



Determination of **chlorate**, **perchlorate**, and **chlorite ions** in drinking water

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 of these components are established in WHO Guidelines for drinking water and other regional and national regulations.

The method is used for the determination of the mass concentration of inorganic anions: chlorate, perchlorate, and chlorite in **drinking water including bottled water** by capillary electrophoresis.



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 266 nm wavelength.

MEASUREMENT RANGE

The measurement ranges for the components are presented in the table below.

Component	Measurement range, mg/L
Chlorate	0.5–200
Perchlorate	0.5–50
Chlorite	0.2–50

Other inorganic anions (chloride, sulfate, nitrate, fluoride, phosphate, bromide, and carbonate) and organic anions (acetate, formate, oxalate, and others) in concentrations, typical for the mentioned water do not deteriorate target components determination.

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® operating system with Elforun software installed. Lumex Instruments set, **order No. 0300001815**.

EXAMPLES OF REAL ANALYSES

BGE: 3-nitrobenzoic acid, with TRIS and CTAB

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

Injection: 300 mbar \times s

Voltage: -20 kV

Temperature: 20 °C

Detection: 266 nm

Sample: spiked tap water sample

Found (mg/L):

C – accompanying anions (chloride, sulfate, nitrate – 170)

1 – chlorate (0.5)

2 – perchlorate (0.5)

3 – chlorite (0.2)

