

## **The International Symposium on Persistent Toxic Substances (ISPTS)-2015**

**– 16-20 November, 2015**

<http://pts2015.ucr.edu/>

### **Incorporating performance reference compounds (PRCs) for passive sampling of organic contaminants using solid phase microextraction (SPME).**

Wenjian Lao, David Tsukada and Keith A. Maruya.

*<sup>1</sup>Southern California Coast Water Research Project Authority, Costa Mesa, CA. USA*

#### **Abstract**

Solid phase microextraction (SPME) has been used in measurement of aqueous-phase hydrophobic organic chemicals (HOCs) in equilibrium passive sampling mode for over a decade. However, the extent of equilibrium achieved using SPME has not been well established, especially in field applications. The goal of this study was to characterize the extent of equilibrium achieved by SPME samplers by incorporating performance reference compounds (PRCs) into existing equilibrium-mode passive sampling methods. Three different reusable SPME fibers [100- $\mu$ m polydimethylsiloxane (PDMS), 85- $\mu$ m polyacrylate (PA), and 65- $\mu$ m PDMS-divinylbenzene (PDMS-DVB) copolymer] were evaluated for loading capacity of 108 individual PAHs, PCBs, PBDEs, pyrethroids, fipronil and organochlorine pesticides. The PDMS and PA fibers were found to be more efficient than the PDMS-DVB copolymer in sorbing most targeted HOCs. The loading of PRCs into PDMS was optimized in a series of experiments that utilized different loading solvent systems, agitation energy and loading time. Suitable parameters were identified for loading PRCs at low (< 300pg) and high (< 5000 pg) concentrations. Isotropy for sorption and desorption of 12 different PRCs was confirmed using a paired, co-exposure approach. SPME fibers pre-loaded with PRCs were co-deployed with polyethylene (PE) film passive samplers (also pre-loaded with the same PRCs) in the ocean off Santa Barbara, CA (USA) for 35 days. The PRC residuals indicated that low molecular weight PAHs (acenaphthylene-d10 and phenanthrene-d10) achieved equilibrium (>90%), high molecular weight PAHs (chrysene-d12 and perylene-d12) achieved 70-50% equilibrium, six PCB congeners representing Cl<sub>3</sub> to Cl<sub>7</sub> homologs achieved 65-20% equilibrium, and DDMU and 13C p,p'-DDE achieved 40% and 25% equilibrium, respectively. The extents of equilibrium achieved on the SPME fiber were in general less than that achieved with the PE. A non-equilibrium correction factor relationship was deduced for the other targeted compounds based on the conditions encountered during this field exposure..