DETERMINATION OF WATER-SOLUBLE FORMS OF **INORGANIC** AND **ORGANIC ANIONS** IN SOILS, CLAYS, PEAT, WASTEWATER SILT, ACTIVATED SLUDGE, AND BOTTOM SEDIMENTS

LUMEX Method M 03-06 (2010)

INTRODUCTION

The content of water-soluble forms of inorganic (chlorides, sulfates, nitrates, fluorides and phosphates) and organic (acetates, formates, and oxalates) anions is one of the substantial characteristics in agrochemical, land reclamation, and sanitary assessments of soils (arable, hayland, pasturable, forest nursery soils). These data are also important in investigation of the behavior of the soil processes, study of nutrient metabolism, and detection of salts harmful to plants.

The anion balance should be controlled during ecological monitoring of soils for the assessment of the human activity impact.

MEASUREMENT METHOD

The measurement method is based on the extraction of water-soluble forms of inorganic anions by distilled water from a soil sample to the 1:5 ratio and subsequent separation, identification, and determination of analyzed components by the capillary electrophoresis method with indirect anion detection at wavelengths of 254 nm (in CAPEL®-103RT/104T) and 374 nm (in CAPEL®-105/105M).

MEASUREMENT RANGE

The measurable anion weight fraction ranges are listed below.

Anions	**Measurement ranges*, mg/kg**	**Anions**	**Measurement ranges*, mg/kg**
Acetate	3.0 – 1000	Formate	1.0 – 500
Nitrate	3.0 – 10000	Phosphate	3.0 – 5000
Oxalate	3.0 – 100	Fluoride	1.0 – 100
Sulfate	3.0 – 20000	Chloride	3.0 – 20000

* – For the sample--distilled water weight ratio 1:5.

Other inorganic and organic anions do not interfere with determination of the analyzed anions.

EQUIPMENT AND REAGENTS

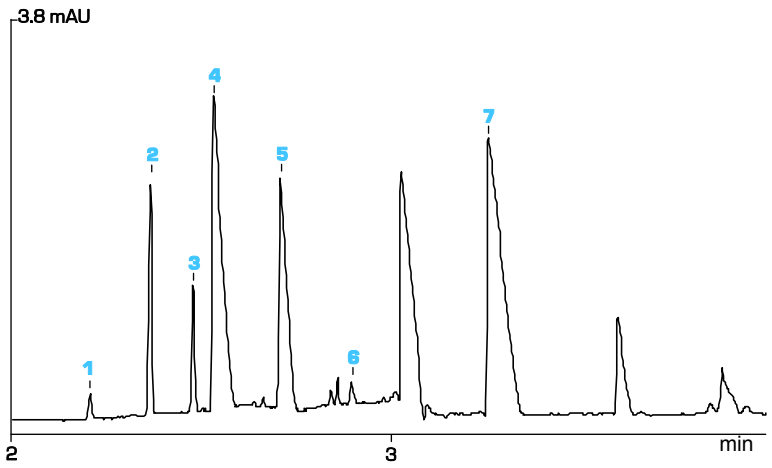
The CAPEL® capillary electrophoresis system with the high-voltage negative polarity is used in measurements.

Data acquisition, collection, processing and output are performed using a personal computer running under WINDOWS® 2000/XP operating system with installed dedicated software package for acquisition and processing of chromatography data.

All reagents must be of analytical grade or better.

EXAMPLES OF REAL ANALYSES

Buffer: chromate, with DEA and CTA-OH
Capillary: L_{eff}/ L_{tot} 50/60 cm, ID 75 µm
Injection: 150 mbar x sec
Voltage: – 25 kV
Detection: 374 nm, indirect
Sample: water extract of a typical chernozem soil
Measurement results:
1 – chloride (5.6 mg/kg)
2 – sulfate (58 mg/kg)
3 – oxalate (26 mg/kg)
4 – nitrate (423 mg/kg)
5 – formate (106 mg/kg)
6 – phosphate (4.6 mg/kg)
7 – acetate (299 mg/kg)



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