O·I·Analytical

Methodology

Reducing Sugars in Wine by Segmented Flow Analysis (SFA)

(Cartridge Part #A003129)

1.0 Scope and Application

1.1 This method is used for the determination of reducing sugars in both dry red and white wine, fortified wines, and sweet wines. Juices may also be analyzed using this method.

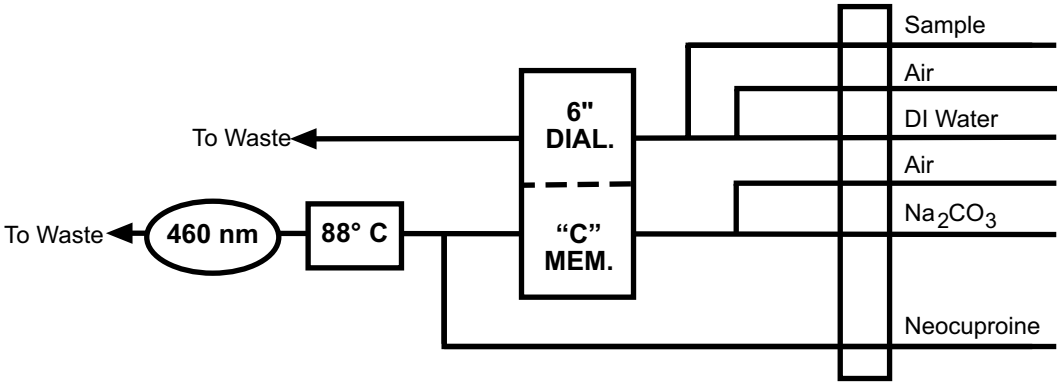
1.2 The applicable range of this method is 0.15 to 10 g/L reducing sugars (glucose and fructose) with a single dialyzer and 1 to 200 g/L with two dialyzers in series. The range may be further extended by sample dilution.

2.0 Summary of Method

2.1 Reducing sugars include those with terminal aldehydes, a-hydroxy ketones and hemiacetal. These compounds are oxidized to acids by various oxidizing agents. Wine samples to be determined for reducing sugars are mixed with a cupric-neocuproine reagent and heated to 88°C to form a complex that is reduced by any present reducing sugar to a colored cuprous-neocuproine complex. The concentration of reducing sugars in wine is proportional to the colored complex that is colorimetrically measured at 460 nm.

2.2 The quality of the analysis is assured through reproducible calibration and testing of the Segmented Flow Analysis (SFA) system.

2.3 A general flow diagram of the SFA system is shown below (see Section 17.0 for detailed flow diagrams).



3.0 Definitions

Definitions for terms used in this method are given in Section 16.0, “Glossary of Definitions and Purposes.”

4.0 Contamination and Interferences

Proteins and colored compounds (polyphenols) that could interfere are removed via dialysis. Note that all reducing compounds in the wine will be measured by this method (sulfites, ascorbic acid, etc.). However, the concentration of these compounds is significantly lower than the reducing sugars; therefore they do not present a significant level of interference.

5.0 Safety

5.1 The toxicity or carcinogenicity of each reagent used in this method has not been fully established. Each chemical should be regarded as a potential health hazard, and exposure should be as low as reasonably achievable. Cautions are included for known extremely hazardous materials.

5.2 Each laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of Material Safety Data Sheets (MSDS) should be made available to all personnel involved in the chemical analysis. The preparation of a formal safety plan is also recommended.

6.0 Apparatus Equipment and Supplies

6.1 Segmented Flow Analysis (SFA) System (OI Analytical Flow Solution IV) consisting of the following:

6.1.1 120-place autosampler

6.1.2 Expanded Range (ER) photometric detector with 5-mm pathlength flowcell and 560-nm optical filter

6.1.3 Data Acquisition System (PC or Notebook PC) with WinFLOW™ software

6.1.4 Reducing Sugars in Wine cartridge, Part #A003129

6.2 Sampling equipment—sample bottle, amber glass, 1.1-L, with polytetrafluoroethylene (PTFE)-lined cap. Clean by washing with detergent and water, rinsing with two aliquots of reagent water, and drying by baking at 110°–150°C for one hour minimum.

6.3 Standard laboratory equipment, including Class A volumetric flasks, pipettes, syringes, etc. all cleaned, rinsed, and dried per the bottle-cleaning procedure in Section 6.2.

7.0 Reagents and Standards

7.1 Raw Materials

7.1.1 Brij-35® 30% w/v (OI Analytical Part # A21-0110-33)

7.1.2 Neocuproine hydrochloride, $C_{14}H_{12}N_2$•HCl•H_2O, FW 244.72 (Riedel-de Haen #33467)

7.1.3 Copper sulfate pentahydrate, $CuSO_4$•5 H_2O, FW 249.68 (Riedel-de Haen #31293)

7.1.4 Sodium carbonate, Na_2CO_3, FW 105.99 (MERCK Catalog #1.06392)

7.1.5 Glucose, $C_6H_{12}O_{6,}$ FW 180.16 (MERCK Catalog #1.08337)

7.1.6 Fructose, $C_6H_{12}O_{6,}$ FW 180.2 (MERCK Microbiologie Catalog #1.05323)
flask.