

# Carbohydrate Analysis of Foxhill Kitchen's Bunz

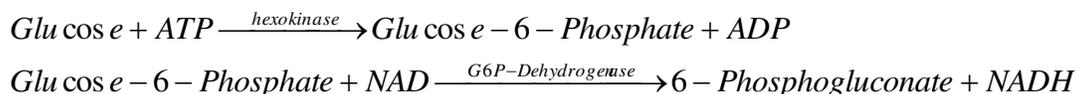
## Introduction

Low-carbohydrate gluten-free buns from Foxhill Kitchens were analyzed for total digestible carbohydrate content using an enzymatic method. Total digestible carbohydrate content includes both complex carbohydrates (starches) and simple carbohydrates (sugars). Non-digestible carbohydrate content (fiber) was not determined. Additionally, two commercially available lower-carbohydrate breads were analyzed for comparison along with control samples consisting of pure starch or sugar.

## Methodology

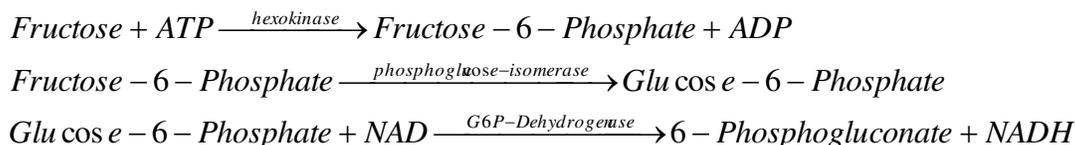
Enzymes have found widespread use in the food industry for quantitative determination of nutrients in foods. Their high sensitivity and specificity make them ideal for determining carbohydrate content in foods with little need for sample preparation.

Glucose content may be determined by treating a food sample with the enzymes hexokinase and glucose-6-phosphate dehydrogenase according to the following reactions:

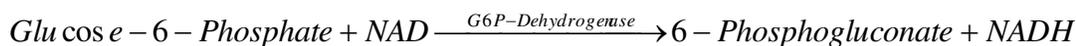
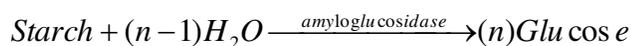


Hexokinase catalyzes the phosphorylation of glucose by adenosine triphosphate (ATP). The resulting glucose-6-phosphate (G6P) is then oxidized by nicotinamide adenine dinucleotide (NAD) to 6-phosphogluconate as catalyzed by glucose-6-phosphate dehydrogenase. The amount of reduced nicotinamide adenine dinucleotide (NADH) formed in the reaction may be determined by measuring the amount of light it absorbs at a wavelength of 340 nm using a UV/visible spectrophotometer. This absorbance is directly related to the amount of glucose in the sample.

Fructose content may be similarly determined by measuring NADH absorption after first converting the fructose-6-phosphate to glucose-6-phosphate using the enzyme phosphoglucose isomerase. The reactions are as follows:



Starch content may be determined by the same method by first hydrolyzing the starch in the presence of the enzyme amyloglucosidase thus converting the starch into its individual glucose units. The reactions are as follows:



## Results

	Starch	Sugars	Total Digestible Carbohydrates
Bunz	0.03 g/Bunz	0.13 g/Bunz	0.16 g/Bunz
Nickles Bread	7.7 g/slice	0.6 g/slice	8.3 g/slice
Schweibels Bread	5.6 g/slice	0.5 g/slice	7.1 g/slice
Pure Starch	0.24 mg/ml (0.28mg/ml)*		
Pure Glucose		0.9 mg/ml (1.0 mg/ml)*	
Pure Fructose		2.0 mg/ml (2.1 mg/ml)*	

\* Actual value

## References

Methods of Enzymatic Analysis, 3<sup>rd</sup> edition, H. U. Bergmeyer, ed, Academic Press, New York, Vol. 6, 2 – 10 (1984)

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