede, 2006). A possible problem however, are endocrine disruptors. These molecules are often difficult to degrade in a WWT plant, and one cannot exclude that they pass through an RO system as well, and thus concentrate into the water cycle. We selected bisphenol A (BPA) as a model compound and followed its concentration throughout the water cycle at the Torreele site in Western Flandres. Because BPA is fluorescencent it can be analyzed sensitively and highly selective.

2. Experimental

All samples were analysed with an HPLC apparatus. Samples were preconcentrated using a Venture anti-BPA immunoaffinity column (Grace Vydac) or a Chromabond Easy (3mL; 200 mg) solid phase extraction (SPE) cartridge. The limits of detection (LODs) were respectively 0.020 and 0.014 ppb and the recoveries 102.5 % and 92.5 %.

3. Results and discussion

Samples were taken from different points in the plant, and analyzed for BPA content. The results are represented in the following table:

Sample	Concentration /($\mu g.L^{-1}$)
WWTP effluent	0.024
UF feed	0.023
UF filtrate	< LOQ
UF concentrate	0.028
RO feed	< LOQ
RO permeate	< LOQ
RO retentate	0.070

It looks like BPA is not decomposed completely in the WWTP. However, it is eliminated almost completely after the UF step. Some BPA must still be present however, because we can find it again in the RO retentate.

4. Conclusions

It is possible to follow the presence of BPA in the water cycle. BPA is not (completely) decomposed in the WWTP, but is probably (almost) completely eliminated through the UF and RO steps of the water purification.

5. Acknowledgement

The authors wish to thank the IWVA for financial support for this project

Van Houtte, E., & Verbauwhede, J. (2006, Feb 01-03). *Operational experience with indirect potable reuse at the Flemish Coast.* Paper presented at the Conference on Integrated Concepts for Reuse of Upgraded Wastewater, Barcelona, SPAIN.

Determination of Bisphenol A in a Potable Water Producing Plant

R. Amery([1]), E. Jooken([1,2]), E. Van Houtte([3]) and B. Meesschaert([1,2])

([1]) KHBO, Department of Industrial Sciences and Technology, Zeedijk 101, B-8400 Oostende, Belgium, etienne.jooken@khbo.be

([2]) K.U. Leuven, Department of Molecular and Microbial Sciences, Centre for Surface Chemistry and Catalysis Arenberg Park 20, B-3001 Leuven, Belgium

([3]) IWVA, Doornpannestraat 1, 8670 Koksijde, Belgium

1. Introduction

In the Torreele site of the IWVA, potable water is produced from the effluent of a Waste Water Treatment Plant (WWTP) that treats the distributed water after use. Thus, we have a water cycle.

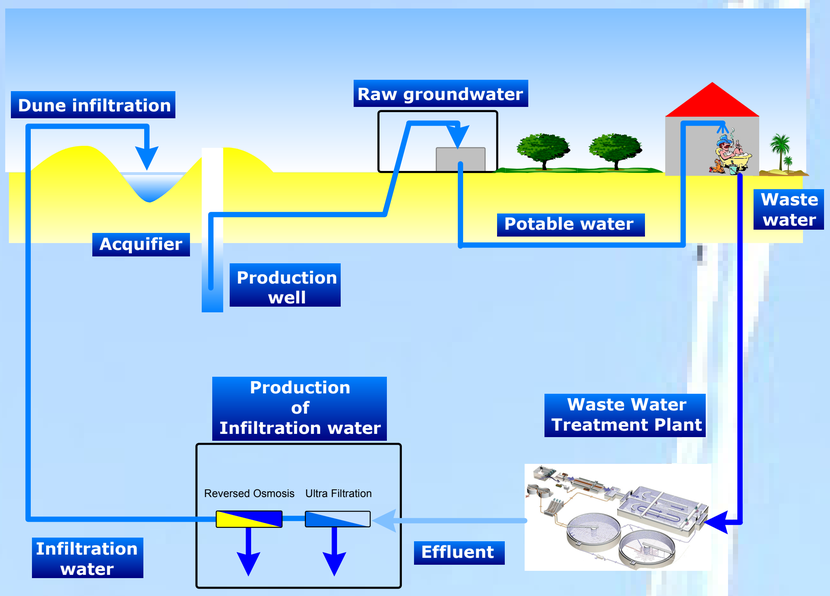

Fig 1: Water cycle

The effluent is treated with Ultra Filtration (UF) and Reversed Osmosis (RO). Then the RO-permeate is infiltrated in an acquifier in the dunes and pumped up after approx. 40 days. After removing the iron by aeration, it is used as potable water.
Details of the treatment of the effluent are shown in the figure.

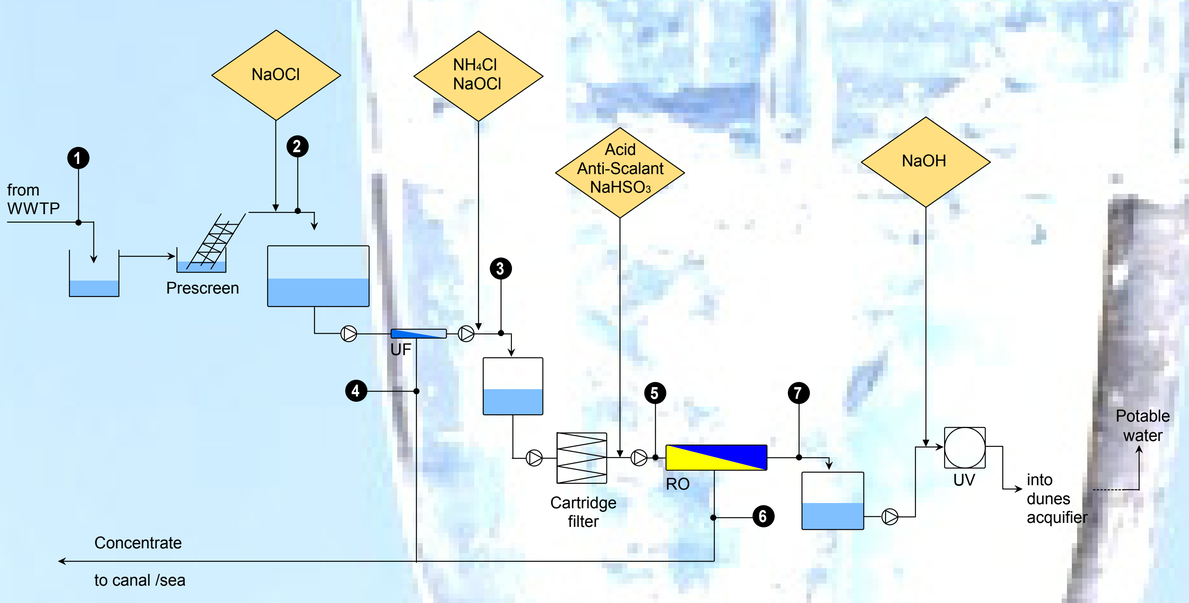

Fig 2: Torreele site, schematic with sampling points

Endocrine disruptors are a possible problem: they might accumulate in this cycle, because they are difficult to break down in a WWTP and might partially pass the RO-membrane. We choose Bisphenol A as a model compound and investigated its fate in this water cycle.

2. Experimental

Bisphenol A (BPA) was analysed with HPLC and fluorescent detection after preconcentration on immuno-affininty columns (IAC) (Grace-Vydac) or Solid Phase Extraction (SPE) (Chromabond Easy, Machery - Nagel). Limits of detection were resp. 0.020 and 0.014 ppb. Recoveries were 102 and 92 %.

3. Results and discussion

The results are given in Table 1. Sample numbers refer to Fig 2.

Table 1: Results of BPA analysis

Sample N°	[BPA] /ppb		
	SPE	IAC	Average
1	0,022	0,032	0,024
2	0,021	0,026	0,023
3	< LOQ	< LOQ	< LOQ
4	0,024	0,031	0,028
5	< LOQ	< LOQ	< LOQ
6	0,064	0,076	0,070
7	< LOQ	< LOQ	< LOQ

BPA is present in the WWTP effluent, confirming its low bio degradability. It is partly retained by the UF unit, a result which surprised us. The remainder of the BPA is retained by the RO membranes. The concentrations of BPA that we found matched with the relative flows.

4. Conclusion

The results show that no BPA accumulates in the water cycle.

5. Acknowledgement

The authors wish to thank the IWVA for financial support for this project.