

Food & Beverage Series

GLUCOSE MEASUREMENT IN FROZEN GREEN BEANS



Introduction

Dextrose (D-glucose) concentrations in complex matrices such as frozen green beans can be measured directly and quickly using either a [YSI 2500 Glucose/Lactate Analyzer](#) or a [YSI 2900 Series Biochemistry Analyzer](#). YSI's unique enzyme technology provides for specific glucose measurement. Measurements are virtually unaffected by color, turbidity, density, pH, or the presence of reducing substances.

When a sample is injected into the sample chamber, the glucose diffuses into the membrane containing glucose oxidase. The glucose is immediately oxidized to hydrogen peroxide and D-glucono-d-lactone. The hydrogen peroxide is detected amperometrically at the platinum electrode surface. The current flow at the electrode is directly proportional to the hydrogen peroxide concentration, and hence to glucose concentration.



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I. Materials & Setup

- A. YSI Biochemistry Analyzer - equipped with a 2365 Glucose Membrane and 2357 Buffer.
- B. Glucose standards (2.50 g/L, 9.00 g/L).
- C. Buffer Diluent (40 g/L NaH₂PO₄, 10 g/L Na₂HPO₄ in reagent water).
- D. Connect the YSI Biochemistry Analyzer to a suitable power source.
- E. Perform the instrument and membrane daily checks described in the Operations Manual (Section 5).
- F. Volumetric glassware (Class A recommended).

- G. The following instrument setup is recommended:
Sample Size 25 µL

Probe A Parameters

Chemistry	Glucose
Unit	g/L
Calibrator	2.50 g/L
End Point	30 Sec

Autocal Parameters

Temperature	1°C
Time	30 Min
Sample	5 Samples
Cal Shift	2%

II. Method

- A. Weigh up to 25.00 g of green beans to be analyzed, add 50 mL of buffer.
- B. Transfer the sample a clean dry blender. Blend until the sample is liquid.
- C. Transfer the sample to a 100 mL volumetric flask using buffer diluent to rinse and dilute. Fill the flask to the mark with buffer. Allow the solution to equilibrate for about twenty minutes before analysis.
- D. Calibrate the YSI Biochemistry Analyzer with a 2.50 g/L glucose standard solution.
- E. Check the linearity of the membrane at least once a day by injection of a glucose linearity check solution (9.00 g/L). Refer to the Operators Manual for specifications.
- F. Assay the sample prepared in C by aspiration into the YSI Biochemistry Analyzer. The linear range of the system is 0.05 to 9.00 g/L glucose. If the value reported exceeds this, further dilution is required.*
- G. Calibrate frequently as described in the Operations Manual (Section 7).

* The linearity of glucose on the YSI Biochemistry Analyzer can be increased to 0.05 to 25.0 g/L. This can be done by decreasing the sample size to 10 µL and checking the linearity with a 25.0 g/L solution.

III. Calculations

To calculate % glucose, multiply the reported value by the appropriate dilution factor.

Example: 27.22 grams of frozen green beans were diluted to 100 mL in a Class A volumetric flask. When assayed, the value reported was 2.20 g/L glucose.

$$\begin{aligned} \text{\% Glucose:} &= 0.0081 \text{ gram glucose /} \\ 2.20 \text{ g/L} \times 0.100\text{L} & \text{ g green beans} \\ / 27.22 \text{ g} & \\ &= 0.81\% \text{ (w/w)} \end{aligned}$$

Ordering Information

YSI Part Numbers:

2500/2900/2950	Biochemistry Analyzer
2365	Glucose Membrane Kit
2776	Glucose Standard Solution (2.50 g/L)
1531	Glucose Standard Solution (9.00 g/L)
2777	Glucose Standard Solution (25.0 g/L)
2357	Buffer Kit
2363	Potassium Ferrocyanide Test Solution
2392	NaCl Solution (for membrane installation)



APPLICATION NOTE 211LS-02



YSI Life Sciences develops and manufactures scientific instruments, sensors and systems that serve a variety of scientific and industrial markets worldwide. YSI has a long history in the life sciences and bioanalytical markets, most notably with our introduction of the world's first commercial whole blood glucose analyzer in 1975. Today there are over 10,000 YSI instruments installed around the world, trusted in critical situations to provide the most accurate data in the shortest time.

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