



Determination of **total sulfur dioxide** in wine and beer



INTRODUCTION

The method is used for the determination of the mass concentration of total sulfur dioxide (sulfurous acid and its salts, food additives E220–E228) **in wine, wine materials, beer and beer products** by capillary electrophoresis (CE) using Capel capillary electrophoresis system.

The mass concentration of total sulfur dioxide is regulated by normative documents to be held within 100–400 mg/L for different types of wine and wine materials and within 20–50 mg/L for beer products. According to certain regulations, for example, European and Russian legislation, it is allowed not to indicate on the labels the presence of sulfur dioxide in beverages if its concentration is less than 10 mg/L.

MEASUREMENT METHOD

The CE method for the determination of mass concentration of total sulfur dioxide is based on a basic hydrolysis of the sample with its subsequent separation in a fused silica capillary under the influence of applied electric field. Identification and quantification of the analyzed sulfur dioxide is performed by indirect detection measuring UV absorption at 374 nm.

MEASUREMENT RANGE

The measurement range for total sulfur dioxide is **5–1000 mg/L**.

The presence of other inorganic anions (chloride, sulfate, nitrate, fluoride, phosphate, and carbonate) as well as organic acids (acetic, tartaric, malic, citric, etc.) in a quantity typical for these types of products does not deteriorate analysis.

ADVANTAGES OF CE METHOD

CE method for the determination of sulfur dioxide has a number of advantages compared with other analytical methods typically used for this purpose, such as photometry, titrimetry, etc.

- CE method is not hampered by:
 - colored compounds;
 - different reducing agents like ascorbic acid;
 - different sulfur compounds.
- Additional steps (masking, lightening, etc.) are not required.
- Sample pretreatment time is only 20 minutes:
 - place 10 mL of a sample into a 12 mL vial;
 - add 1.5 mL of sodium hydroxide solution, seal the vial and stir;
 - leave the vial at room temperature for 15 min;
 - dilute the resulting solution and use for CE analysis.
- Analysis time on Capel CE system is less than 3 minutes.

EQUIPMENT AND REAGENTS

Capel capillary electrophoresis system is used in measurements. Data acquisition, collection, processing and output are performed using a personal computer running under WINDOWS® XP/7/8/10 operating system with installed dedicated software package ELFORUN.

Lumex Instruments set, order № **0300001860**.

The following reagents are used:

- hydrochloric acid, 36.5-38%;
- sodium sulfite, ≥98%;
- sodium hydroxide, ≥98%;
- chromium (VI) oxide, ≥99%;
- hexadecyltrimethylammonium hydroxide, 10 wt. % in water (CTA-OH);
- ethanol, ≥95%;
- triethylamine (TEA), ≥99%.

EXAMPLES OF REAL ANALYSES

Buffer: chromate, with TEA and CTA-OH

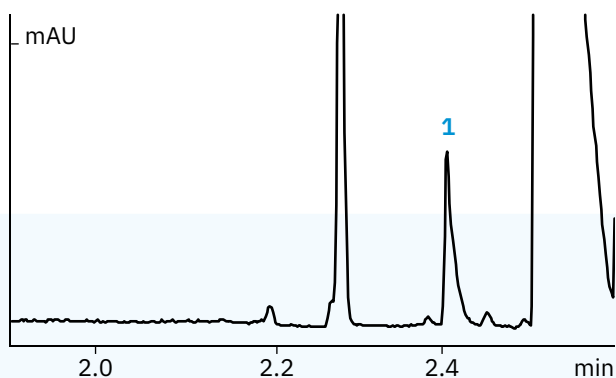
Capillary: $L_{\text{eff}}/L_{\text{tot}} = 50/60$ cm, ID 75 μm

Sample injection: 300 mbar x s

Voltage: - 25 kV

Temperature: +20 °C

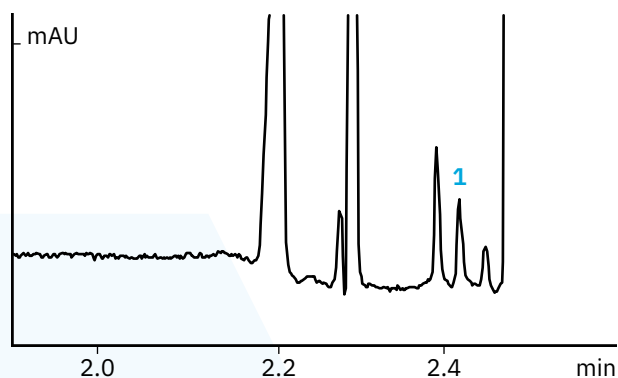
Detection: 374 nm



Sample: pretreated dry white wine

Measurement results:

1 – total sulfur dioxide (93 mg/L)



Sample: pretreated dark beer

Measurement results:

1 – total sulfur dioxide (7 mg/L)

