



## DETERMINATION OF CHLORATE, PERCHLORATE, AND CHLORITE IONS IN DRINKING WATER INCLUDING BOTTLED WATER

LUMEX Method M 01-52-2012

### INTRODUCTION

Chlorination remains the most widespread way of disinfecting water in the world. Its flaws are: high toxicity of chlorine and other chlorinating reagents, also formation of various chlorine-containing compounds, including chlorite-, chlorate, and perchlorate anions. Maximum permitted levels (MPL) of these components are established in WHO Guidelines for drinking water and other regional and national regulations.

### MEASUREMENT METHOD

The method is based on water test processing cation exchanger in the H-form, separation, identification and determination of mass concentration of chlorate, perchlorate, and chlorite ions by capillary electrophoresis. Identification and quantitative determination of the analyzed anions is performed by indirect detection measuring UV absorption at 254 or 266 nm wavelength.

### MEASUREMENT RANGE

Ranges of the measured mass concentrations of anions and MPL are listed below.

Anions	Measurement ranges*, mg/l	MPL, mg/l		
		WHO Guidelines for drinking water (4 <sup>th</sup> ed.)	GSO 149/2014 OS 8/2012 ISIRI 1053	Guidelines for Canadian Drinking Water Quality (2008)
Chlorate	0.5–200	0.7	0.7	1
Perchlorate	0.5–50	–	–	–
Chlorite	0.2–50	0.7	0.7	1

The determination of chlorate, perchlorate, and chlorite anions is not hindered by the presence of chloride, sulfate, nitrate, nitrite, formate, fluoride, phosphate, acetate, carbonate anions, neutral organic compounds, and other inorganic and organic anions in the concentrations that are typical for these types of samples.

### EQUIPMENT AND REAGENTS

The CAPEL<sup>®</sup> capillary electrophoresis system is used in measurements. Data acquisition, collection, processing and output are performed using a personal computer running under WINDOWS<sup>®</sup> XP/7/8 operating system with installed dedicated software package ELFORUN<sup>®</sup>. All reagents must be of analytical grade or better.

### EXAMPLES OF REAL ANALYSES

**BGE:** 3-nitrobenzoic acid, with TRIS and CTAB

**Capillary:**  $L_{\text{eff}}/L_{\text{tot}}$  50/60 cm, ID 75  $\mu\text{m}$

**Injection:** 300 mbar x sec

**Voltage:** –20 kV

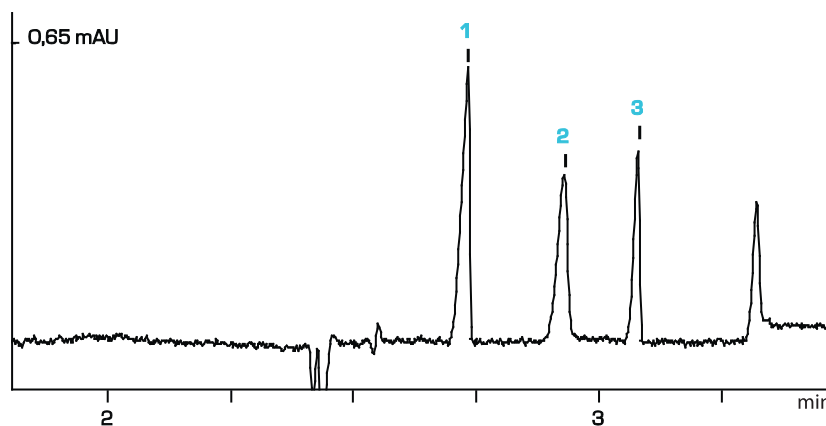
**Temperature:** RT

**Detection:** 254 nm

**Sample:** calibration solution

#### Measurement results:

- 1 – chlorate (2.5 mg/L)
- 2 – perchlorate (2.5 mg/L)
- 3 – chlorite (1.0 mg/L)

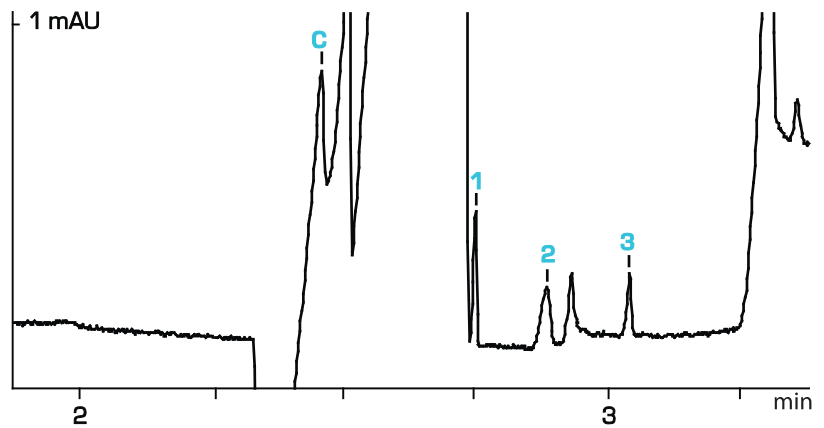




**Sample:** the prepared test of tap water with an additive

**Measurement results:**

- C** – the accompanying anions (chloride, sulfate, nitrate, 170 mg/L)
- 1** – chlorate (0.5 mg/L)
- 2** – perchlorate (0.5 mg/L)
- 3** – chlorite (0.2 mg/L)



The information in this leaflet is supplemental. To get more specific, please contact the manufacturer of CAPEL® CE systems LUMEX INSTRUMENTS Group.

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