eurofins | Food Testing

MEASUREMENT OF CEREAL β-GLUCANS

The Carbohydrate Competence Centre (Eurofins Food Testing, The Netherlands) is performing cereal β-glucan determination in food products (solids and liquids), cereals, cereal products and pure ingredients with a method similar to AOAC 965.16 / AACC 32-23.01 / ICC Standard Method No 166.
The method is available with the test codes HEC2Z and HEC1C.

Introduction

Cereal β-glucans are non-digestible, non-starch polysaccharides naturally occurring in cell walls of cereals, such as oat and barley. Due to their health benefits they find wide application in food products as well as supplements.

- Cereal β-glucans are comprised by mixed β-(1→3) and β-(1→4)-linkages that form linear polysaccharides (Figure 1).
- β-Glucans are generally considered as high molecular weight (long-chain) polysaccharides, however the presence of endogenous enzymes in cereals or processing/purification may lead to the formation of low molecular weight (short-chain) molecules .
- β-glucans are water soluble and have the ability to form gels and viscous solutions.
- Cereal β-glucans are considered soluble dietary fibre.

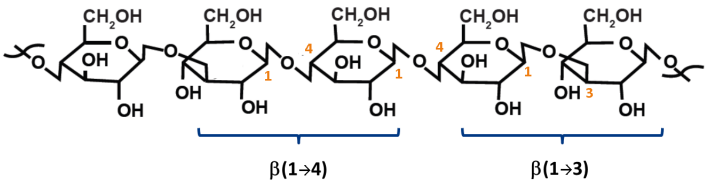


Figure 1: *Cereal β-glucan chemical structure*

Health Benefits and Health Claims

It is recognized that oat and barley β-glucans are:

- contributing to the maintenance of blood cholesterol levels.
- reducing of postprandial blood glucose levels.

Recent studies have shown that cereal β-glucans may also have beneficial effect on the immune system.

These health benefits have been recognized by health agencies worldwide by authorizing health claims in products containing oat and barley and thus containing β-glucan from these cereals. The US Food and Drug Administration's (FDA) health claim states that soluble fibre from these sources, as part of a diet low in saturated fat and cholesterol, may reduce the risk of cardiovascular disease. The European Food and Safety Authority (EFSA) recognized the cholesterol-lowering and blood glucose reducing benefits of oat and barley β-glucans by permitting related claims on oat and barley containing products.

Applications & Uses

Oat and barley are used, because of their β-glucan-related health benefits, in a variety of (food) products such as:

- Breakfast cereals, granola, müsli
- Wholegrain (healthy) bars
- Drinks with added (oat) cereals
- Dairy products with added (oat) cereals
- Bread and other bakery products
- Pasta
- Nutritional supplements

Furthermore, barley (as malt) is indispensable ingredient in beer brewing. However β-glucan, due to the formation of viscous solutions, may cause problems related to reduced rates of wort separation, filtration, formation of haze, gels and precipitates.

Why quantifying β-glucans ?

- Product labeling & health claim support
- Product R&D: influence on (sensory) properties
- Beer brewing control

Method of analysis

We offer a method similar to AOAC 965.16 / AACC 32-23.01 / ICC Standard Method No 166

Test codes : HEC2Z and HEC1C

For method description and details see backside.

Method

Principle

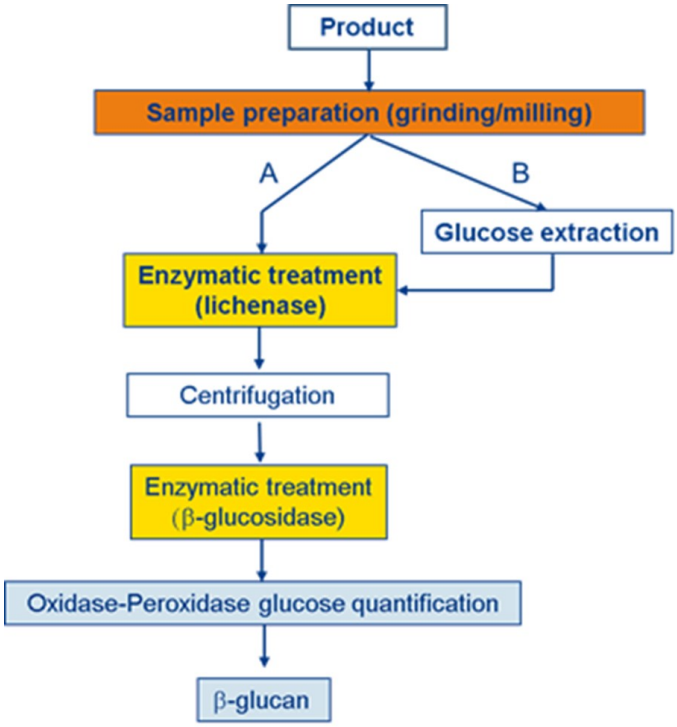
The product sample is treated with lichenase to specifically hydrolyze β-glucan to oligosaccharides, which are then quantitatively cleaved to glucose by β-glucosidase (Scheme 1, route A). Glucose is measured using glucose oxidase-peroxidase-buffer mixture. Correction for free glucose present is applied.

For samples with high levels of glucose a pre-extraction step before the enzymatic treatment is performed (Scheme 1, route B). Note that, short-chain β-glucan (if present) may also extracted, leading thus to quantification of only long-chain β-glucans.

The method is specific for β-(1→3)(1→4)-β-glucan and the presence of other β-glucan or α–glucan does not influences the result.

Test applicability

The method is applicable for cereals, cereal-based products, flours, food products (solids and liquids), nutritional supplements as well as cereal β-glucan ingredients.



Scheme 1: *Schematic representation of the cereal β-determination method. HEC2Z performed as route A; HEC1C performed as route B.*

Which test code to chose?

The method is offered in two variations depending on the glucose content in the sample.

Test code	Choose for
HEC2Z (total β-glucan)	**Majority of matrices (for the most cases the first choice).** **Samples with low level of glucose content (i.e. ratio glucose: β-glucan is <5).** **Both high and low molecular weight β-glucan are quantified.**
HEC1C (polymeric β-glucan)	**Samples with high level of glucose content (i.e. ratio glucose : β-glucan is >5).** **Only high molecular weight (polymeric) β-glucan is quantified.**
HEC2Z & HEC1C	**If information on both low and high molecular weight β-glucan is required**

Contact us

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