

Sucrose Measurement in Molasses

I. Introduction

Sucrose concentrations in complex matrices such as molasses can be measured directly and quickly using the YSI 2700 SELECT Biochemistry Analyzer. YSI's unique enzyme technology provides for rapid sucrose 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 sucrose diffuses into the membrane containing invertase, mutarotase, and glucose oxidase. The sucrose is hydrolyzed to α -D-glucose and fructose. The mutarotase allows for the quick equilibrium of glucose between its α and β forms. In the presence of glucose oxidase, the β -D-glucose (dextrose) is immediately oxidized to hydrogen peroxide and D-glucono- δ -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 through the series of reactions described above, the hydrogen peroxide concentration is also directly proportional to the sucrose concentration.

Because the membrane contains glucose oxidase, any dextrose in the sample will also be oxidized and produce a signal. For this reason, the sample must be **dextrose-free**. If dextrose is present in the sample, refer to Application Note #303 for the Simultaneous Measurement of Dextrose and Sucrose in Molasses. For more information, refer to Section 4 of the Operations Manual.

II. Materials and Setup

- YSI 2700 SELECT Biochemistry Analyzer - equipped with a 2703 Sucrose Membrane and 2357 Buffer.
- Sucrose standards (5.00 g/L, 25.00 g/L). Place the 5.00 g/L solution in Cal Station #1.
- Connect the 2700 SELECT to a suitable power source.
- Perform the instrument and membrane check described in the Operations Manual (Section 3).
- Volumetric glassware (Class A recommended).
- The following instrument setup is recommended.

Sample size:	25 μ L
Sample Station #	2
CalMethod	One Station

Black Probe Parameters

Chemistry	Sucrose
Unit	g/L
Calibrator	5.00 g/L
End Point	30 Sec
CalStation#	1

White Probe Parameters

Single Channel 2700	N/A
Dual Channel 2700	None

Autocal Parameters

Sample Error	ON
Temperature	1°C
Time	15 Min
Sample	5 Sam
Cal Shift	2%

III. Method

- Weigh up to 5.000 g of molasses to be analyzed.
- Transfer the sample to a 100 mL volumetric flask, using 2357 buffer to rinse and dilute. Fill the flask to the mark with buffer and mix.
- Calibrate the 2700 SELECT with a 5.00 g/L sucrose standard solution.
- Check the linearity of the membrane at least once a day by injection of a sucrose linearity check solution (25.00 g/L). Refer to the Operators Manual (Section 3) for specifications.
- Assay the sample prepared in B by aspiration into the 2700 SELECT. The linear range of the system is 0 to 25.00 g/L sucrose. If the value reported exceeds this, further dilution is required.
- Calibrate frequently as described in the Operations Manual (Section 6).

IV. Calculations

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

Example: 2.01 g of molasses was diluted to 100 mL in a Class A volumetric flask. When assayed, the value reported was 5.89 g/L sucrose.

% Sucrose:
 $5.89 \text{ g/L} \times 0.100\text{L}/2.001\text{g} = 0.294\text{g sucrose/g molasses}$
 $= 29.4\% \text{ (w/w)}$

V. Ordering Information

YSI No.

2700	Biochemistry Analyzer
2703	Sucrose Membrane Kit
2780	Sucrose Standard Solution (5.00 g/L)
2778	Sucrose Standard Solution (25.0 g/L)
2357	Buffer Kit
2363	Potassium Ferrocyanide Test Solution
2392	NaCl Solution (for membrane installation)

Y S I *incorporated*



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