

Introduction

Sugars are simple, soluble carbohydrates that are commonly found in foods, foodstuffs, beverages and other consumer products.

Cornerstone Analytical Laboratories provides sugar analysis by Ion Chromatography with Pulsed Amperometric Detection (IC-PAD). This service can be used to help identify and quantify the sugar content of a wide variety of sample types.

Types of Sugars

Sugars are categorized based on the number of sugar monomers present in the compound: Monosaccharides are comprised of a single sugar molecule (Examples include fructose, glucose, mannose and galactose). Disaccharides are comprised of two sugar molecules (Examples include sucrose and lactose). Longer chains of sugars are categorized as either oligosaccharides or polysaccharides, depending on the number of sugar monomers present in the molecule.

Cornerstone's sugar analysis is limited to mono- and disaccharides (see the list of routine sugars below). Oligosaccharides and Polysaccharides may be analyzed for monosaccharide content after enzymatic digestion (see below).

Sample Types

Sugar analysis can be applied to many types of samples, such as:

- Foods
- Pharmaceuticals
- Dietary Supplements
- Natural Products
- Bodily Fluids (saliva, plasma, urine, etc.)
- Consumer products
- Water and Wastewater

Method

Our internal method is designed for application of a wide variety of sample types. The method contains details on each of the general topics below.

Sample Preparation

Since sugars are water soluble, the preparation is usually limited to dissolving the sample or extracting it into the mobile phase of the analysis. Most samples will be filtered prior to analysis to remove any particulate matter.

Calibration

The IC-PAD is calibrated externally with solutions of standard grade sugars.

Analysis

Sample analysis is conducted on an IC-PAD that has previously been calibrated with a series of sugar standards. For the result to be considered valid, all quality control must be within the acceptance criteria.

Calculations

The sugar concentration of the sample is calculated based on the mass of sample taken for the analysis to give the results on the weight/weight basis, such as ppm or ppb. Results that are below the method limit of quantitation are reported as a less-than value (e.g. <10 ppm).

Reporting

Results are reported based on the mass of sample taken for the analysis (wt/wt basis). If a sample is not dissolved during the preparation step, the results are reported as "extracted."

Limit of Detection and Quantitation

The limit of detection and quantitation are a function of the mass of sample taken for the analysis and the instrument limits. The limit of quantitation of this analysis is easily dialed low by taking a relatively large sample size. Contact us for specific LOD/LOQ we can reach in your sample.

Enzymatic Digestion of Oligosaccharides and Polysaccharides

Oligosaccharides and polysaccharides may be enzymatically digested to provide a means of analysis for the oligosaccharide or polysaccharide by measuring the monosaccharide content. This approach relies on the identification of a suitable enzyme and analysis for the resulting monosaccharides.

Method Development and Validation

Cornerstone Analytical Laboratories can develop and validate an analytical method for sugar analysis in your sample. Please view our page on method validation for more information on our process of developing and validating methods. Once validated, we can transfer it to your facility if desired.

Scope

The following is a list of sugars provided in our routine service. Other sugars may be available - please contact us to learn more:

- Ribose
- Sucrose
- Galactose
- Glucose
- Arabinose
- Lactose
- Fructose
- Maltose
- Mannose
- Xylose

References

1. AP-CHROM-CARBOHYDRATES-1, *Analysis of Carbohydrates by Ion Chromatography*, Version 1, Cornerstone Analytical Laboratories, December 2015.