



QUASIMEME Interlaboratory Study on the Analysis of Short-Chained Chlorinated Paraffins in Environmental Matrices – Round 4

Short-chained chlorinated paraffins (SCCPs) are complex mixtures existing of more than 4,200 polychlorinated *n*-alkane congeners with a carbon chain length between 10-13 and a chlorination degree of 30-70% by mass. Due to their high production volumes, persistency, bioaccumulative properties and toxicity potential, concerns regarding the risks to the (human) environment associated with SCCP exposure are rising. For example, SCCPs are currently under review by the persistent organic pollutant review committee (POPRC) under UNEP Stockholm convention on POPs, classified as substances of very high concern and listed as key compounds in several legislations or guidelines to be monitored in environmental matrices, including water by the the European water framework directive. The analysis of SCCPs is, however, extremely challenging. To date, there is only one validated analytical procedure available for routine monitoring of CPs in environmental samples (e.g. water) and only semi-quantitative analysis is possible, although the number of studies reporting on method developments, modifications and analytical results has relatively increased over the last five years.

During a workshop of QUASIMEME (Ostend, Belgium, March 2010), It was generally agreed that there was a clear need for an interlaboratory study (ILS), preferably designed in a step-wise way. The Institute for Environmental Studies (IVM) has therefore organized, in cooperation with the proficiency testing scheme of QUASIMEME, the first three rounds of an ILS on CPs, of which reports are available for new participants upon request (I.vanmourik@ug.edu.au). Briefly, results of the previous rounds show that the CP analysis is still challenging, resulting in large differences in reported concentrations between laboratories. Nonetheless, inter-laboratory CVs were found to decrease between the second (137%) and third round (80-86%), suggesting improvement. Using different cleanup methods did not seem to have a major effect on the variation. However, the choice of instrumental technique and quantification procedures might have had an effect, as many different instrumental techniques and quantification procedures were applied in the third round.

Therefore, with this round we will focus on the instrumental techniques and quantification procedures currently used on determining CPs in different matrices. This will include providing a new analytical method, and improving quality by proposing general precautions that need to be taken during analysis.

With this flyer we therefore initiate the fourth round of this exercise. We kindly ask you to express your willingness to participate in this round. Participants that did not participate in previous rounds are also welcome to join this round.

Design of the Study

The entire study consists of four steps, unless it would appear that corrective actions or a repeat of one step would be needed. It is hoped that after the entire study the SCCPs could be included in the routine proficiency testing scheme of QUASIMEME (www.quasimeme.org).

Study Design

Round 1 (completed, report has been sent out)

The first round of the study focused on the analysis of CPs in a solution with an undisclosed concentration. Standards were provided.

Round 2 (completed, report has been sent out)

The second round of the study focused on the analysis of CPs in a clean fish extract. The extract was analyzed and quantified with a known total CP standard solution.

Round 3 (completed, report has been sent out)

The second round of the study focused on the analysis of CPs in a clean and raw sediment extract. The extract was analyzed and quantified with a known total CP standard solution and with standards used by the laboratories.

The results of rounds 1-3 have been described in separate reports (Van der Veen et al., 2012, 2014, Van Mourik et al., 2015), which has been sent to all participants and is available for new participants upon request (l.vanmourik@uq.edu.au).

Phase 4

The fourth round of the study will focus on the analysis of SCCPs in different matrices (e.g. biota, dust, sediment and/or biosolids), including a new promising technique. The extracts are to be analyzed and quantified by in-house techniques with provided known total SCCP standard mixture solutions as well as standards that are used by the laboratory itself. We will also provide a new promising method on the TOF-MS (Bogdal et al., 2015), which enables to quantify on congener group level (e.g. C₁₀H₁₇Cl₅). Participating laboratories are free to apply this method, either solely or in addition to their in-house technique.

Materials:

Standard solution: Ampoules with a standard mixture containing a disclosed concentration of SCCPs with different chlorination degrees.

Clean extract of three different environmental matrices: Three ampoules, each containing a cleaned environmental extract (e.g. biota, dust, sediment and/or biosolids).

The study will be described in a report, with a description of the preparation of the materials, the methods of analyses, the results, discussion and conclusions, including recommendations on how to improve analytical performance.

Evaluation meeting

An evaluation meeting will be planned in The Netherlands after the fourth round, tentatively in February 2017.

Time Table

Round 1-3

Completed

Round 4

15 March 2016	Announcement and invitation
15 May 2016	Deadline for registration
July 2016	Shipment of samples
15 October 2016	Deadline for returning results
1 January 2017	Draft report
February 2017	Evaluation meeting
1 April 2017	Final report

Coordination

The fourth round of this study will be coordinated by Ms. Louise van Mourik MSc and Prof. Dr. Jacob de Boer, IVM, Vrije Universiteit, Amsterdam, The Netherlands.

Participation Fee

The fee for participation in the second round of this study will be 880 Euro. The samples will be dispatched after receipt of the fee.

Registration

Registration deadline is the 1st May 2016. To register, please send the registration form by email to I.vanmourik@uq.edu.au, mentioning confirmation CP ILS 4 participation. Upon receipt of your email you will receive a confirmation of your participation and an invoice for the fourth round. Participants that did not participate in previous rounds are also welcome to join this round.

QUASIMEME and co-organisers

QUASIMEME (Quality Assurance of Information in Marine Environmental Monitoring in Europe) operates a series of Proficiency Testing Studies for institutes making chemical measurements worldwide. As part of the improvement programme, QUASIMEME co-operates with centres of excellence to provide workshops for discussion, and “hands on” experience to complement the development programmes in the Laboratory Performance Studies.

The Institute for Environmental Studies (IVM) of the Vrije Universiteit (VU) in Amsterdam, The Netherlands, acts as a centre of excellence for QUASIMEME. It contributes to biological test material testing for proficiency tests on organic contaminants. In addition, scientific advice is given to the annual QUASIMEME programmes through the Scientific Assessment Group. IVM assists in organizing workshops on specific analytical topics and in the organisation of specific interlaboratory studies (learning exercises). IVM combines knowledge on analytical chemistry and toxicology to address a broad range of environmental issues, with a focus on contaminants. More information can be found at www.ivm.vu.nl.

Reference

Bogdal, C., Alsberg, T., Diefenbacher, P.S., MacLeod, M., Berger, U., 2015. Fast quantification of chlorinated paraffins in environmental samples by direct injection high-resolution mass spectrometry with pattern deconvolution. *Anal. Chem.* 87, 2852-2860.