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Applikationsbericht

Determination of Food Sugars in Fruit Juice Using Evaporative Light Scattering Detection and BEH Amide Column Chemistry

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This is an Application Brief and does not contain a detailed Experimental section.

Abstract

XBridge BEH Amide Column chemistry provided an analysis time of less than 7.5 minutes for the analysis of sugars in fruit juice. This method enabled the accurate quantification of sugars in fruit juices using the robust XBridge BEH Amide.

Benefits

- Five food sugars are rapidly analyzed and quantified using the robust XBridge BEH Amide *XP* Column chemistry with proven Alliance HPLC System technology.
- Ability to determine sugar content in a variety of fruit juices with minimum sample preparation, rapid analysis time, and cost effectiveness.

Introduction

The healthier option of consuming pure fruit juice instead of soft drinks containing sugar has been promoted in recent years due to studies linking the latter with obesity, coronary problems, and the development of Type 2 Diabetes. Additionally, certain juices such as pomegranate have been reported to provide health benefits due to their antioxidant content. These products, therefore, often command premium prices.

To ensure quality and satisfy regulatory agencies, the fruit juice industry must test these products to meet certain standards. One indicator is sugar content. Fructose, sucrose, and glucose are important analytes in fruit juice analysis. Their content and relative ratio vary and serve as markers for various cultivars.

HPLC with evaporative light scattering (ELS) detection has long been a recognized technique for these analyses. Columns for sugar separations have used amine-based chemistry. However, this can lead to the formation of Schiff bases that can shorten column lifetime and lead to inaccurate sugar quantification.

Waters proprietary amide column chemistry prevents the formation of Schiff bases, eliminating the aforementioned problems. This study shows the versatility of the Waters XBridge BEH Amide *XP* Column for sugar analysis.

Figure 1. Alliance HPLC System with ELS detector.

Results and Discussion

Various fruit juices were purchased in local markets. Samples of these juices were centrifuged at a high speed to remove pulp and other particulate matter. A portion of the supernatant of each juice was diluted with a 1:50 water/acetone mixture. This was the only sample preparation required.

The analyses were performed on an Alliance HPLC System equipped with a 2424 Evaporative Light Scattering Detector. ELS detection is appropriate here as the target analytes are non-chromophoric excluding the use of UV and fluorescence detection. ELS also allows gradient elution enabling the resolution of related compounds such as other sugars, sugar alcohols (sorbitol), and higher oligomers. An XBridge BEH Amide *XP* 4.6 x 100 mm, 2.5 µm Column was used. Gradient elution was used with a binary mobile phase consisting of water and acetone modified with triethyl amine (TEA). Samples were quantified against a six-point calibration curve generated by running dilutions of a stock sugar mixture. Figure 2 shows the separation of four food sugars and sorbitol, a sugar alcohol found in certain cultivars that can be used as an adulteration marker. A profile of several fruit juices is shown in Figure 3. The slight presence of sorbitol in apple juice is noteworthy.

Conclusion

XBridge BEH Amide column chemistry provided an analysis time of less than 7.5 minutes for the analysis of sugars in fruit juice. This method enabled the accurate quantification of sugars in fruit juices using the robust XBridge BEH Amide *XP* column chemistry with proven Alliance HPLC System technology for accurate solvent delivery, repeatable injection performance, the ability to create non-linear gradients, and simple ELS detection, meeting the goals of simple sample preparation, rapid analysis time, and cost effectiveness.

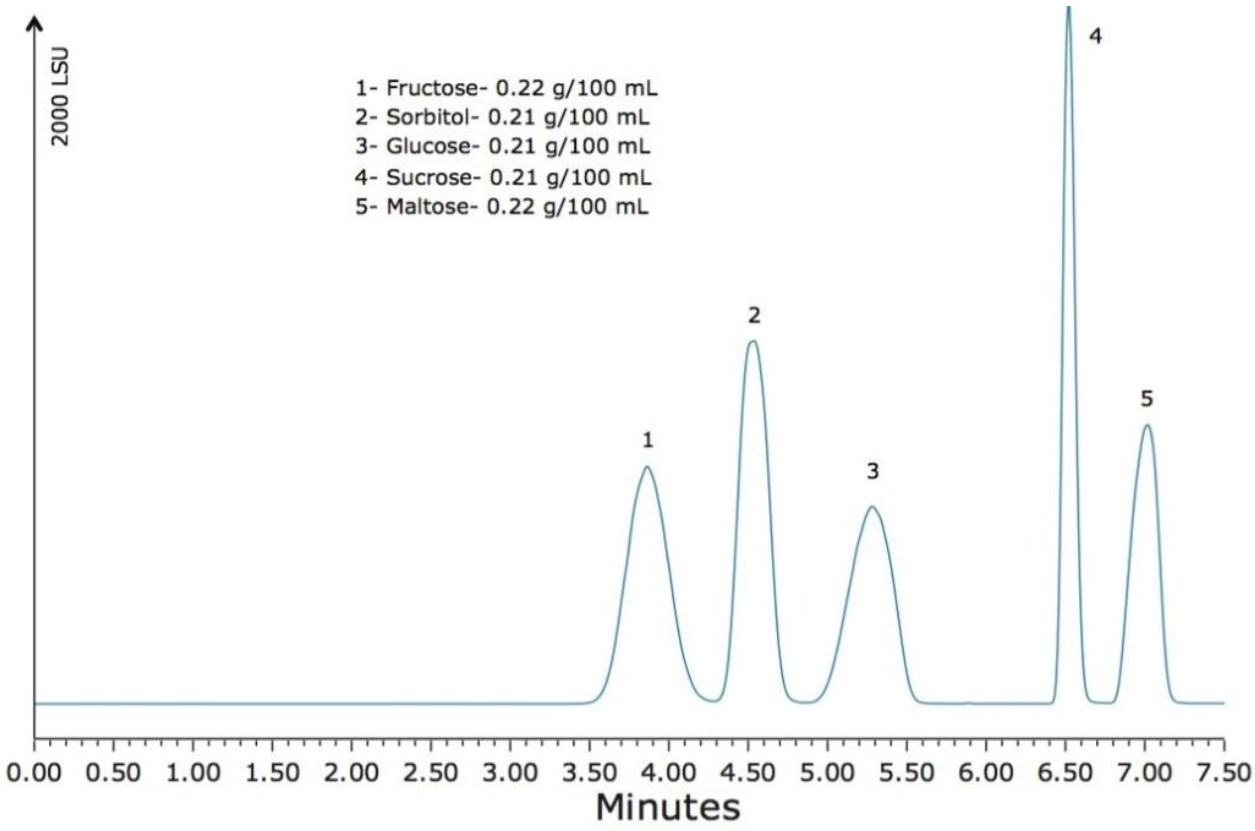
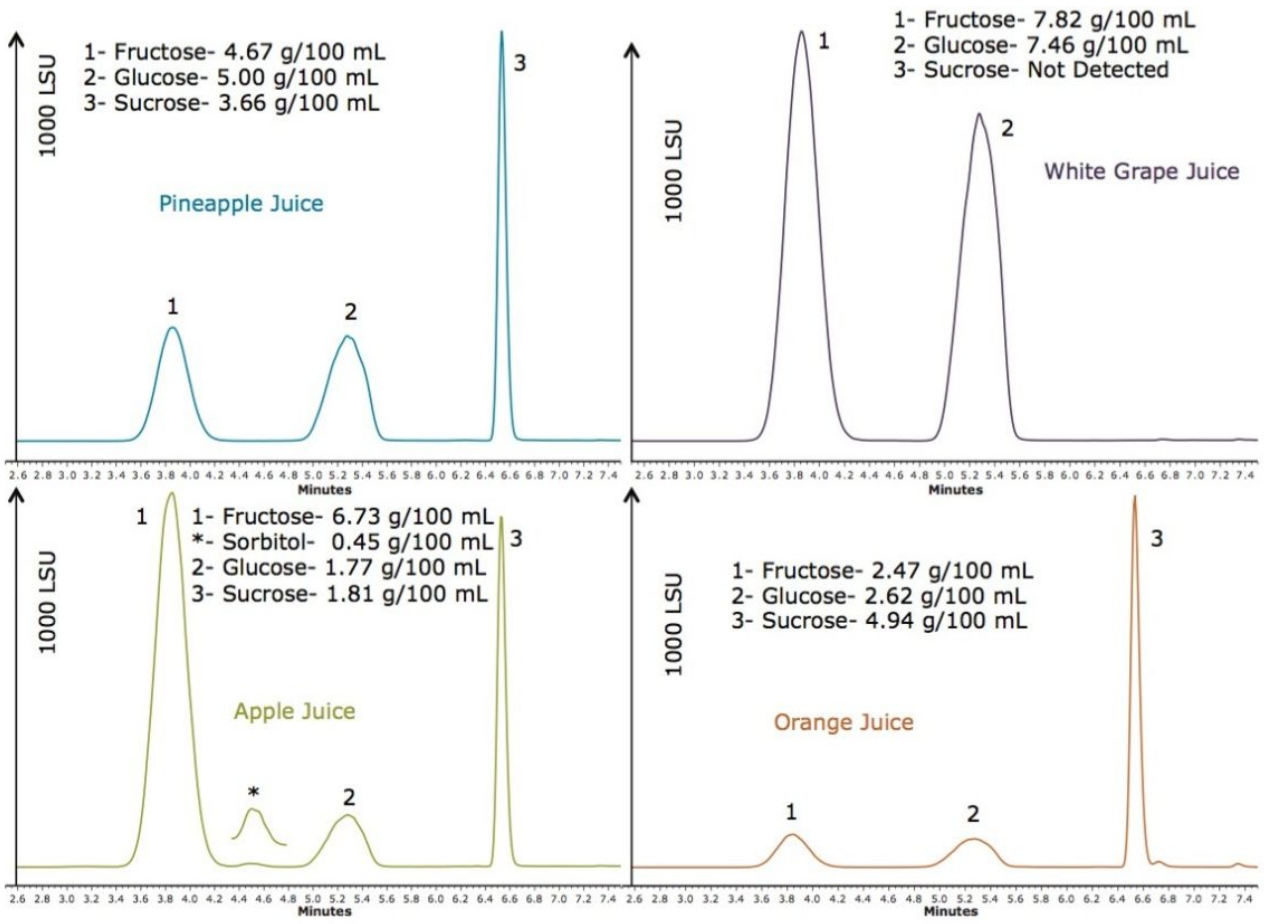


Figure 2. ELSD chromatogram showing a gradient separation of the five food sugars.



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XBridge BEH Amide XP, 2.5 µm, 4.6 x 100 mm Column <
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