Analysis of Carbohydrates in Lemonade using HPLC

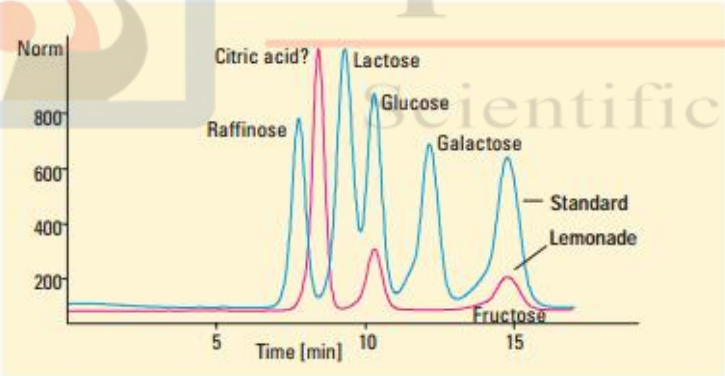
Instrument: HP/Agilent 1100 Series HPLC System

Abstract

The following carbohydrates have been analyzed: glucose, galactose, raffinose, fructose, mannitol, sorbitol, lactose, maltose, cellobiose, and sucrose. Food carbohydrates are characterized by a wide range of chemical reactivity and molecular size. Because carbohydrates do not possess chromophores or fluorophores, they cannot be detected with UV-visible or fluorescence techniques. Nowadays, however, refractive index detection can be used to detect concentrations in the low parts per million (ppm) range and above, whereas electrochemical detection is used in the analysis of sugars in the low parts per billion (ppb) range.

Sample preparation

Degassed drinks can be injected directly after filtration. More complex samples require more extensive treatment, such as fat extraction and deproteination. Sample cleanup to remove less polar impurities can be done through solid-phase extraction on C18 columns.



Conditions

Column
300 ˜ 7.8 mm Bio-Rad HPXP, 9 µm
Mobile phase water
Column compartment 80 ºC
Flow rate 0.7 ml/min
Detector refractive index

Sample preparation
Samples were directly injected.

Figure 1
Analysis of carbohydrates in lemonade

Chromatographic conditions

The HPLC method presented here was used to analyze mono-, di-, and trisaccharides as well as sugar alcohols.

HPLC method performance

Limit of detection
<80 ng with S/N = 2

Repeatability of
RT over 10 runs <0.05 %
areas over 10 ru ns 2 %

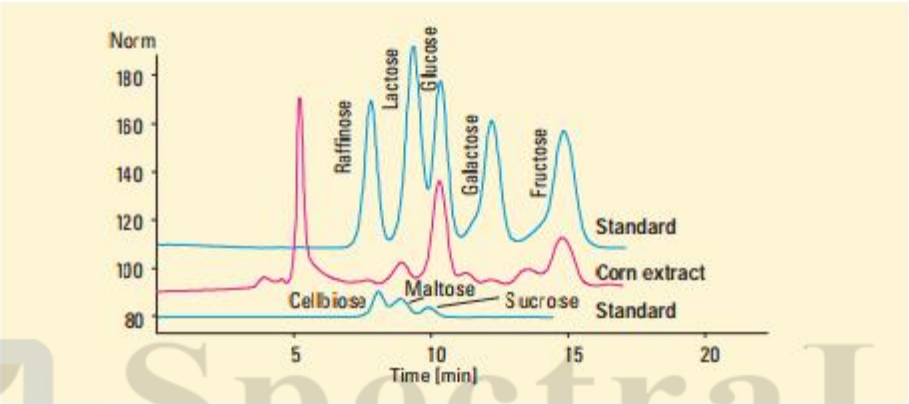


Figure 2
Analysis of carbohydrates in corn extract

References

1.
Official Methods of Analysis, Food Compositions; Additives, Natural Contaminants, 15th ed; AOAC: Arlington, VA, 1990, Vol. 2; AOAC Official Method 980.13: Fructose, glucose, lactose, maltose, sucrose in milk chocolate; AOAC Official Method 982.14: Glucose, fructose, sucrose, and maltose in presweetened cereals; AOAC Official Method 977.20: Separation of sugars in honey; AOAC Official Method 979.23: Saccharides (major) in corn syrup; AOAC Official Method 983.22: Saccharides (minor) in corn syrup; AOAC Official Method 984.14: Sugars in licorice extracts.
2 https://www.chem.agilent.com/Library/applications/59660637.pdf