Rapid and Sensitive Determination of Bisphenol A in Drinking Water

Using Supelclean™ ENVI™-18 SPE and an Ascentis® Express C18 HPLC Column

A major source of human exposure to endocrine-disrupting compounds, such as bisphenol A (BPA), is through ingestion of food and beverage products tainted with these harmful compounds. BPA is used to make polycarbonate plastics and epoxy-based lacquers. Therefore, its ingestion can be related to two food packaging types and their enclosed products:

- Re-useable rigid containers made of polycarbonate plastic; commonly used for water bottles, baby bottles, plastic mugs, carboys and storage containers
- Metal cans with an internal epoxy-based lacquer coating; used to keep the foods or beverages from directly contacting the metal

The determination of analytes from liquid matrices, such as drinking water, can be much simpler than from solid matrices. Direct injection and/or headspace techniques are often used. For increased sensitivity, limited sample preparation can be employed without adding substantial processing time.

Experimental

A sample was spiked with BPA at a 0.2 µg/mL level prior to extraction. Sample processing using solid phase extraction (SPE) was selected so that extraction and concentration tasks could be performed.
Results and Discussion

The choice of an Ascentis Express column allowed efficient chromatography in a short time. In fact, a benefit of this column line is that great efficiency can be obtained on any system, regardless of whether used with HPLC or UHPLC equipment.

A better signal-to-noise ratio was obtained with the FL detector. Also of note is the slightly longer retention time and broader peak shape observed on the FL chromatograms. These are caused by the extra system volume contributed as the sample passes through the UV cell, as well as the tubing connecting the detectors. The removal of the UV component and shortening the tubing connecting the column to the FL detector would eliminate these phenomena.

This fast procedure for determining bisphenol A in drinking water employs materials and techniques selected in part for speed, but also those that do not contribute unwanted artifacts. The use of ENVI-18 SPE allows BPA to be extracted and concentrated, which results in greater method sensitivity compared to simple direct injection or headspace methods. Using the calibration factor generated for the FL detector, a recovery of 88% was calculated.

References