



Determination of **potassium, sodium, chlorides, and nitrates** in food products, food raw materials, and food additives

INTRODUCTION

The method is used for the determination of the mass fraction of cations (potassium, sodium) and anions (chloride, nitrate) in samples of **all types of food products (including milk and dairy products), food raw materials, and food additives** by capillary electrophoresis.

Determining the mineral composition of food products is crucial during their production, certification, and quality control.



MEASUREMENT METHOD

The measurement method is based on extraction of components from a solid sample by water (dilution of a liquid sample) and their determination by capillary electrophoresis with indirect UV detection at the wavelength of 254 nm. Potassium and sodium or chlorides and nitrates are determined simultaneously.

MEASUREMENT RANGE

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

Compound	Measurement range, mg/kg	Measurement range, %
	Food products, food raw materials	Food additives
Potassium	100–20 000	0.01–55
Sodium	100–40 000	0.01–40
Chloride	100–20 000	0.01–60
Nitrate	50–20 000	0.01–80

EQUIPMENT AND REAGENTS

The following equipment and reagents are used in the measurements:

- Capel capillary electrophoresis system;
- standard solutions of cations: potassium (1000 mg/L), sodium (1000 mg/L);
- standard solutions of anions: chloride (1000 mg/L), nitrate (1000 mg/L);
- tartaric acid, ≥98.5 %;
- benzimidazole, ≥98 %;
- 18-crown-6, ≥98 %;
- chromium (VI) oxide, ≥ 99 %;
- hexadecyltrimethylammonium hydroxide (CTA-OH) solution 10 wt. % in water;
- diethanolamine (bis(2-hydroxyethyl)amine, DEA), ≥98.5 %;
- hydrochloric acid, 36.5–38 %;
- sodium hydroxide, ≥98 %.

Data acquisition, collection, processing, and output are performed using a personal computer running under Windows® operating system with Elforun software installed.

EXAMPLES OF REAL ANALYSES

BGE: benzimidazole, with tartaric acid and 18-crown-6

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

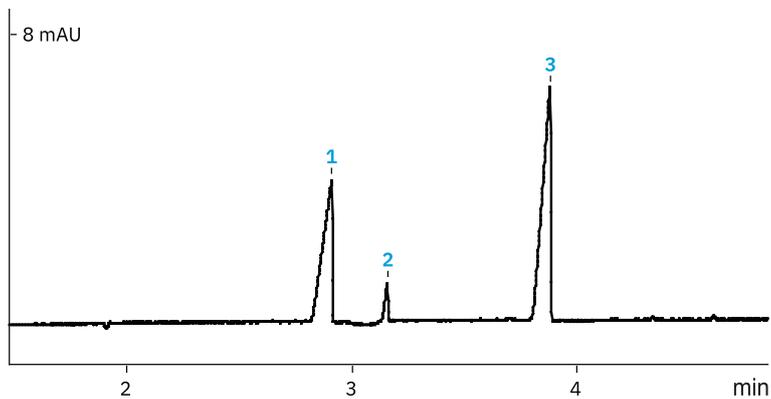
Sample: cheese

Found (mg/100 g):

1 – ammonium

2 – potassium (150)

3 – sodium (790)



BGE: chromate, with diethanolamine and CTA-OH

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

Sample: fresh vegetables mix

Found (mg/100 g):

1 – chloride (51)

2 – sulfate

3 – nitrate (20)

