



Extraction and quantitative determination of Inulin content in some bakery products by HPLC

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Abstract:

Inulin is a naturally occurring polysaccharides produced by many types of plant. It is a form of fermentable fiber called as oligosaccharide which helps create a friendly environment for helpful bacteria in the digestive tract. Inulin and FOS (fructo-oligosaccharides) are increasingly used as a health enhancing ingredient in all kinds of food and in pet food products also.

In the present study isolation of inulin from bakery products first achieved by extraction using deionized water, followed by acid hydrolysis and neutralization of solution. The extracted compounds were characterized by HPLC-008 using UV-Visible spectroscopic detector and the sucrose content in the samples were calculate. It is observed that in a hydrolysis reaction of sucrose the percentage of sucrose decreases and the amount of glucose and fructose increases in a given sample. At the end the obtained experimental results of FOS and Inulin were compared and evaluated for given different samples.

Introduction:

Inulin and FOS (fructo-oligosaccharides) are increasingly used as a health enhancing ingredient in all kinds of food and also feed and pet food products. Inulin molecules consist of a linear series of β -(2 \rightarrow 1) fructose units, and typically have a terminal non-reducing glucose.



FOS is low molecular weight material with degrees of polymerization of up to 10. There are two types of FOS material, being material prepared by hydrolysis of inulin (this is a mixture of primarily oligofructose (Fm) and some small inulin (GF_n) material) and material prepared by enzymatic elongation of sucrose (primarily GF_n, with n ranging from 2 to 5). Inulin (GF_n) consists of a broad range of molecules with a number of fructose units that can range from 2 to over 50. GF_n are non-reducing carbohydrates, Fm has a reducing fructose end group.

The aims of this study is to develop and optimize extraction and purification procedures for the industrial commercialization of inulin and fructooligosaccharides from bakery products.

Experimental:

Bakery products: First sample - Dark Fantasy , Second sample- Parle-G, Third sample - Hide & Seek

Preparation of sample:

A .Sample extraction :

Take a weight of empty conical flask and note as "M1". Weigh approximately 5 gm of sample. Transfer this sample in conical flask and weigh it as "M2". Add 40 ml. of water to above conical flask and mix well on magnetic stir. Warm the conical flask for 15 minutes in bath water till sample get dissolve. Cool it and dilute the volume till 100 ml and note weight as "M3". Filter it by whatman paper. Collect the filtrate and transfer to conical flask.

B. Acid hydrolysis

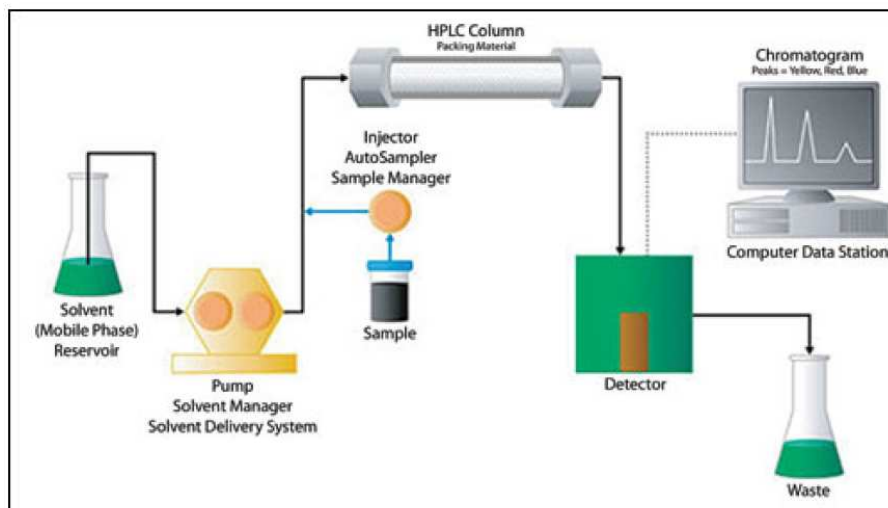
Weigh empty conical flask as "M4". Add 5ml. of filtrate to this conical flask and weigh it as "M5". Add 45 ml of 0.2N HCl and weight it as "M6". Put cotton plug on the top of conical flask. Place the conical flask in water bath and heat it for 45 min at nearly 70⁰C.

C. Neutralization

Weigh empty hard test tube and note it as "M7". Cool the solution and take 10 gm and put it in the hard test tube and weigh it as "M8". Neutralize the acid hydrolysis with 50 % NaOH by use micro pipette and note weight "M9". Use this final extract for estimation by total glucose & fructose content by the HPLC analysis.



Instrumentation:



Result and Discussion:

Chromatograms:

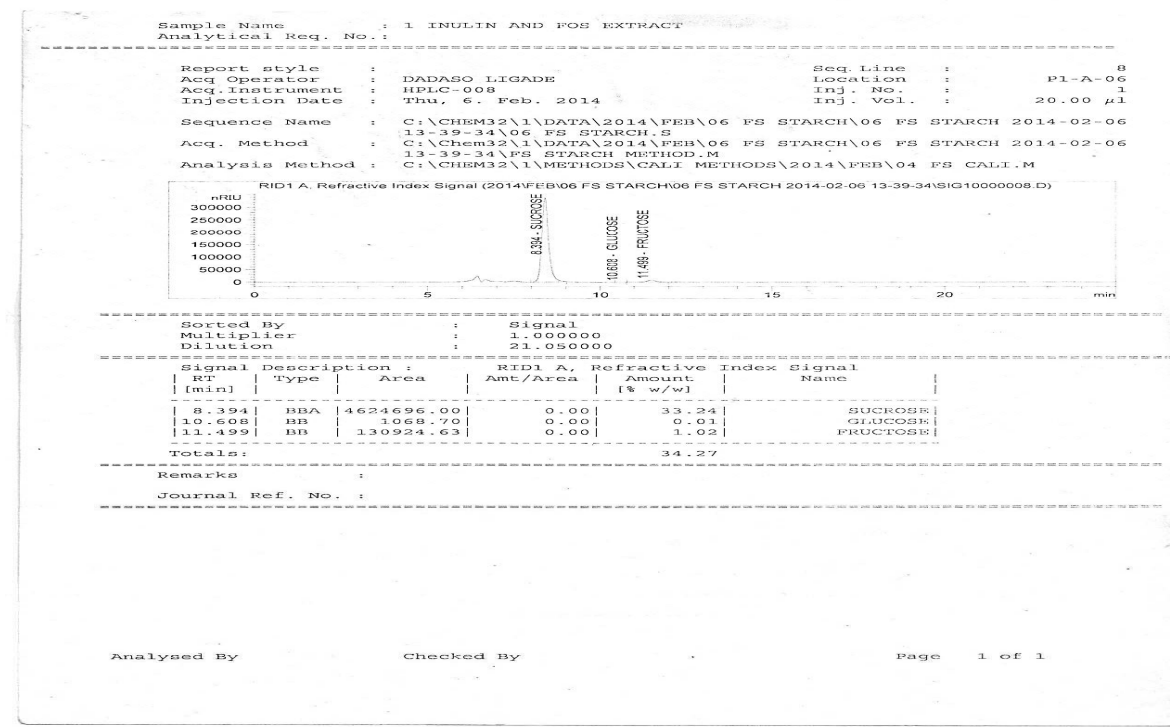




TABLE 1 : Samle-1 INULIN AND FOS EXTRACT

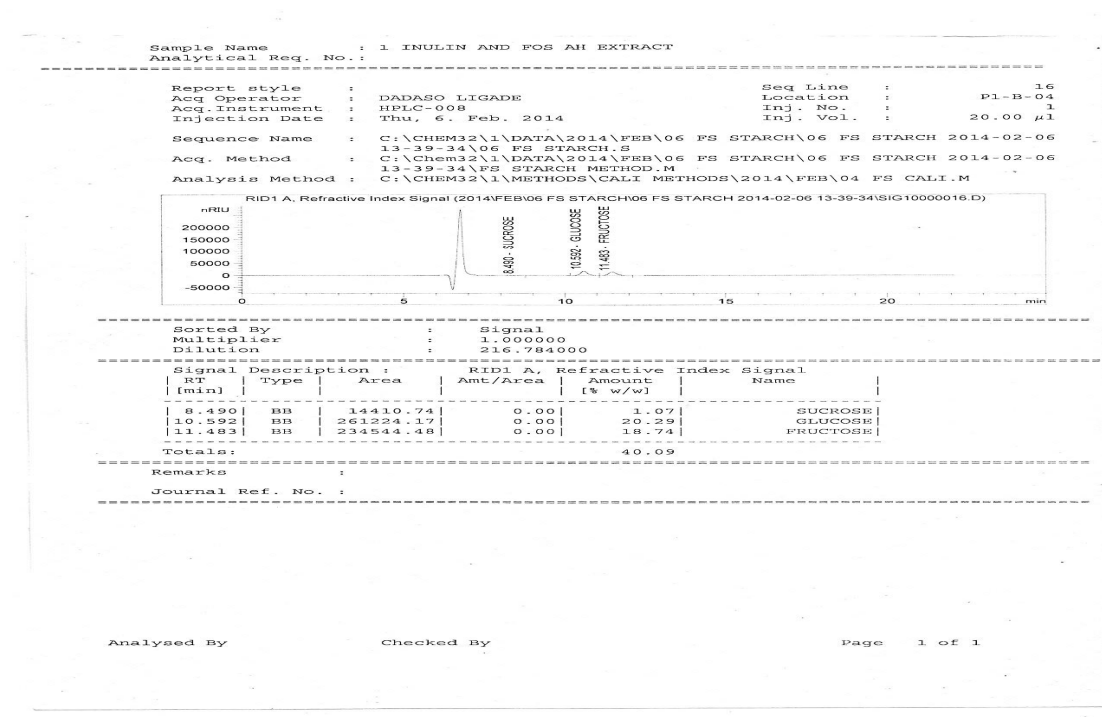


TABLE 2 : Sample-1 INULIN AND FOS AH EXTRACT

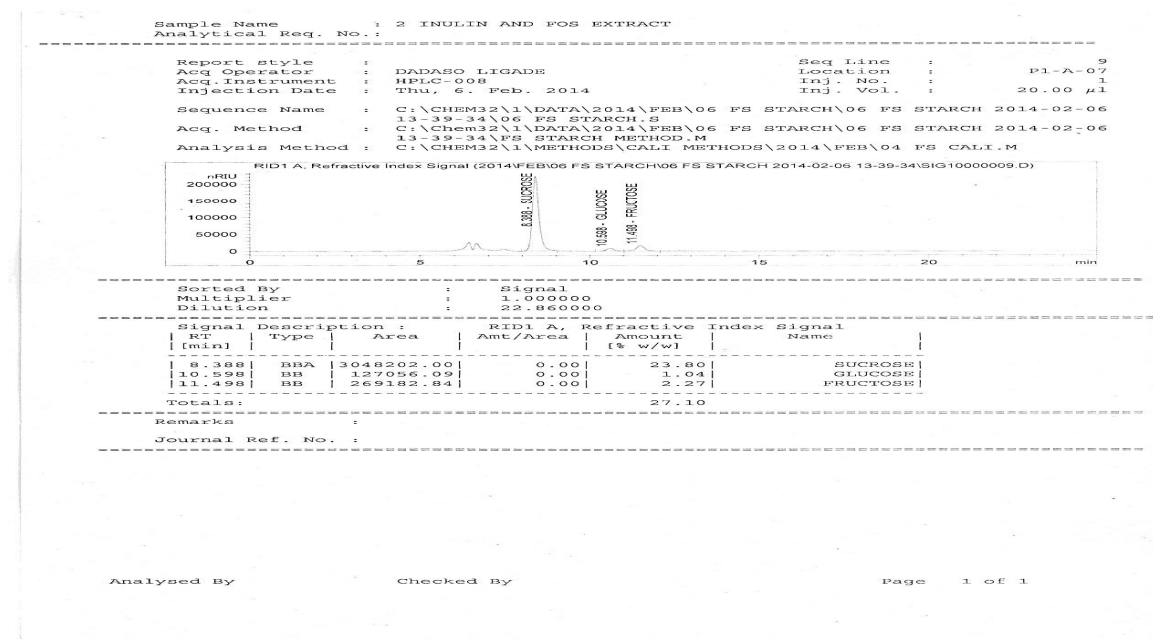




TABLE 3 : Sample 2 INULIN AND FOS EXTRACT

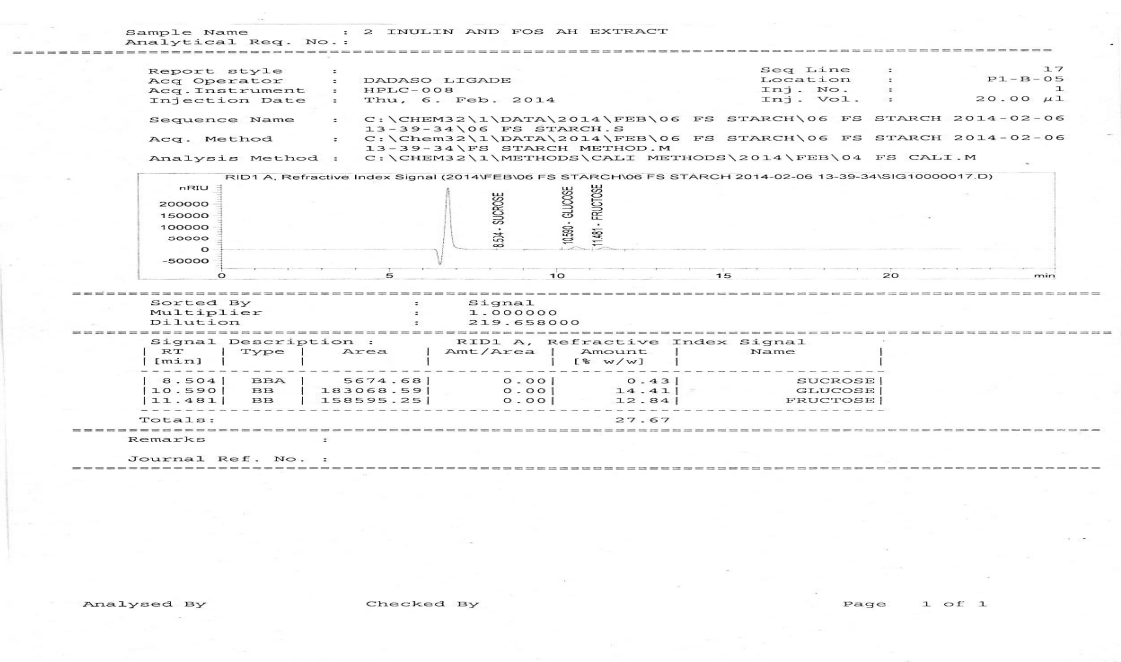


TABLE 4 : Sample 2 INULIN AND FOS AH EXTRACT

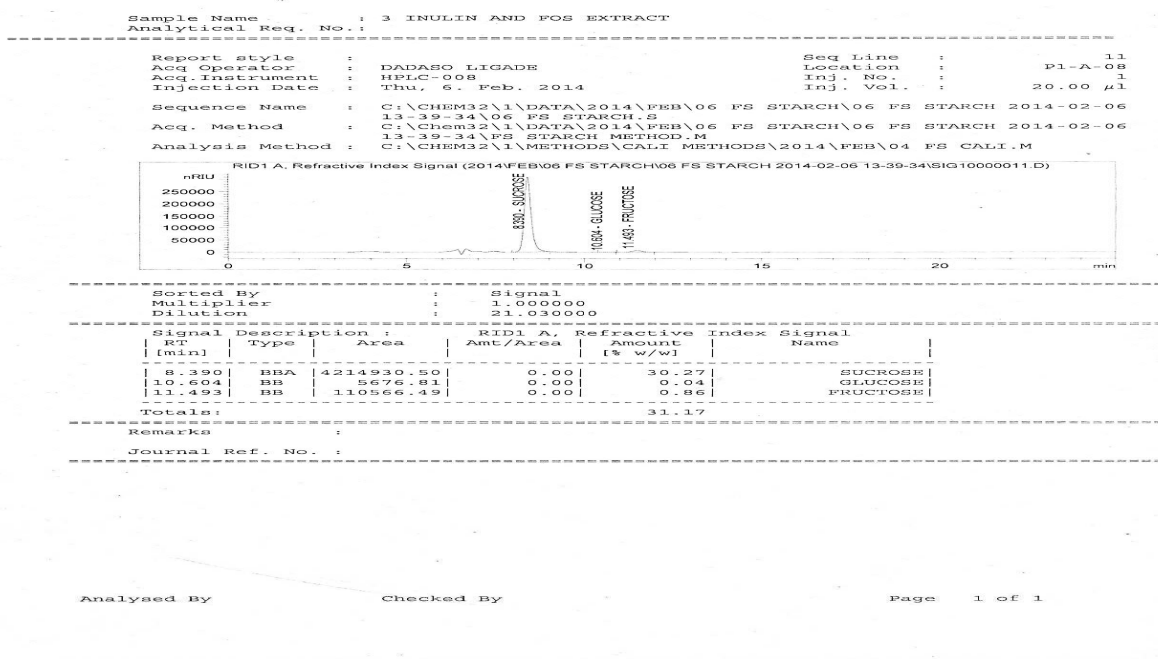




TABLE 5 : Sample-3 INULIN AND FOS EXTRACT

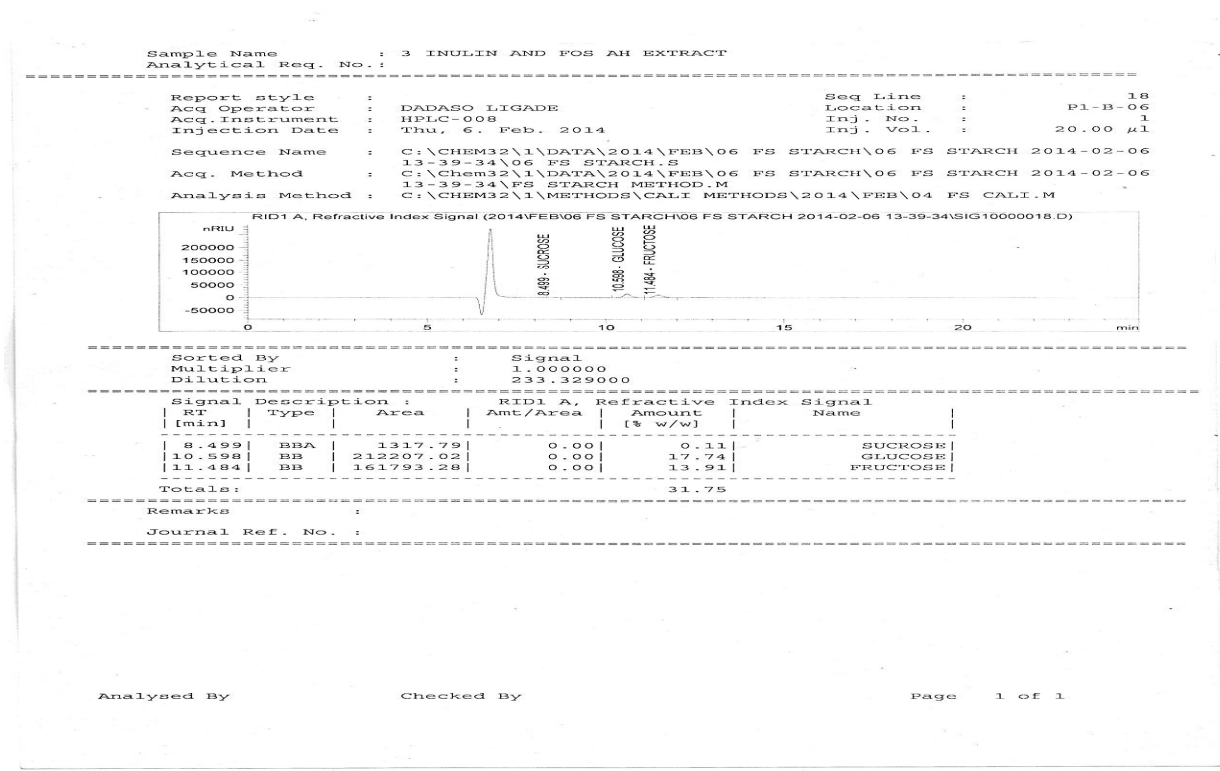


TABLE 6 : Sample- 3 INULIN AND FOS AH EXTRACT

Calculationsto determine Dilution factor

1. Before acid Hydrolysis

$$Df1 = \frac{M3 - M1}{M2 - M1}$$

$$Df1 = \frac{189.06 - 84.028}{89.016 - 84.028}$$



$$Df1 = 21.04811548$$

2. After acid hydrolysis

$$Df2 = \frac{M6 - M4}{M5 - M4}$$

$$Df2 = \frac{145.009 - 95.107}{100.633 - 95.107}$$

$$Df2 = 10.13032887$$

1. Neutralization

$$Df3 = \frac{M9 - M7}{M8 - M7}$$

$$Df3 = \frac{42.445 - 32.275}{42.278 - 32.275}$$

$$Df3 = 1.016694992$$

Total Dilution factor

$$D = Df1 \times Df2 \times Df3$$

$$D = 21.04811548 \times 10.13032887 \times 1.016694992$$

$$D = 216.7841102$$



Total FOS and inuline content(W)

$$(W) = (M4 - M3) \times 0.9$$

$$(W) = (40.09 - 34.27) \times 0.9$$

$$(W) = 5.238\%$$

Table.6.Total FOS and Inulin content of samples:

| Sample | Total Inulin and FOS (%) |
|--------------|--------------------------|
| Dark Fantasy | 5.238 |
| Parle-G | 0.513 |
| Hide & Seek | 0.522 |

Conclusion:

It is observed that Dairy milk contain highest amount of Inulin and FOS as compared to all other given samples. As we know that the amount of carbohydrate is more in dairy product so it contain highest percentage of FOS produced by hydrolysis of starch which is also a component of carbohydrate. It is also observed that coffee bite chocolate contain lowest percentage of FOS and Inulin. Conversion of starch results in decrease in amount as it produce FOS after hydrolysis. It is well observed by chromatogram obtained during experiment. HPLC is the technique and HPLC-008 is the instrument which is used for extraction and determination of Inulin. Sample amount of 20.00 microliter gives better result.

References:

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