



## DETERMINATION OF **CAFFEINE, ASCORBIC ACID,** **PRESERVATIVES (BENZOIC ACID, SORBIC ACID, AND THEIR SALTS),** **AND ARTIFICIAL SWEETENERS (ACESULFAME K, SACCHARIN)** IN SOFT AND STRONG DRINKS

### INTRODUCTION

The method<sup>1</sup> is used for the determination of the mass concentration of caffeine, ascorbic acid and its salts, sorbic acid and its salts, benzoic acid, and its salts, acesulfame K, saccharin and its salts in beverages. The method can be applied for **all types of non-alcoholic and alcoholic beverages including sport and energetic drinks, juices, beer and beer products, wines, brandy and spirits, liquors, and vodka.**

### MEASUREMENT METHOD

The micellar electrokinetic chromatography (MEKC) allows separation of neutral and ionic forms of analyzed components. The components are detected by intrinsic absorption at a wavelength of 254 nm.

### MEASUREMENT RANGE

Measurement ranges of analyzed components are presented in the table below.

Compound	CSFA code	E number	Determined form	Measurement range*, mg/L
Caffeine	–	–	Caffeine	<b>10–1000</b>
Sorbic acid	INS 200	E 200	Sorbic acid	
Sodium sorbate	INS 201	E 201		
Potassium sorbate	INS 202	E 202		
Calcium sorbate	INS 203	E 203		
Benzoic acid	INS 210	E 210	Benzoic acid	
Sodium benzoate	INS 211	E 211		
Potassium benzoate	INS 212	E 212		
Calcium benzoate	INS 213	E 213		
Ascorbic acid	INS 300	E 300	Ascorbic acid	
Sodium ascorbate	INS 301	E 301		
Calcium ascorbate	INS 302	E 302		
Potassium ascorbate	INS 303	E 303		
Acesulfame K	INS 950	E 950	Acesulfame K	
Saccharin	INS 954(i)	E 954(i)	Sodium saccharin	
Calcium saccharin	INS 954(ii)	E 954(ii)		
Potassium saccharin	INS 954(iii)	E 954(iii)		
Sodium saccharin	INS 954(iv)	E 954(iv)		

\* For every mentioned form of the food additive.

The present method does not allow separation of such food additives as E 200 – E 203, E210 – E 213, E 300 – E 303, and E 954. Other sweeteners (aspartame, cyclamate) synthetic food dyes, vitamins B, and vanillin do not hinder the analysis if added in concentrations, typical for the analyzed drinks.

### EQUIPMENT AND REAGENTS

The 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 complex set, order No **0300002054**.

<sup>1</sup> – National Standard GOST R 53193-2008, SM GOST R 53193:2012 (Moldova).

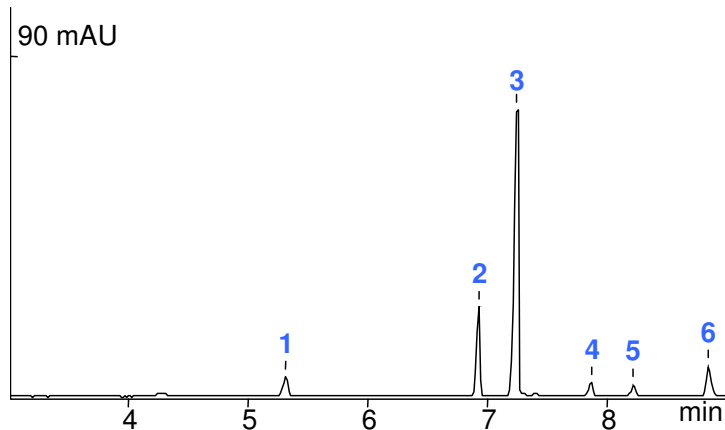


## EXAMPLES OF REAL ANALYSES

**BGE:** borate, with SDS  
**Capillary:**  $L_{\text{eff}}/L_{\text{tot}}$  50/60 cm, ID 75  $\mu\text{m}$   
**Injection:** 150 mbar x sec  
**Voltage:** + 25 kV  
**Temperature:** 20 °C  
**Detection:** 254 nm

**Sample:** test mixture (30 mg/L of each compound)

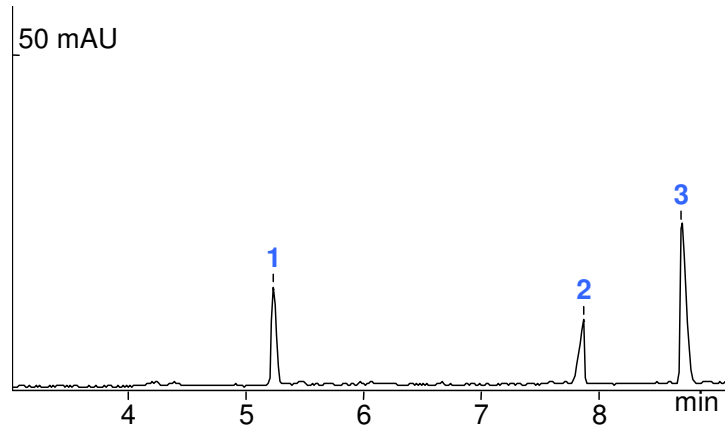
- 1 – caffeine
- 2 – ascorbic acid
- 3 – sorbic acid
- 4 – benzoic acid
- 5 – sodium saccharin
- 6 – acesulfame K



**Sample:** soft drink, undiluted

**Measurement results:**

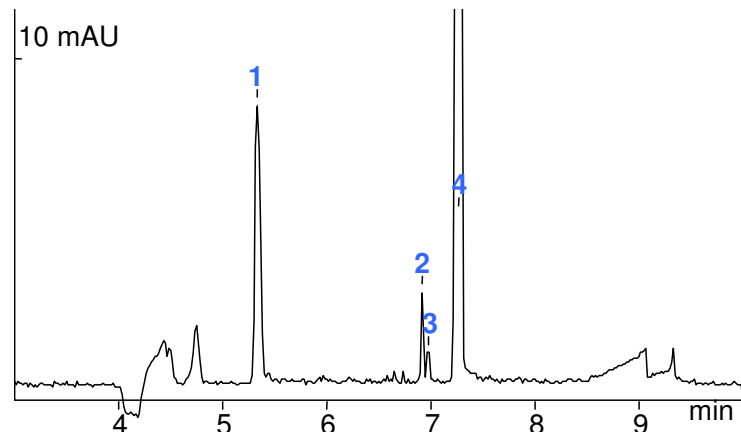
- 1 – caffeine (90 mg/L)
- 2 – benzoic acid (120 mg/L)
- 3 – acesulfame K (130 mg/L)



**Sample:** energy drink, fivefold diluted

**Measurement results:**

- 1 – caffeine (325 mg/L)
- 2 – ascorbic acid (20 mg/L)
- 3 – vanillin
- 4 – sorbic acid (220 mg/L)



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