

CHROMATOGRAPHIC DETERMINATION OF BISPHENOL A IN BOTTLED WATER

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Abstract

- The main focus was to develop method for the extraction and quantitative analysis of bisphenol A (BPA).
- Liquid chromatography HPLC with UV detection was chosen.
- 15 bottled waters were chosen for analysis.

INTRODUCTION

BPA or 2,2-bis[4-hydroxyphenyl] propane is an industrially important chemical that is widely used as a raw material for the production of polycarbonate plastics and epoxy resins.

Due to the BPA negative effects on human health, many plastics manufacturing companies have decided to eliminate BPA from their synthesis, but it is still generally used [1]. BPA's unreacted particles migrate into water and, if consumed, can cause numerous diseases in the human body.

This contribution presents the determination of BPA in the selected bottled water samples. Solid phase extraction using Strata X column was performed prior to HPLC-UV analysis at wavelength 210 nm. The solubility of BPA was evaluated, and the method was validated.

METHODS AND MATERIALS

15 water samples were chosen (Fig. 1).



Fig. 1. Water samples

The VAC-ELUT was used for sample extraction. HPLC system is shown in Fig. 2. Elution of the compounds was performed by isocratic method. Mobile phase was methanol: water = 70:30, V/V. The separation took 12 min at the flow rate of 0.5 mL/min.



Fig. 2. HPLC system

RESULTS AND DISCUSSION

To evaluate reproducibility, three replicates were prepared for each concentration. Reproducibility was confirmed with RSD lower than 4.7 % as shown in Table 2.

Table 2. Reproducibility

γ (mg/L)	RSD (%)
0.5	4.64
1.0	3.64
10.2	1.64
25.7	1.88
51	0.27
100	0.27

Calibration curve is presented in Fig. 3. The values of correlation coefficient R^2 values were greater than 0.999, and the quality coefficient was 2.14 %. The linearity was confirmed.

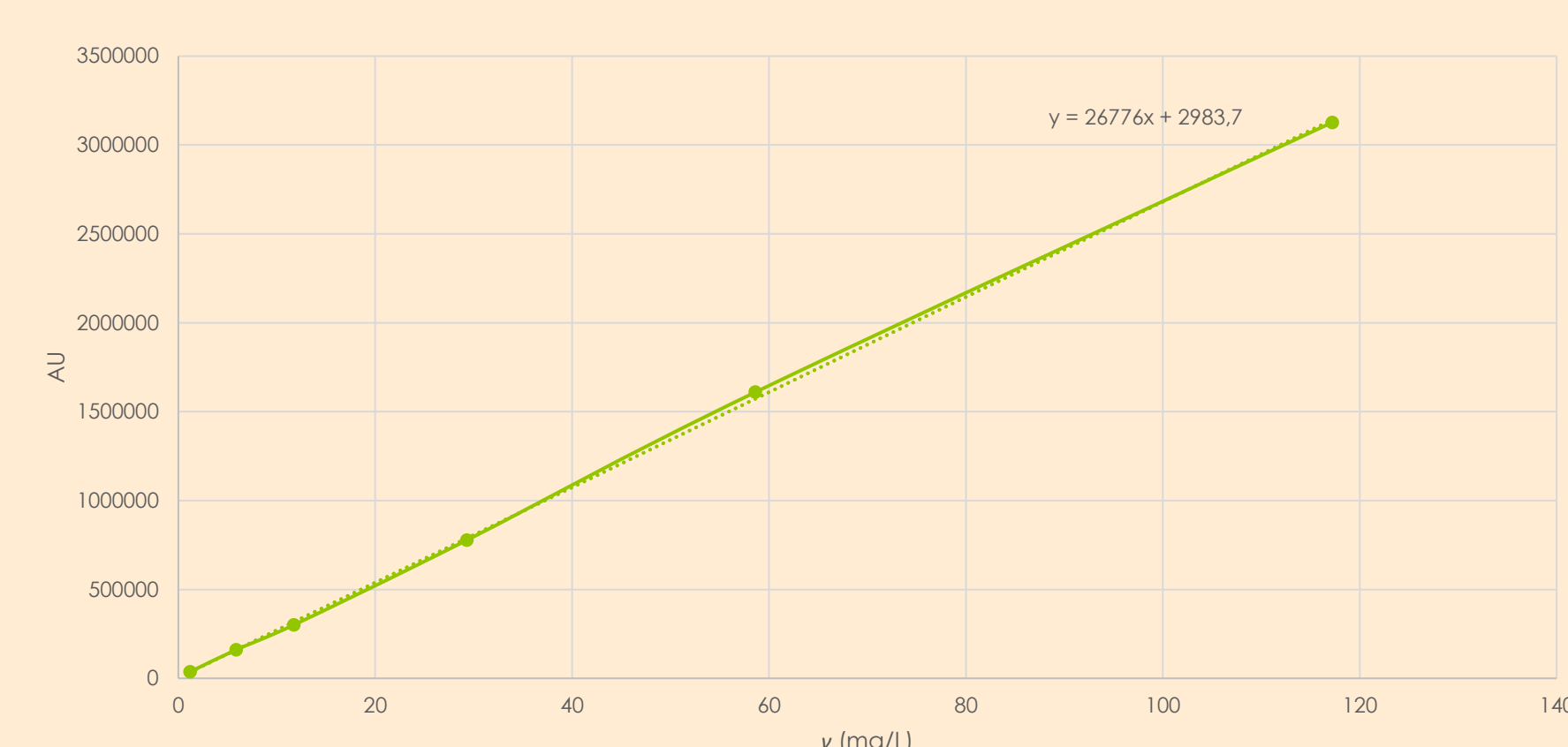


Fig. 3. The calibration curve for BPA

Fig. 4a represents the chromatogram of the standard solution containing BPA. The repeatability of areas obtained for the blank chromatograms was good. Three replicates were made for each sample. A typical chromatogram of the selected Slovenian bottled water sample can be seen from Fig. 4b.

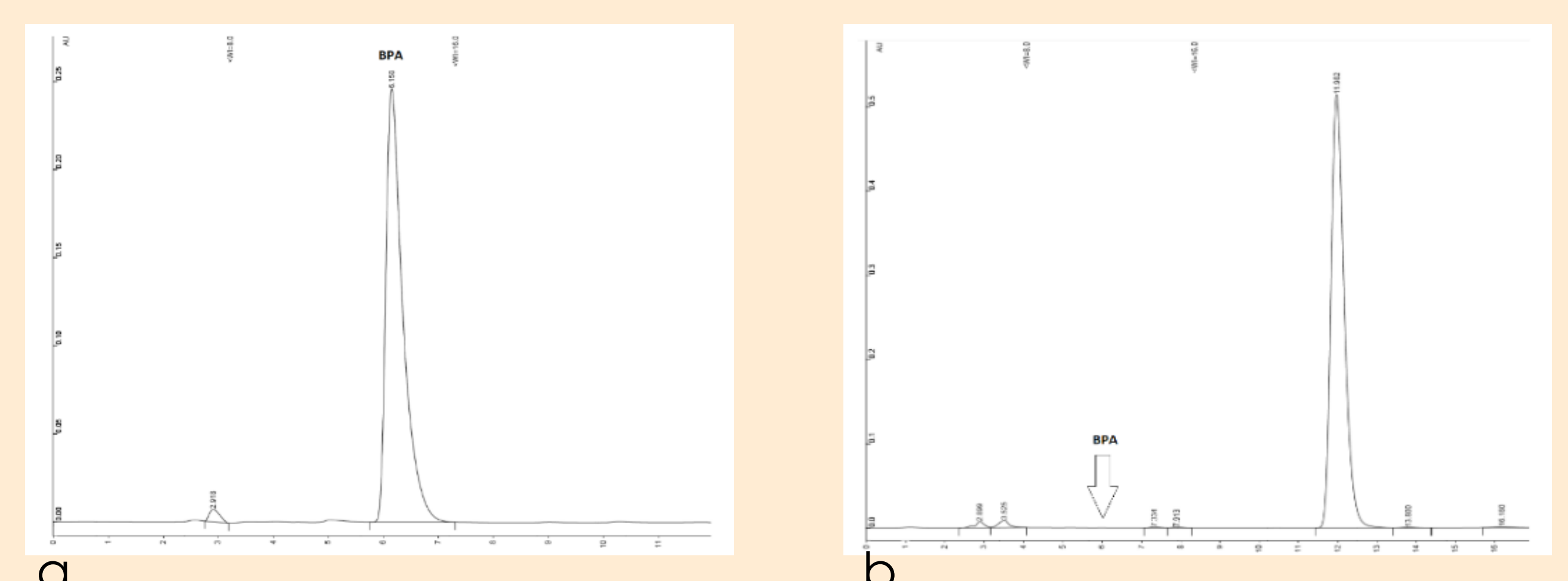


Fig.4. Standard BPA solution chromatogram (a) and chromatogram of selected Slovenian bottled water sample (b)

CONCLUSION

- The linearity of the method was confirmed with the correlation coefficient greater than 0.999.
- The recoveries ranged from 94 % to 104 %, which is satisfactory.
- RSD below 4.7 % indicates the reproducibility of the developed method.
- BPA was not detected in any of the 15 water samples analysed.

Reference

[1] Oluranti O. I., Alabi B. A., Michel O.S., Ojo A. O., Fatokun B. P. (2021) Rutin prevents cardiac oxidative stress and inflammation induced by Bisphenol A and Dibutyl phtalate exposures via NFR-2/NF-B pathway, Life Sciences, in press.