



## DETERMINATION OF ORGANIC ACIDS IN BEVERAGES

LUMEX Method M 04-47 (2007)

### INTRODUCTION

The method allows determination of organic acids, in soft drinks (juices, fizz drinks) and alcoholic drinks (wines, beer).

### MEASUREMENT METHOD

The method is based on differential migration and separation of anions of organic acids in electric field due to their different electrophoretic mobility.

Identification and quantitative determination of the analyzed components are performed by detecting the optical density of a solution at 254 nm wavelength.

### MEASUREMENT RANGE

Acids	Measurement range, mg/L
Acetic acid	1.0–2000
Citric acid	1.0–10000
Formic acid	1.0–500
Lactic acid	1.0–5000
Malic acid	1.0–10000
Oxalic acid	1.0–500
Succinic acid	1.0–2000
Tartaric acid	1.0–6000

Inorganic anions (chloride, nitrite, sulphate, nitrate, fluoride, phosphate, carbonate), ascorbic acid, and preservatives (benzoic and sorbic acids) do not influence the determination of analyzed organic acids.

### EQUIPMENT AND REAGENTS

The "CAPEL<sup>®</sup>" capillary electrophoresis system with high-voltage negative polarity is used in measurements. Data acquisition, collection, processing and output are performed using a personal computer running under "WINDOWS<sup>®</sup> 2000/XP" operating system with installed dedicated software package for acquisition and processing of chromatography data.

### EXAMPLES OF REAL ANALYSES

**Buffer:** benzoic acid, with DEA, CTAB, and disodium EDTA

**Capillary:**  $L_{EFF}/L_{TOTAL}$  50/60 cm, ID 75  $\mu$ m

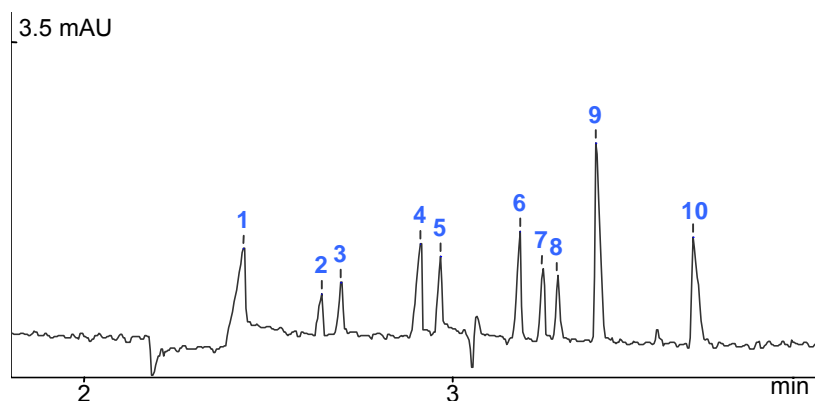
**Injection:** 150 mbar x sec

**Voltage:** – 20 kV

**Detection:** 254 nm, indirect

**Sample:** test solution of organic acids and phosphate (10 mg/L of each acid):

- 1 – oxalic acid
- 2 – formic acid
- 3 – tartaric acid
- 4 – malic acid
- 5 – citric acid
- 6 – succinic acid
- 7 – lactic acid
- 8 – phosphate (as hydrophosphate)
- 9 – acetic acid
- 10 – propionic acid

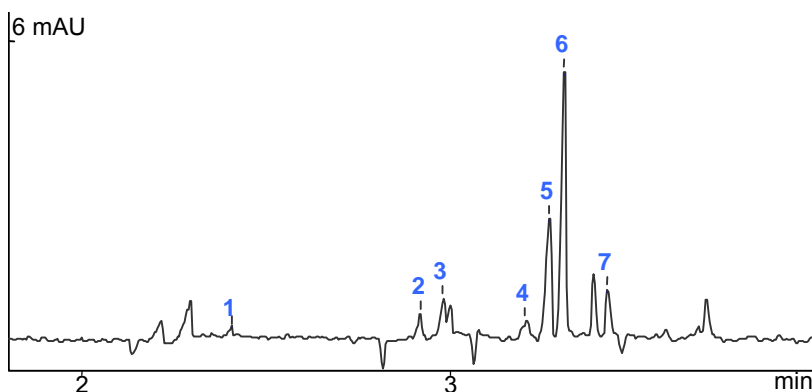




**Sample:** dark beer (dilution 1:19)

**Measurement results:**

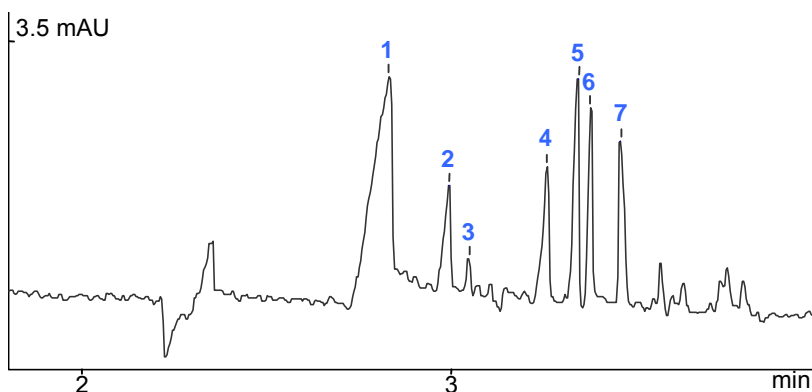
- 1 – oxalic acid (9.8 mg/L)
- 2 – malic acid (82.3 mg/L)
- 3 – citric acid (148 mg/L)
- 4 – succinic acid (46.2 mg/L)
- 5 – lactic acid (67 mg/L)
- 6 – phosphate (as hydrophosphate)
- 7 – acetic acid (107 mg/L)



**Sample:** dry white wine (dilution 1:49)

**Measurement results:**

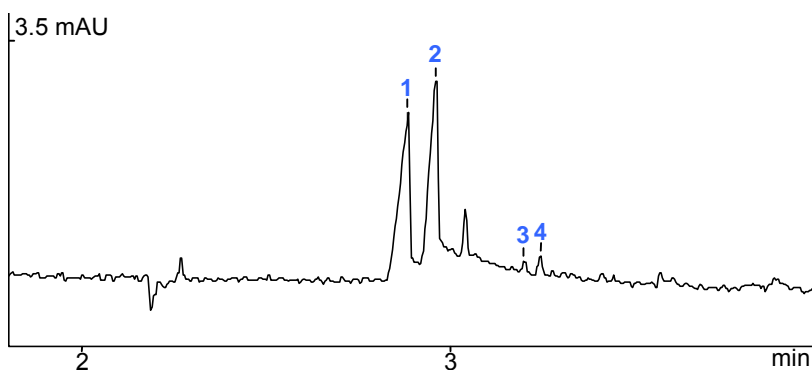
- 1 – tartaric acid (1415 mg/L)
- 2 – malic acid (1643 mg/L)
- 3 – citric acid (465 mg/L)
- 4 – succinic acid (500 mg/L)
- 5 – lactic acid (1165 mg/L)
- 6 – phosphate (as hydrophosphate)
- 7 – acetic acid (405 mg/L)



**Sample:** cherry juice (dilution 1:99)

**Measurement results:**

- 1 – malic acid (2725 mg/L)
- 2 – citric acid (3054 mg/L)
- 3 – lactic acid (112 mg/L)
- 4 – phosphate (as hydrophosphate)



#### ADVANTAGES OF CAPILLARY ELECTROPHORESIS

Compared with determination of organic acids in beverages samples by HPLC method, capillary electrophoresis has several advantages:

- high separation efficiency;
- low analysis cost;
- absence of an expensive chromatographic column;
- short analysis time.

The contents on this paper are subject to change without notice.