

Determination of Hydrogen Peroxide

I. Introduction

Hydrogen peroxide can be measured quickly using the YSI 2700 SELECT Biochemistry Analyzer. YSI's unique enzyme technology provides for rapid hydrogen peroxide determination. Measurements are virtually unaffected by color, turbidity, density, or pH.

When a sample is injected into the sample chamber, the hydrogen peroxide diffuses to the platinum electrode and is oxidized. The current flow at the electrode is directly proportional to hydrogen peroxide concentration. The blank membrane placed over the electrode surface rejects potential interfering substances.

Low molecular weight phenols, mercaptans, hydroxylamines, hydrazines, and anilines can be electrochemical interferences. Refer to Section 4 of the Operations Manual for specifics.

II. Materials and Setup

- A. YSI 2700 SELECT Biochemistry Analyzer - equipped with a 2701 Blank Membrane and 2357 Buffer.
- B. Hydrogen Peroxide Standards. YSI does not offer hydrogen peroxide standards. Prepare a calibration standard with a hydrogen peroxide concentration near the expected assay value of the sample, however, the calibration standard must produce at least 5 nA of current. In general, about 15 ppm (mg/L) hydrogen peroxide is the lower limit for a calibration standard.

A linearity standard can also be prepared. Target a concentration that reflects the highest hydrogen peroxide concentration of the samples being analyzed.
- C. Connect the 2700 SELECT to a suitable power source.
- D. Perform the instrument and membrane check described in the Operations Manual (Section 3).
- E. Volumetric glassware (Class A recommended).
- F. The following instrument setup is recommended.

Sample size:	10 - 65 µL*
Sample Station #	3**
CalMethod	One Station

Black Probe Parameters

Chemistry	Peroxide
Unit	mg/L (ppm)
Calibrator	See section B above
End Point	30 Sec
CalStation#	2**

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%

* The sample volume can be changed to meet the specific needs. Low hydrogen peroxide concentrations will require larger sample volumes.

** The calibration solution should be stored and sampled from glass containers. However, if the solution is prepared and used the same day, Station #1 can be used for calibration and samples can be taken from Station #2. Otherwise, calibrate from Station #2 and sample from Station #3 (Stations #4 or #5 can also be used for instruments equipped with a turntable or monitoring station).

III. Method

- A. Dilute samples with distilled water to bring the hydrogen peroxide concentration below 1000 ppm.
- B. Calibrate the 2700 SELECT with the hydrogen peroxide calibration standard prepared in II.B.
- C. If desired, check the linearity of the membrane by injection of the linearity solution prepared in II.B. Typically, hydrogen peroxide response is linear from 0 to 1000 ppm.
- D. Assay the sample prepared in III.A. by aspiration into the 2700 SELECT. If the value reported exceeds 1000 ppm, dilute the sample further.
- E. Calibrate frequently as described in the Operations Manual (Section 6).

IV. Calculations

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

Example: 10.0 ml of sample was diluted to 100 mL in a Class A volumetric flask. When assayed, the value reported was 320 mg/L (ppm).

Hydrogen peroxide in original sample:

$$320 \text{ mg/L} \times 0.100\text{L}/0.010\text{L} = 3200 \text{ mg/L (ppm)}$$

V. Ordering Information

YSI No.

2700	Biochemistry Analyzer
2701	Blank Membrane Kit
2357	Buffer Kit
2363	Potassium Ferrocyanide Test Solution
2392	NaCl Solution (for membrane installation)

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