Optimized LC-MS/MS Methods for Bisphenols in Drinking Water

By Jamie L. York, PhD

Key Highlights

- Two fast, simple, direct injection methods provide baseline resolution and accurate quantitative results for bisphenols in drinking water.
- Targeted method for BPA, BPS, and BPB complies with the EU directive sensitivity requirement (LLOQ of 2.5 ug/L).
- Comprehensive method for 15 bisphenols supports labs wanting to expand analyte lists in anticipation of regulatory changes.

Abstract

Bisphenols are synthetic chemicals commonly used in the production of polycarbonate plastics and epoxy resins, making them widespread environmental contaminants. Their structural similarity to estrogen allows them to act as endocrine disruptors, raising concerns about their presence in drinking water. While BPA-free products often use substitutes like BPS and BPB, these alternatives can also potentially pose health risks. This study presents a rapid, reliable method for detecting BPA, BPS, and BPB in drinking water that complies with EU regulations. A secondary method expands detection to 15 bisphenol compounds, offering a practical approach for laboratories conducting comprehensive drinking water contamination testing.

Related Products

- *Raptor Biphenyl, 2.7 µm, 50 x 3.0 mm HPLC Column*
- *Raptor Biphenyl EXP Guard Column Cartridge, 2.7 µm, 5 x 3.0 mm, 3-pk.*
- *EXP Direct Connect Holder for EXP Guard Cartridges, Includes Fitting & Ferrules*
- *Short-Cap Vial with Grad Marking Spot, 9-425 Screw-Thread, 2.0 mL, 9 mm, 12 x 32 (vial only), Amber, 100-pk.*
- *Short Screw Cap, Polypropylene, Screw-Thread, PTFE/Silicone/PTFE Septa, Blue, Preassembled, 2.0 mL, 9 mm, 100-pk.*

Introduction

Bisphenols are a type of man-made chemical that can be found in food and the environment as contaminants. These synthetic phenols are primarily used in the production of polycarbonate plastics and epoxy resins. Due to the ubiquitous manufacture and use of these compounds worldwide, bisphenol contaminants are likely to be found in the environment and in drinking water. In 2011, a National Institutes of Health (NIH) study published their findings that 91% of the 427 people in their study tested positive for bisphenol A in their urine samples [1]. Bisphenols share a general structure consisting of two phenol groups connected by a bridging group. This structural similarity to estrogen allows them to mimic and interfere with natural hormone functions, classifying them as endocrine disruptors [2]. Bisphenols A, B, and S are some of the compounds that have been linked to human health effects. This is especially true for bisphenol A, and regulatory authorities are moving to restrict or ban bisphenols in food contact materials and children's toys.

Although regulations exist in some regions of the world, bisphenols and their derivatives are used in high volumes and across a wide variety of goods, which increases the likelihood of them being introduced into water supplies through environmental avenues. Bisphenol S has been used as a replacement for bisphenol A in "BPA-free" products, but it also carries health concerns and has been identified as a reproductive toxicant in California's Proposition 65 [3]. Bisphenol B is used as an alternative to both A and S in consumer goods, but there are also concerns over its endocrine-disrupting capabilities [4]. The European Union (EU) Drinking Water Directive has introduced bisphenol A as a parameter and, by January of 2026, water suppliers must ensure that bisphenol A levels do not exceed the parametric limit of 2.5 µg/L in drinking water [5].

In this work, two direct injection LC-MS/MS methods for bisphenols in drinking water were established. A rapid and reliable method was developed for bisphenols A, B, and S because they are the most frequently analyzed bisphenols. This method satisfies the EU's Drinking Water Directive and was evaluated for accuracy and precision using fortified water samples. In addition, a secondary, comprehensive method was developed to include a total of 15 bisphenol compounds, offering a proactive approach to anticipated regulatory changes. The methods presented here provide a quick and easy solution for drinking water analysis for bisphenols for labs interested in implementing or expanding contamination testing.

Experimental

LC-MS/MS Method for Bisphenols A, B, S

The chromatographic conditions are shown in Table I, and the transitions and internal standards are provided in Table II.

Table I: Analytical Conditions for Bisphenols A, B, and S

Parameter	Condition	
Column	Raptor Biphenyl 50 x 3.0 mm, 2.7 µm (cat.# 9309A5E)	
Guard column	Raptor Biphenyl EXP guard column cartridge 5 x 3.0 mm, 2.7 µm (cat.# 9309A0253)	
Column temperature	30 °C	
Injection volume	10 µL	
Mobile phase A	Water	
Mobile phase B	Methanol	
Flow rate	0.8 mL/min	
Detection	ESI (-) MS/MS	
Gradient	**Time (min)**	**%B**
	0.00	40
	0.50	40
	3.50	85
	3.51	40
	5.00	40
Valve position to waste	0.00	–
Valve position to MS	0.80	–
Valve position to waste	3.51	–

Table II: Analyte MS Transitions for Bisphenols A, B, and S in Water Samples

Analyte	Precursor	Product 1	Product 2	Internal Standard
Bisphenol S	249.00	108.15	92.10	1
Bisphenol A	227.00	212.05	133.25	2
Bisphenol B	241.00	212.05	211.10	2
Bisphenol A-d16	241.00	223.25	–	2
Bisphenol S-d8	257.00	112.20	–	1

Comprehensive LC-MS/MS Method for Bisphenols

The chromatographic conditions are shown in Table III, and the transitions and internal standards are provided in Table IV.

Table III: Analytical Conditions for 15 Bisphenols

Parameter	Condition	
Column	Raptor Biphenyl 50 x 3.0 mm, 2.7 µm (cat.# 9309A5E)	
Guard column	Raptor Biphenyl EXP guard column cartridge 5 x 3.0 mm, 2.7 µm (cat.# 9309A0253)	
Column temperature	30 °C	
Injection volume	10 µL	
Mobile phase A	Water	
Mobile phase B	Methanol	
Flow rate	0.8 mL/min	
Detection	ESI (-) MS/MS	
Gradient	**Time (min)**	**%B**
	0.00	40
	1.00	40
	6.50	85
	7.00	85
	7.01	40
	8.50	40
Valve position to waste	0.00	–
Valve position to MS	1.00	–
Valve position to waste	7.00	–

Table IV: Analyte MS Transitions for 15 Bisphenols in Water Samples

Analyte	Precursor	Product 1	Product 2	Internal Standard
Bisphenol S-d8	257.00	112.20	–	1
Bisphenol S	249.00	108.15	92.10	1
Bisphenol F	199.00	93.10	104.85	2
Bisphenol E	213.00	197.10	119.05	2
Bisphenol A-d16	241.00	223.25	–	2
Bisphenol A	227.00	212.05	133.25	2
Bisphenol AF	335.00	265.05	177.20	3
Bisphenol B	241.00	212.05	211.10	2
Bisphenol C	255.00	240.15	147.20	2
Bisphenol AP	289.00	274.15	273.15	2
Bisphenol Z	267.00	173.15	223.10	2
Bisphenol G	311.00	296.30	295.00	3
Bisphenol FL	349.00	256.15	215.20	2
Bisphenol BP	351.00	274.15	273.15	3
Bisphenol M	345.00	251.20	330.20	3
Bisphenol P-13C4	349.00	333.20	–	3
Bisphenol P	345.00	330.15	315.15	3
Bisphenol PH	379.00	364.10	209.15	3

Standard and Sample Preparation

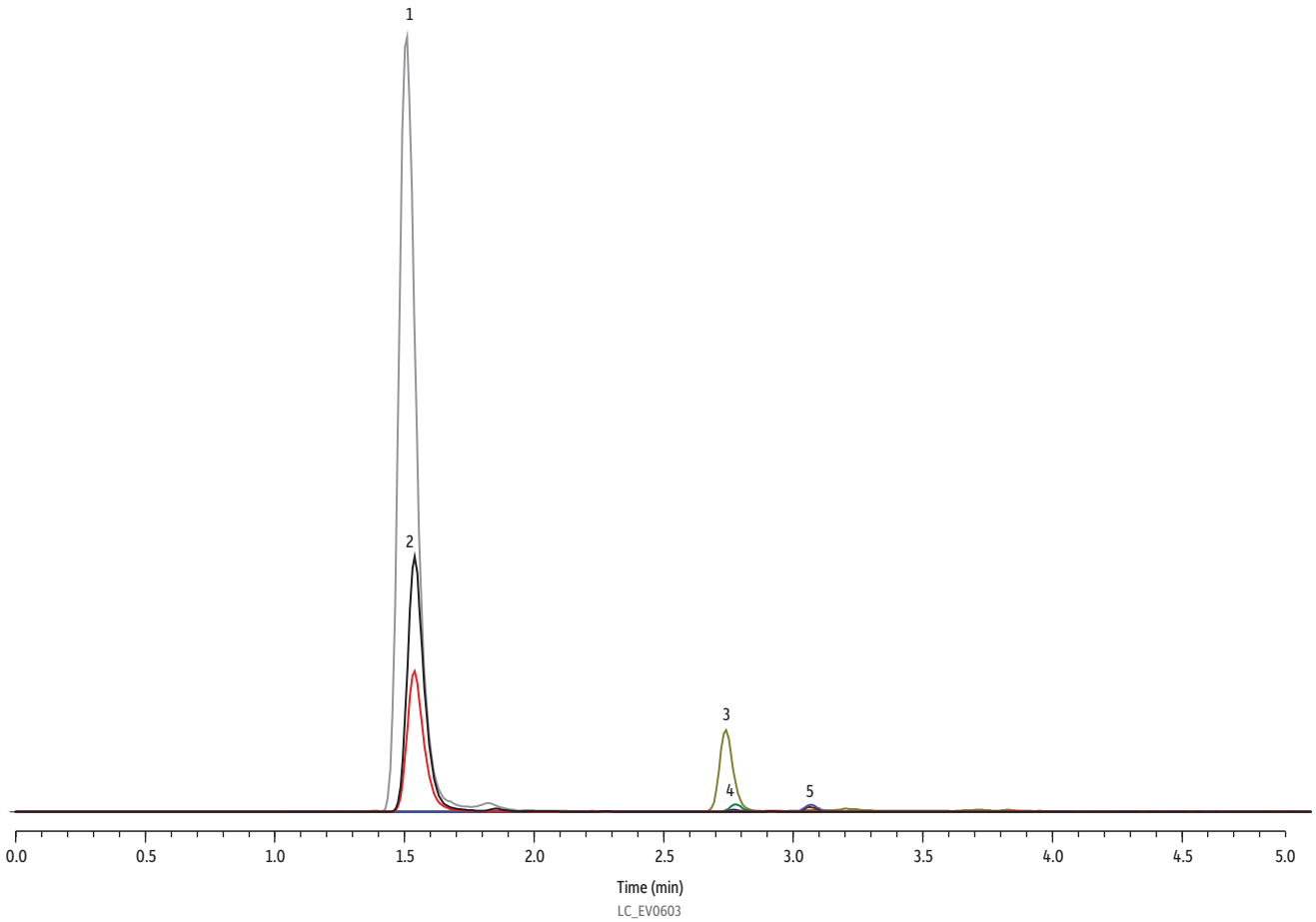
Calibration standards for the LC-MS/MS methods for bisphenols were prepared as follows at a range of 2.5-300 µg/L. A 30 µL aliquot of 1 mg/L isotopically labeled internal standard (IS) was mixed with 50 µL of working standard and 920 µL MS-grade water in amber vials (cat.# 21142). Five different sources of drinking water were collected locally. For accuracy and precision experiments, 1 mL water samples were fortified at 2.5 (LLOQ); 7.5 (LQC); and 75 (MQC) µg/L. All samples were capped, vortexed, and 10 µL was injected into the LC-MS/MS for analysis.

Results and Discussion

Chromatographic Performance

The Raptor Biphenyl column, used under the chromatographic conditions established here, achieved full resolution for both the targeted BPA, BPB, and BPS method as well as the comprehensive 15-bisphenols method. Complete chromatographic separation is useful with MS detection because it mitigates ion suppression caused by coeluting analytes. It also allows these methods to be amenable to analysis with less expensive and nonspecific fluorescence detectors, which need baseline resolution to integrate each analyte accurately. Both LC-MS/MS methods for bisphenols analysis used direct injection and had fast run times, making them ideal for high-throughput environments. The three-analyte bisphenols method has a total cycle time of just 5 minutes, and the comprehensive 15-analyte method has a cycle time of 8.5 minutes. In order to reduce both matrix effects and the amount of matrix reaching the MS, a diverter valve was used before and after compound elution to divert the eluent to waste. This step was implemented because it reduces downtime by allowing instruments to analyze more samples before maintenance is required.

Figure 1: Bisphenols A, B, and S Analyzed by LC-MS/MS



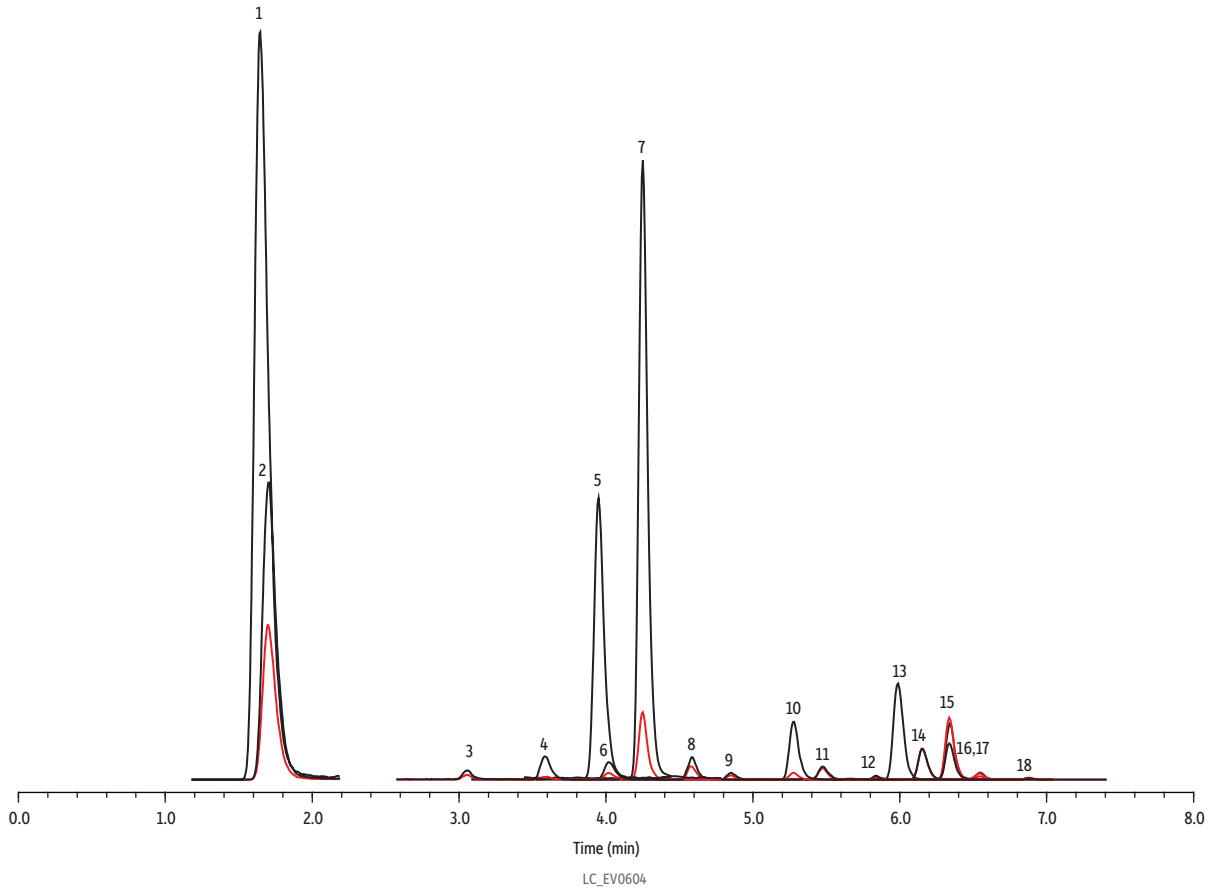
Peaks	t_R (min)	Conc. (ng/mL)	Precursor Ion	Product Ion 1	Product Ion 2
1. Bisphenol S (BPS)	1.57	2.5	249.0	108.2	92.1
2. Bisphenol S-d8	1.57	30	257.0	112.2	-
3. Bisphenol A (BPA)	2.74	2.5	227.0	212.1	133.3
4. Bisphenol A-d16	2.77	30	241.0	223.3	-
5. Bisphenol B (BPB)	3.06	2.5	241.0	212.1	211.1

Column Raptor Biphenyl (cat.# 9309A5E)
Dimensions: 50 mm x 3.0 mm ID
Particle Size: 2.7 µm
Pore Size: 90 Å
Guard Column: Raptor Biphenyl EXP guard column cartridge 5 mm, 3.0 mm ID, 2.7 µm (cat.# 9309A0253)
Temp.: 30 °C
Standard/Sample
Diluent: Water
Conc.: 2.5 ng/mL
Inj. Vol.: 10 µL
Mobile Phase
A: Water
B: Methanol

Time (min)	Flow (mL/min)	%A	%B
0.00	0.8	60	40
0.50	0.8	60	40
3.50	0.8	15	85
3.51	0.8	60	40
5.00	0.8	60	40

Max Pressure: 330 bar
Detector Shimadzu 8060 MS/MS
Ion Source: Electrospray
Ion Mode: ESI-
Mode: MRM
Instrument Shimadzu Nexera X2
Sample Preparation Water samples were aliquoted into an amber short-cap vial (cat.# 21142) and fortified with analytes at 2.5 ng/mL. The samples were then capped with a 9 mm short cap (cat.# 24497) and vortexed ~30 seconds before being injection onto the LC-MS/MS for analysis.
Notes The flow was directed to waste for the first 0.8 minutes of analysis and after 3.50 minutes to maintain cleanliness of the source.

Figure 2: Comprehensive Method for 15 Bisphenols by LC-MS/MS



Peaks	t_R (min)	Conc. (ng/mL)	Precursor Ion	Product Ion 1	Product Ion 2	Internal Standard
1. Bisphenol S-d8	1.65	30	257.0	112.2	-	1
2. Bisphenol S (BPB)	1.70	2.5	249.0	108.1	92.1	1
3. Bisphenol F (BPF)	3.06	2.5	199.0	93.1	104.9	2
4. Bisphenol E (BPE)	3.59	2.5	213.0	197.1	119.1	2
5. Bisphenol A-d16	3.95	30	241.0	223.3	-	2
6. Bisphenol A (BPA)	4.02	2.5	227.0	212.1	133.3	2
7. Bisphenol AF (BPAF)	4.25	2.5	335.0	265.1	177.2	3
8. Bisphenol B (BPB)	4.59	2.5	241.0	212.1	211.1	2
9. Bisphenol C (BPC)	4.85	2.5	255.0	240.2	147.2	2
10. Bisphenol AP (BPAP)	5.28	2.5	289.0	274.2	273.2	2
11. Bisphenol Z (BPZ)	5.48	2.5	267.0	173.2	223.1	2
12. Bisphenol G (BPG)	5.84	2.5	311.0	296.3	295.0	3
13. Bisphenol FL (BPFL)	5.99	2.5	349.0	256.2	215.2	2
14. Bisphenol BP (BPBP)	6.15	2.5	351.0	274.2	273.2	3
15. Bisphenol M (BPM)	6.34	2.5	345.0	251.2	330.2	3
16. Bisphenol P-13C4	6.50	30	349.0	333.2	-	3
17. Bisphenol P (BPP)	6.55	2.5	345.0	330.2	315.2	3
18. Bisphenol PH (BPPH)	6.87	2.5	379.0	364.1	209.2	3

Column Raptor Biphenyl (cat.# 9309A5E)
Dimensions: 50 mm x 3.0 mm ID
Particle Size: 2.7 µm
Pore Size: 90 Å
Guard Column: Raptor Biphenyl EXP guard column cartridge 5 mm, 3.0 mm ID, 2.7 µm (cat.# 9309A0253)
Temp.: 30 °C
Standard/Sample
Diluent: Water
Conc.: 2.5 ng/mL
Inj. Vol.: 10 µL
Mobile Phase
A: Water
B: Methanol

Time (min)	Flow (mL/min)	%A	%B
0.00	0.8	60	40
1.00	0.8	60	40
6.50	0.8	15	85
7.00	0.8	15	85
7.01	0.8	60	40
8.50	0.8	60	40

Max Pressure: 329 bar
Detector Shimadzu 8060 MS/MS
Ion Source: Electrospray
Ion Mode: ESI-
Mode: MRM
Instrument Shimadzu Nexera X2
Sample Preparation Water samples were aliquoted into an amber short-cap vial (cat.# 21142) and fortified with analytes at 2.5 ng/mL. The samples were then capped with a 9 mm short cap (cat.# 24497) and vortexed ~30 seconds before being injection onto the LC-MS/MS for analysis.
Notes The flow was directed to waste for the first minute of analysis and after 7.00 minutes to maintain cleanliness of the source.

Internal Standard Assessment

Two isotopically labeled internal standards were examined for the analysis of bisphenols A, B, and S to determine if they would effectively compensate for matrix effects. The results showed excellent accuracy and precision. However, when the two internal standards were used for the comprehensive 15 bisphenols method, the results showed that using only two returned poor quantitative results for the mid-to-late eluting compounds.

The optimization of valve switching helped with accuracy and precision for bisphenols F and E, but it did not improve quantitative results for bisphenols AF, G, BP, M, P, and PH. A third internal standard, bisphenol P-13C4, was introduced into the method and acceptable precision and accuracy values were obtained for all 15 bisphenols.

Linearity

Both LC-MS/MS methods for bisphenols analysis produced linear calibrations. Using a 1/x weighted linear regression, bisphenols A, B, and S showed acceptable linearities with r2 values of >0.993 and deviations of <20% across a calibration range of 2.5-300 µg/L.

The comprehensive method also used a linear regression of 1/x with acceptable linearities of r 2 >0.991 and deviations of <20% across calibration range of 2.5-300 µg/L for all compounds except bisphenol PH (5-150 µg/L); bisphenol G (5-100 µg/L); and bisphenol AF (2.5-150 µg/L).

Accuracy and Precision

Drinking water was collected locally and fortified with bisphenols A, B, and S at 2.5 (LLOQ); 7.5 (LQC); and 75 (MQC) µg/L. Three batches were analyzed over three days for a total of nine replicates. The results can be seen in Table V. Accuracy ranged from 82.4-113.7% for bisphenols A, B, S for intraday results and 86.6-108.3% for interday percent recovery. Precision measured by %RSD values was ≤11.2% for intraday results and ≤6.6% for interday results.

Table V: Accuracy and Precision Results for Bisphenols A, B, and S Method

		Day 1			Day 2			Day 3			Interday	
Water Sample	**Target Conc. (µg/L)**	**Calc. Conc. (µg/L)**	**% Recovery**	**%RSD**	**Calc. Conc. (µg/L)**	**% Recovery**	**%RSD**	**Calc. Conc. (µg/L)**	**% Recovery**	**%RSD**	**Average**	**%RSD**
Bisphenol S												
1 Drinking Water	2.5	2.2	86.8	4.0	2.3	90.6	2.2	2.4	95.7	1.2	91.0	4.9
	7.5	7.9	106.0	2.5	7.8	103.8	3.6	7.9	105.2	1.5	105.0	1.1
	75.0	78.0	103.9	0.9	75.5	100.7	4.1	76.8	102.4	1.5	102.3	1.6
2 Ice Machine Water	2.5	2.1	84.8	2.9	2.3	91.2	4.3	2.4	95.0	2.9	90.3	5.7
	7.5	7.6	101.3	5.8	7.9	104.7	2.9	7.8	104.2	1.8	103.4	1.8
	75.0	77.6	103.5	5.7	78.7	104.9	3.3	75.7	100.9	1.9	103.1	2.0
3 Drinking water	2.5	2.1	84.0	3.0	2.3	91.1	5.4	2.4	95.8	1.6	90.3	6.6
	7.5	7.7	102.4	7.4	7.9	105.5	4.7	7.9	105.1	1.2	104.3	1.6
	75.0	80.5	107.3	2.8	80.7	107.6	5.2	77.0	102.6	1.3	105.9	2.6
4 Drinking water	2.5	2.1	84.6	7.6	2.2	86.3	4.5	2.2	88.9	2.6	86.6	2.5
	7.5	7.6	101.1	2.6	7.3	97.1	4.4	7.4	98.0	6.4	98.7	2.1
	75.0	78.0	103.9	2.2	78.1	104.1	1.9	78.0	104.0	2.0	104.0	0.1
5 Drinking water	2.5	2.1	82.4	4.4	2.3	92.6	5.3	2.3	91.5	2.4	88.8	6.3
	7.5	7.6	101.4	4.8	8.1	108.2	2.8	7.6	101.5	2.3	103.7	3.8
	75.0	77.8	103.7	2.0	85.3	113.7	3.9	76.1	101.5	1.9	106.3	6.1
Bisphenol B												
		Day 1			Day 2			Day 3			Interday	
Water Sample	**Target Conc. (µg/L)**	**Calc. Conc. (µg/L)**	**% Recovery**	**%RSD**	**Calc. Conc. (µg/L)**	**% Recovery**	**%RSD**	**Calc. Conc. (µg/L)**	**% Recovery**	**%RSD**	**Average**	**%RSD**
1 Drinking Water	2.5	2.7	106.3	2.6	2.7	106.6	6.5	2.6	102.4	4.7	105.1	2.2
	7.5	7.3	97.0	2.1	7.3	97.8	2.9	7.0	92.8	4.1	95.9	2.8
	75.0	72.0	96.0	6.6	69.6	92.8	3.4	74.4	99.2	11.2	96.0	3.3
2 Ice Machine Water	2.5	2.5	100.1	5.4	2.4	96.3	4.7	2.5	101.4	1.7	99.3	2.7
	7.5	7.2	95.5	2.3	7.0	93.2	5.3	7.1	94.4	10.6	94.4	1.3
	75.0	69.5	92.7	2.2	65.7	87.6	1.8	70.2	93.7	5.3	91.3	3.5
3 Drinking water	2.5	2.5	101.9	3.8	2.7	108.0	0.1	2.7	106.8	3.7	105.6	3.0
	7.5	7.4	98.1	1.7	7.3	97.2	4.3	7.2	96.2	3.2	97.2	1.0
	75.0	68.2	91.0	3.1	71.1	94.8	2.4	72.6	96.8	4.0	94.2	3.2
4 Drinking water	2.5	2.7	106.4	5.8	2.7	110.0	1.7	2.7	108.6	7.2	108.3	1.7
	7.5	7.8	104.2	3.1	7.7	103.0	2.3	7.5	100.4	5.6	102.5	1.9
	75.0	79.6	106.1	3.0	72.7	96.9	1.7	71.6	95.5	3.4	99.5	5.8
5 Drinking water	2.5	2.7	107.7	1.7	2.6	102.4	7.2	2.5	101.7	0.2	103.9	3.1
	7.5	7.5	100.5	2.6	7.4	99.0	2.5	6.7	89.9	6.0	96.5	6.0
	75.0	71.4	95.2	2.4	70.6	94.1	1.9	66.0	88.0	1.7	92.4	4.2

Table V: Accuracy and Precision Results for Bisphenols A, B, and S Method

Bisphenol A												
		Day 1			Day 2			Day 3			Interday	
Water Sample	Target Conc. (µg/L)	Calc. Conc. (µg/L)	% Recovery	%RSD	Calc. Conc. (µg/L)	% Recovery	%RSD	Calc. Conc. (µg/L)	% Recovery	%RSD	Average	%RSD
1 Drinking Water	2.5	2.8	110.1	7.5	2.5	101.0	8.4	2.6	105.1	2.9	105.4	4.3
	7.5	7.5	100.2	6.4	7.6	102.0	0.9	7.2	96.0	3.9	99.4	3.1
	75.0	72.9	97.1	3.6	71.4	95.2	3.0	76.9	102.6	5.8	98.3	3.9
2 Ice Machine Water	2.5	2.5	99.2	4.3	2.7	107.4	8.1	2.6	103.9	9.4	103.5	4.0
	7.5	7.6	101.6	2.9	7.7	102.4	5.7	7.7	102.3	6.1	102.1	0.4
	75.0	71.3	95.1	4.6	73.6	98.1	3.3	73.8	98.4	1.4	97.2	1.9
3 Drinking water	2.5	2.7	108.7	7.7	2.6	104.1	1.5	2.5	100.6	4.8	104.5	3.9
	7.5	7.8	104.0	3.6	7.4	98.2	3.6	7.4	98.7	3.1	100.3	3.2
	75.0	72.6	96.8	2.9	75.5	100.6	4.1	76.5	102.0	3.3	99.8	2.7
4 Drinking water	2.5	2.6	102.7	5.4	2.5	101.3	3.2	2.6	106.0	8.9	103.3	2.3
	7.5	8.0	107.0	3.4	7.6	100.7	3.5	7.6	101.8	5.3	103.2	3.3
	75.0	75.3	100.4	3.1	75.0	100.0	2.8	73.4	97.8	5.4	99.4	1.4
5 Drinking water	2.5	2.5	100.5	6.2	2.7	107.3	3.1	2.5	99.4	3.2	102.4	4.2
	7.5	7.7	102.2	6.1	7.4	98.4	2.5	7.1	94.4	7.7	98.4	4.0
	75.0	73.3	97.7	2.1	73.7	98.3	0.2	71.3	95.1	3.9	97.0	1.8

The comprehensive method also had validation and accuracy experiments performed. Water collected locally was fortified with 15 bisphenols at 2.5, 7.5, and 75 µg/L. Three batches were analyzed over three days for a total of nine replicates. The results can be seen in Figures 3, 4, and 5. Accuracy ranged from 88.9-115.9% for the comprehensive method for interday percent recovery. Precision as measured by %RSD was ≤17.3% for interday results (n=9).

Figure 3: Interday Accuracy and Precision for the Comprehensive Bisphenols Method at the LLOQ (2.5 µg/L) (n=9) (Note that recovery at 2.5 µg/L was not assessed for bisphenols PH and G due to their higher LLOQs.)

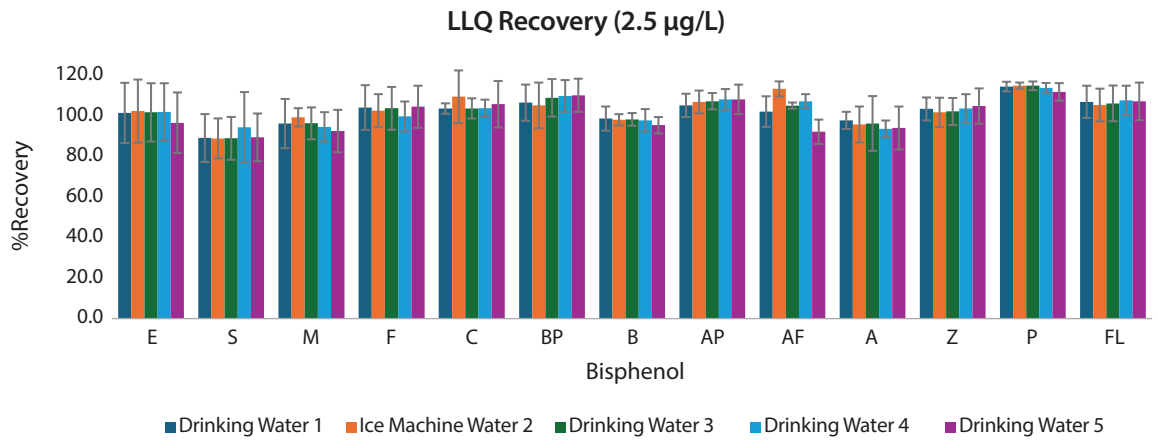


Figure 4: Interday Accuracy and Precision for the Comprehensive Bisphenols Method at the LQC (7.5 µg/L) (n=9)

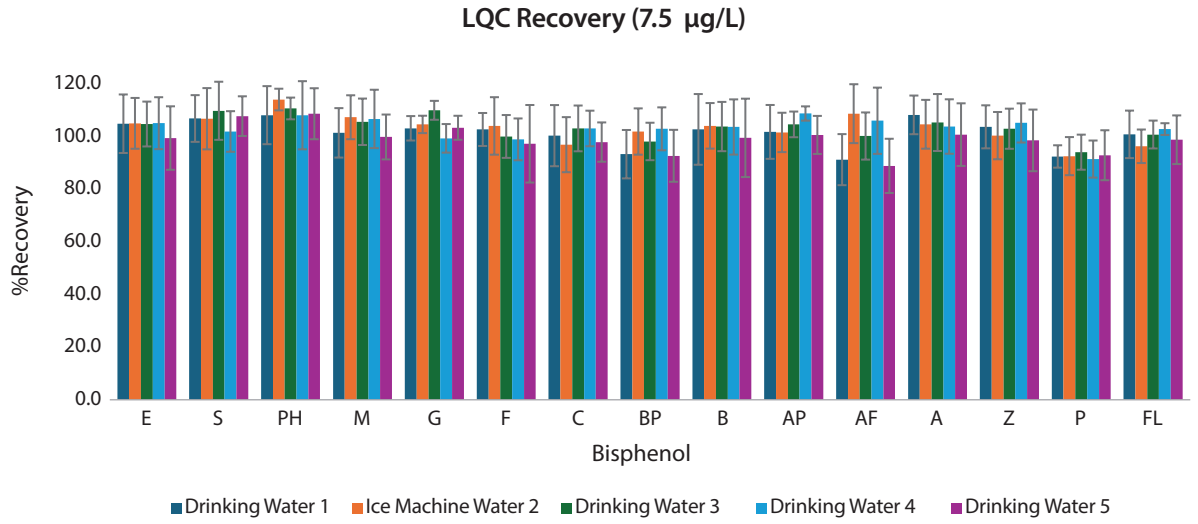
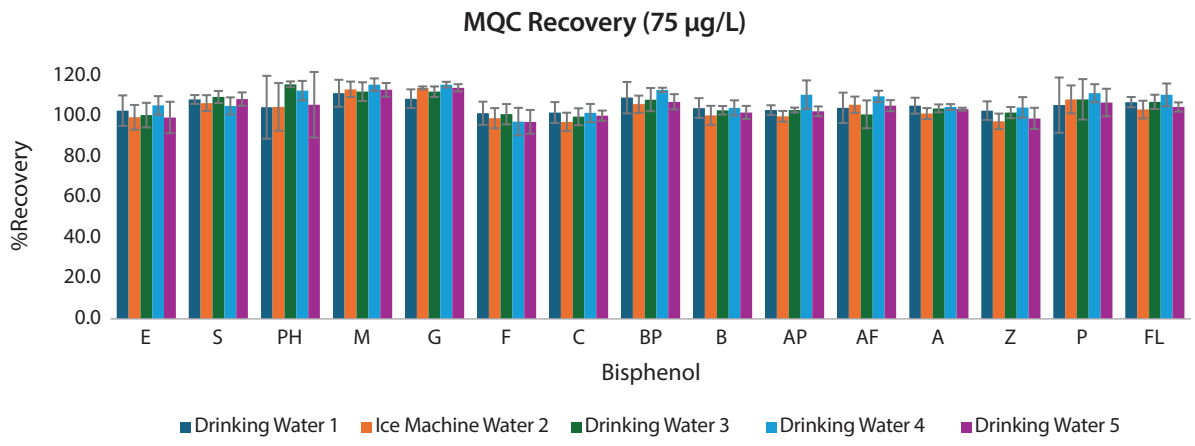


Figure 5: Interday Accuracy and Precision for the Comprehensive Bisphenols Method for at the MQC (75 µg/L) (n=9)



Conclusion

In this study, two robust LC-MS/MS methods for bisphenols analysis in drinking water were developed and both generated good quantitative results. A direct injection approach was utilized to streamline sample preparation, and the two complementary analytical methods produced complete chromatographic separation of all compounds in fast analysis times that are conducive to high-throughput testing.

One method was optimized for targeted analysis of BPA, BPS, and BPB because they are the most commonly tested bisphenols. The other method was optimized for 15 bisphenols to support labs wanting to expand into more comprehensive analyte lists in anticipation of regulatory changes. The developed methods meet the sensitivity requirements outlined in the EU's Drinking Water Directive, offering a practical solution for routine monitoring of bisphenol contamination.

References

1. X. Ye, L. Wong, A.M. Bishop, A.M. Calafat, Variability of urinary concentrations of bisphenol A in spot samples, first morning voids, and 24-hour collections. Environ Health Perspect, 119 (7) (2011) 983-988. https://pubmed.ncbi.nlm.nih.gov/21406337/
2. 2. M.E. Cull, L.M. Winn, Bisphenol A and its potential mechanism of action for reproductive toxicity. Toxicology 511 (2025) 154040. https://doi.org/10.1016/j.tox.2024.154040
3. 3. OEHHA. The Proposition 65 List. https://oehha.ca.gov/proposition-65/proposition-65-list
4. 4. European Chemical Agency, Member state committee support document for identification of 4,4'-isopropylidenediphenol (bisphenol a) as a substance of very high concern because of its endocrine disrupting properties which cause probable serious effects to the environment which gives rise to an equivalent level of concern to those of CMR and PBT/vPvB substances. https://echa.europa.eu/documents/10162/800d3c50-3d4d-2e2b-9577-4863052cf2f2
5. 5. European Parliament and Council of the European Union. Directive (EU) 2020/2184 of the European Parliament and of the Council of 16 Dec 2020 on the quality of water intended for human consumption. https://eur-lex.europa.eu/eli/dir/2020/2184/oj/eng

Raptor Biphenyl, 2.7 µm, 50 x 3.0 mm HPLC Column

- Ideal for bioanalytical testing applications like drug and metabolite analyses.
- Heightened selectivity and retention for compounds that are hard to resolve or elute early on C18 and other phenyl chemistries.
- Limits ionization suppression and allows simple, MS-friendly mobile phases.
- Part of Restek's Raptor LC column line featuring 1.8, 2.7, and 5 µm SPP core-shell silica.

Catalog No.	Product Name	Units
9309A5E	Raptor Biphenyl, 2.7 µm, 50 x 3.0 mm HPLC Column	ea.

9309A0253

25808

LC Column Accessories

Catalog No.	Product Name	Units
9309A0253	Raptor Biphenyl EXP Guard Column Cartridge, 2.7 µm, 5 x 3.0 mm, 3-pk.	3-pk.
25808	EXP Direct Connect Holder for EXP Guard Cartridges, Includes Fitting & Ferrules	ea.

21142

24497

Vials and Caps

Catalog No.	Product Name	Units
21142	Short-Cap Vial with Grad Marking Spot, 9-425 Screw-Thread, 2.0 mL, 9 mm, 12 x 32 (vial only), Amber, 100-pk.	ea.
24497	Short Screw Cap, Polypropylene, Screw-Thread, PTFE/Silicone/ PTFE Septa, Blue, Preassembled, 2.0 mL, 9 mm, 100-pk.	ea.

RESTEK