Point of View

The latest advances in Chemical Analysis of Waters at CETESB

Carlos Roberto dos Santos

President of CETESB - Environmental Agency of São Paulo State,
São Paulo, SP, Brazil
carlosrs@sp.gov.br

One of the most important topics for the environmental laboratories at CETESB (Environmental Agency of São Paulo State) is provide reliable data to support decision makers when it comes to regulations, monitoring programs, responses to chemical emergencies, sources inspections and other applications. All these different goals need high quality procedures in compliance with ISO 17025 for several matrices such as water, sludge, air, soils, solid waste and biological samples. For the Toxicological Analyses Laboratory to achieve excellence in our analytical methods was necessary to improve some steps of water sample preparation for bioassays and chemical analysis. For Ames test (*Salmonella typhimurium* reverse mutation assay) solid-phase extraction (SPE) was previously carried out manually using open glass column filled with adsorbent resin. At this point, large amount of organic solvent were being used per sample and low analytical frequency of four samples a week during the whole process. Over the last seven years, the interest in endocrine disrupting chemicals (EDC) has been growing worldwide including São Paulo State, Brazil and the number of samples increased greatly. It leaded us to research new techniques and find automated instrumentation. According to the advances in analytical chemistry in water analysis an automated extraction method using SPE disk was developed and implemented. This system controlled by specific software, consists of three programmable extraction towers capable of processing aqueous samples directly from their original containers. Furthermore, a combination of prefilter and SPE disk with large surface area provides better throughput even for samples that contain substantial amount of particulate matter. Finally, extract is concentrated using evaporating system for solvent removal that can be used simultaneously for 16 vials of 40 mL and 96 vials of 2 mL. This instrumental innovation increased the capacity of the laboratory up to 700% samples/year and volume reduction of 500% of the total organic solvent volume. The final result was less toxic chemicals in the environment and high productivity.

References

- Thurman, E. M.; Snavely, K. Advances in solid-phase extraction disks for environmental chemistry. *TrAC, Trends Anal. Chem.*, **2000**, 19 (1), pp 18-26. (DOI: 10.1016/S0165-9936(99)00175-2)
- Umbuzeiro, G. A.; Roubicek, D. A.; Sanchez, P. S.; Sato, M. I. Z. The *Salmonella* mutagenicity assay in a surface water quality monitoring program based on a 20-year survey. *Mutat. Res., Genet. Toxicol. Environ. Mutagen.*, **2001**, 491 (1-2), pp 119-126. (DOI: 10.1016/S1383-5718(01)00139-5)