COGENT
Bidentate C8™

Analyzing Bisphenol A in Carbonless Paper by HPLC

Extended Application Note

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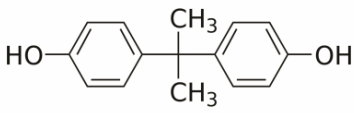


Bisphenol A (BPA)

Figure 1

Gradient:

Time (min.)	%B
0	30
2	30
6	90
8	90
9	30

Post Time: 1 min
Flow Rate: 0.5 mL/min
Injection Volume: 5.0µL

Introduction

Bisphenol A (BPA) is a synthetic compound used in a variety of consumer products, such as CDs, water bottles, and water pipe linings. Despite having many uses in these products, there has been some concern in recent years that exposure to BPA may have adverse health implications. BPA is believed to act as an endocrine disruptor by mimicking the metabolic action of estradiol. With current studies, it remains to be determined just how harmful BPA actually is. What is certain is that, due to its ubiquity in modern society, BPA is detectable in approximately 90% or more of the U.S. population.

Infants and young children are thought to be at the greatest risk from BPA exposure since the metabolic detoxification pathway used to remove it from the body is not fully developed. For this reason, BPA was banned from baby bottles in the U.S. However, the FDA does not consider it to be a significant health threat to adults, although their findings continue to be challenged by new studies.

If a more definitive conclusion regarding the health effects of BPA is to be reached, then reliable analytical methods will be needed to aid in future studies. Here we present the use of the Cogent Bidentate C8™ column for HPLC analysis of two BPA-containing materials. The column is well-suited to reversed phase analysis of hydrophobic compounds such as BPA. The stationary phase surface is virtually free of silanols, which allows for very fast equilibration between injections. For the gradient runs investigated here, only 1 minute equilibration time was required. The column is also versatile in that excellent data can be obtained using different BPA-containing samples as well as extraction procedures.

Experimental

Materials

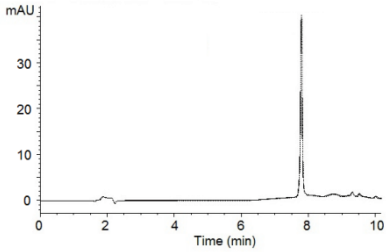
Carbonless copy paper (NCR paper) was obtained from a notebook. Receipts were obtained from a cash register transaction. Formic acid and BPA were from Sigma–Aldrich (St. Louis, MO, USA). Deionized water (DI H_2O) was prepared on a Milli-Q™ purification system from Millipore (Bedford, MA, USA). Acetonitrile (HPLC grade) was obtained from GFS Chemicals, Inc. (Powell, OH, USA).

Instrumentation

A Hewlett–Packard (Palo Alto, CA, USA) 1050 HPLC system consisting of an autosampler, degasser, binary pump, and variable wavelength UV detector set at 275 nm was used. The system was interfaced with Agilent Chemstation (Santa Clara, CA, USA) software. The analytical column was a Bidentate C8™ stationary phase (MicroSolv Technology Corporation, Leland, NC, USA), 4.6 x 75 mm, 4µm, 100Å. Mobile phase A was DI H_2O + 0.1% formic acid and mobile phase B was ACN + 0.1% formic acid.

Sample Preparation

200 mg receipt/carbon paper was incubated in 20 mL methanol in a glass tube for 3 hours at room temperature. The resulting solution was then decanted and filtered. A KimWipe™ (lightly dampened with methanol) was brushed across the top surface of a piece of receipt/carbon paper weighing 200 mg. Then the KimWipe was incubated in 20 mL methanol in a glass tube for 3 hours at room temperature. The resulting solution was then decanted and filtered.



Results and Discussion

The Bidentate C8™ column provided good retention of BPA. Only one column volume was required for equilibration after the gradient. This had no adverse effect on retention time repeatability, as a five-injection overlay demonstrated (see **Figure 2**). In addition to chromatographic optimization, BPA standards were also used to construct a calibration curve in the range 2–10 mg/L.

In terms of extraction of BPA from the receipt samples, two sample preparation methodologies were used. The first was digestion analysis (Fig. 3A), in which the sample is soaked in the extraction solvent. The second was migration analysis (Fig. 3B), where extraction is accomplished with a solvent-laden KimWipe™ brushed across the paper.

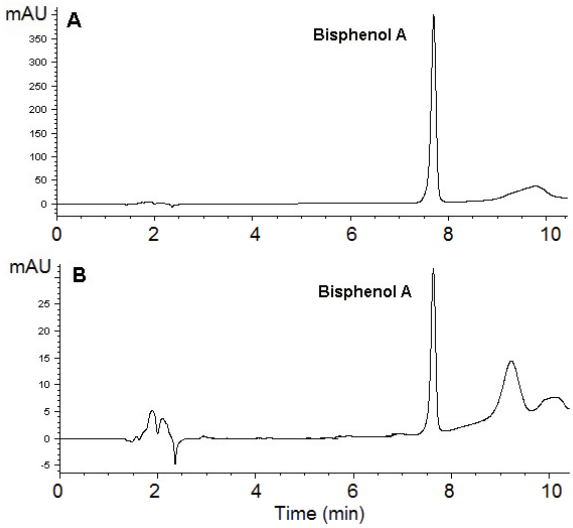


Figure 3

Digestion analysis describes the total BPA content present in the material. This was found to be 10µg/mg for the receipt samples. The migration method is meant to represent the amount transferred in handling (i.e. absorption through fingertips). This amount was calculated to be 0.8µg/mg.

BPA was also detected in carbonless copy paper samples from a notebook (**Figure 4**). Here, excellent resolution was obtained from other compounds that were also extracted from the sample. The amount was outside the calibration curve range but above the LOD. The data shown in the figure is using the digestion method.

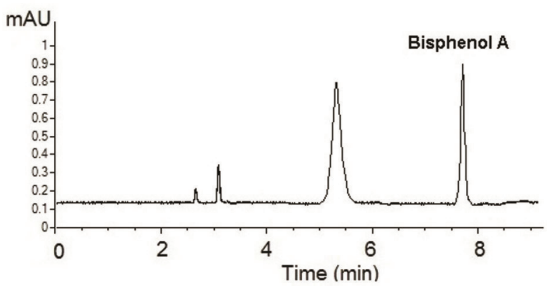


Figure 4

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Conclusion

The Cogent Bidentate C8™ column can be used in BPA analyses of both different samples and extraction procedures. The compound is well-retained and the peak shape shows high efficiency. Construction of a calibration curve allowed for quantitative estimates of BPA present in the samples. These strategies could be applied to any number of other BPA-containing samples, which may be needed as further safety investigations are conducted in the future. The calculated amounts in the samples were:

- Receipts, digestion method: 10µg/mg
- Receipts, migration method: 0.8µg/mg

For more information visit www.mtc-usa.com

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