LCEC Determination of Glucose in Foods

Purpose
Determination of Glucose in Various Liquid and Solid Foods

Existing Methods
Colorimetric Test Kits, Flow injection analysis, a LC-RI (refraction index detector), Amperometric oxygen and peroxide based glucose analyzers.

LCEC Method
Offers a rapid, accurate, selective, and very sensitive alternative method with minimum sample preparation. Uric acid and ascorbic acid do not interfere with the analysis and can be determined.

Conditions
System: BAS 400 Glucose Analyzer
Column: BAS ODS column (5 µm, 30 x 4.6 mm) and Glucose oxidase reactor column (IMER), both maintained at 35°C with an LC-23B temperature controller.
Mobile Phase: 20 mM NaH_2PO_4, 0.05% dimethylhexylamine, pH 5.5
Electrode: anionic membrane coated Pt
Potential: +700 mV vs Ag/AgCl
Detection Limit: 300 pg glucose injected, at a S/N of 3. The injection volume was 20 µL. Smaller amounts can be detected with a BAS 400 system using a smaller diameter column. In general, glucose concentrations are very high in the food samples of interest and the detection limit is not an issue.
Linear Range: up to 500 ng injected (a large amount was not tested).

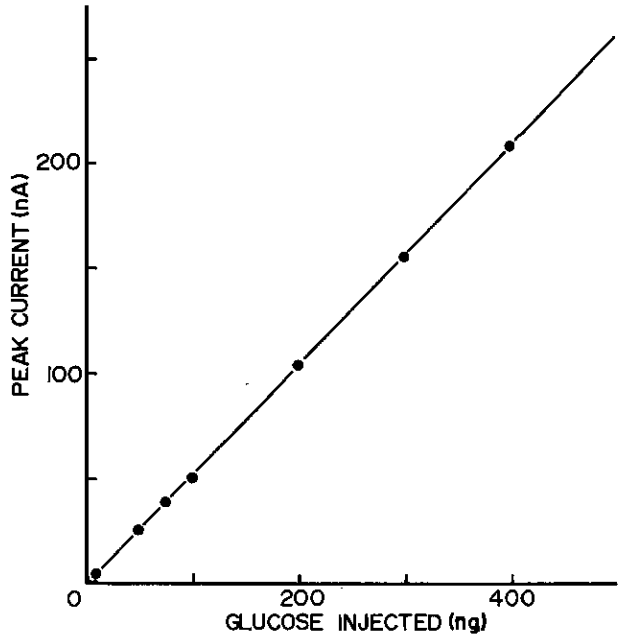

Figure 1. Glucose Calibration Curve

Sample Preparation
For liquid samples: dilute sample with 200 - 2000 volumes of mobile phase (minimal sample size was 1 µL). Centrifuge if necessary and then directly inject 20 µL. For solid samples: accurately weigh appropriate size sample (0.1 - 5 g) into sealable vial. Add 100 mL of water (80 - 90°C - for high fat samples) and shake contents vigorously. Let samples sit 3 - 10 min. to allow insoluble material to settle or rise, and to cool to room temperature in the case of high fat samples. Centrifuge if necessary, dilute 100 µL of supernatant 100 times with mobile phase. Inject 20 µL of the sample solution into the analyzer. Note, since the analyzer is very sensitive, samples are normally diluted hundreds of times and sample-filtering is not necessary. The column is protected with a filter as an extra precaution.

The following food sample types are representative of those which have been studied with this analyzer:

white wine	apple juice
red wine	spiced cider
cola drink	potato powder
pineapple juice	instant banana
lemon juice	rice cereal
lime juice	chocolate

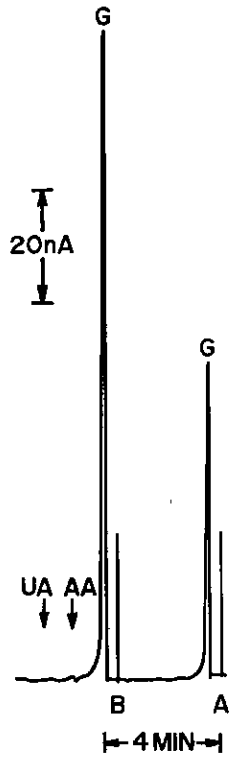

Figure 2. Glucose in lemon juice using a coated Pt electrode

A. Glucose (G), ascorbic acid (AA), uric acid (UA) standards, 50 ng of each injected.

B. Glucose in lemon juice. 2000-fold dilution, 2 µL injected.

Note: The precision is dependent on the preparation and coating of the Pt electrode. Please contact BAS for further information about the electrode treatment technique.

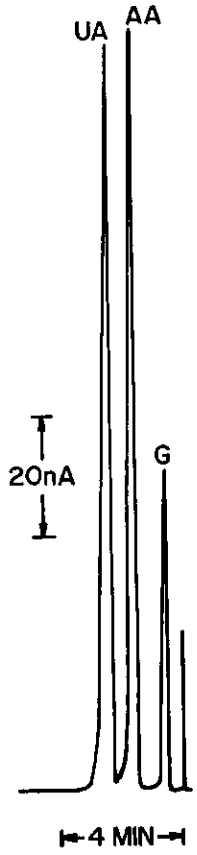

Figure 3. Glucose (G), ascorbic acid (AA), uric acid (UA) standards using a bare Pt electrode, 40 ng of each injected.