

# Accepted Manuscript

Quaternary (triphenyl-) phosphonium compounds: Environmental behavior and toxicity

Simon Brand, Michael P. Schlüsener, Dinah Albrecht, Uwe Kunkel, Claudia Strobel, Tamara Grummt, Thomas A. Ternes



PII: S0043-1354(18)30139-8

DOI: [10.1016/j.watres.2018.02.032](https://doi.org/10.1016/j.watres.2018.02.032)

Reference: WR 13584

To appear in: *Water Research*

Received Date: 22 September 2017

Revised Date: 9 February 2018

Accepted Date: 13 February 2018

Please cite this article as: Brand, S., Schlüsener, M.P., Albrecht, D., Kunkel, U., Strobel, C., Grummt, T., Ternes, T.A., Quaternary (triphenyl-) phosphonium compounds: Environmental behavior and toxicity, *Water Research* (2018), doi: 10.1016/j.watres.2018.02.032.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# Quaternary (Triphenyl-) Phosphonium Compounds: Environmental Behavior and Toxicity

Simon Brand<sup>a</sup>, Michael P. Schlüsener<sup>a</sup>, Dinah Albrecht<sup>a</sup>, Uwe Kunkel<sup>a,†</sup>, Claudia Strobel<sup>b</sup>,  
Tamara Grummt<sup>b</sup> and Thomas A. Ternes<sup>a,\*</sup>

<sup>a</sup> Federal Institute of Hydrology, Department of Aquatic Chemistry, 56068 Koblenz, Germany

<sup>b</sup> German Environment Agency, Section Drinking Water and Swimming Pool Water Toxicology,  
08645 Bad Elster, Germany

<sup>†</sup> Present address: Bavarian Environment Agency, Department of Specific Analysis for Environmental  
Monitoring, 86179 Augsburg, Germany

## \* Corresponding Author:

T.A. Ternes, Phone: +49 261 1306 5560. Fax: +49 261 1306 5363. E-Mail: ternes@bafg.de

## Note:

All authors declare no competing financial interest.

## Abstract

An analytical method based on high resolution mass spectrometry coupled with liquid chromatography (LC-HRMS) for 25 quaternary phosphonium compounds (QPCs) and derived phosphine oxides (POs) was developed and validated. To investigate the occurrence and fate of QPCs in the aquatic environment, water, suspended solids and sediments from the rivers Rhine and Elbe (upper and middle Elbe as well as tidal Elbe) were analyzed, as well as samples from tributaries bearing significant loads of QPCs. For the first time, the quaternary phosphonium compound tetrabutylphosphonium ( $\text{Bu}_4\text{P}^+$ ) was detected. In the river Elbe concentrations were determined of up to 4.7  $\mu\text{g/L}$  (surface water) and 1000  $\mu\text{g/kg}$  (sediment), respectively. Analysis of a time series of suspended solids (2005-2015) showed that QPCs have been present in the Elbe and Rhine catchment for at least one decade, with partly rising tendency. A degradation experiment with Rhine sediment revealed that triphenylphosphonium compounds ( $\text{R-Ph}_3\text{P}^+$ ) and  $\text{Bu}_4\text{P}^+$  are persistent in contact with sediment and suspended solids and tend to sorb onto sediment particles. Toxicological studies (reactive oxygen

Download English Version:

<https://daneshyari.com/en/article/8874190>

Download Persian Version:

<https://daneshyari.com/article/8874190>

[Daneshyari.com](https://daneshyari.com)