



## DETERMINATION OF **PROTEINOGENOUS AMINO ACIDS** IN FEEDSTUFFS, COMPOUND FEEDS, AND FEED RAW MATERIALS

Lumex Method M 04-38-2009

### INTRODUCTION

The method<sup>1</sup> is used for the determination of the mass fraction of total amino acids: arginine, lysine, tyrosine, phenylalanine, histidine, leucine and *iso*-leucine (as a sum), methionine, valine, proline, alanine, glycine, cystine, tryptophan, aspartic, and glutamic acids in **feedstuffs, compound feeds, fodders, premixes, and all types of feed raw materials** by capillary electrophoresis.

The method is intended for the determination of the total content of amino acids in a sample, e.g. the sum of both free and bound forms. Due to the hydrolysis stage of the sample treatment, the aspartic acid and glutamic acid content is the sum of the acid content and its amide (asparagine and glutamine respectively) content. Cystine content represents the sum of cystine and cysteine that are both oxidized to cysteic acid prior to analysis. Leucine and *iso*-leucine form an unresolved peak thus representing its summary content.

The method does not distinguish between the salts of amino acids, nor does it differentiate between *D*- and *L*- forms of amino acids. It is not valid for determination of hydroxy analogues of amino acids. For the determination of methionine hydroxy analogue (HMTBa) in fodder additives use the method M 04-83-2014 (Lumex Instruments set, order No 0300001888).

### MEASUREMENT METHOD

The determination of amino acids in the samples is made either after preliminary alkaline hydrolysis for tryptophan or after acidic hydrolysis for all the other amino acids. Free amino acids are transformed to phenylisothiocyanate derivatives (PITC derivatives) and their ionic forms are determined by capillary zone electrophoresis with direct UV detection at the wavelength of 254 nm. Tryptophan is quantified without derivatization by capillary zone electrophoresis with direct UV detection at the wavelength of 219 nm.

### MEASUREMENT RANGE

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

Amino acid	Code	Measurement range*, %	Amino acid	Code	Measurement range*, %
Alanine	Ala	0.25–10.0	Methionine	Met	0.25–10.0
Arginine	Arg	0.5–10.0	Phenylalanine	Phe	0.25–10.0
Aspartic acid + asparagine	Asp+Asn	0.5–10.0	Proline	Pro	0.25–10.0
Cystine	Cys-Cys	0.1–10.0	Serine	Ser	0.25–10.0
Glutamic acid + glutamine	Glu+Gln	0.5–10.0	Threonine	Thr	0.5–10.0
Glycine	Gly	0.25–10.0	Tryptophan	Trp	0.1–10.0
Histidine	His	0.5–10.0	Tyrosine	Tyr	0.25–10.0
Leucine + <i>iso</i> -leucine	Leu+Ile	0.25–10.0	Valine	Val	0.5–10.0
Lysine	Lys	0.25–20.0	* For the sample weight of 100 mg.		

### 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 kit, order **No 0300002027**.

<sup>1</sup> National Standard GOST R 55569-2013, Interstate Standard GOST 31480-2012, Chinese Agricultural Standard NY/T 3001-2016.



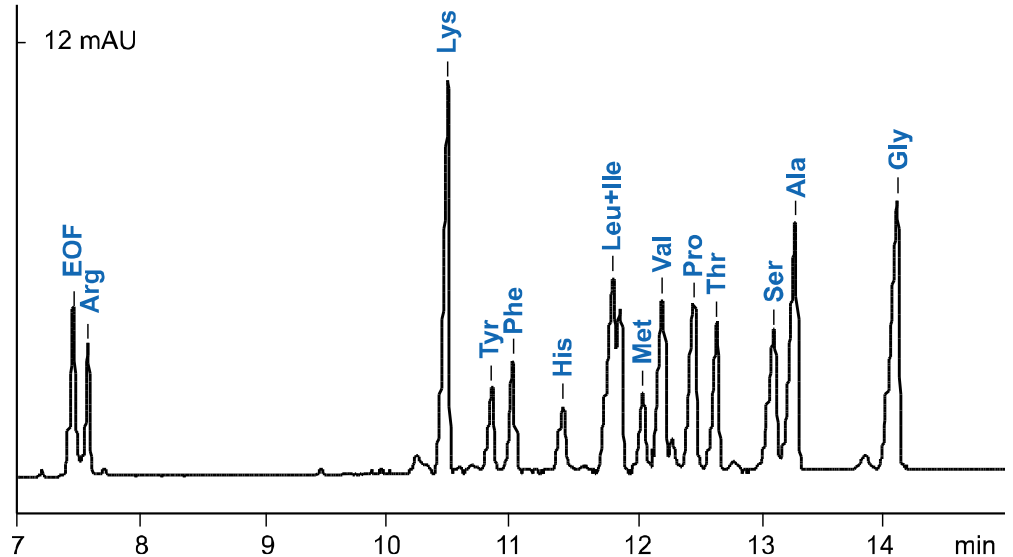
## EXAMPLES OF REAL ANALYSES

**BGE:** phosphate, with  $\beta$ -cyclodextrin  
**Capillary:**  $L_{\text{eff}}/L_{\text{tot}}$  65/75 cm, ID 50  $\mu\text{m}$   
**Injection:** 150 mbar x sec  
**Voltage:** + 25 kV  
**Temperature:** + 30  $^{\circ}\text{C}$   
**Detection:** 254 nm

**Sample:** fish meal

### Measurement results:

**Arg** – 3.3%;  
**Lys** – 4.8%;  
**Tyr** – 1.8%;  
**Phe** – 2.3%;  
**His** – 1.1%;  
**Leu+Ile** – 6.6%;  
**Met** – 2.0%;  
**Val** – 2.9%;  
**Pro** – 3.3%;  
**Thr** – 2.4%;  
**Ser** – 2.9%;  
**Ala** – 3.8%;  
**Gly** – 5.2%

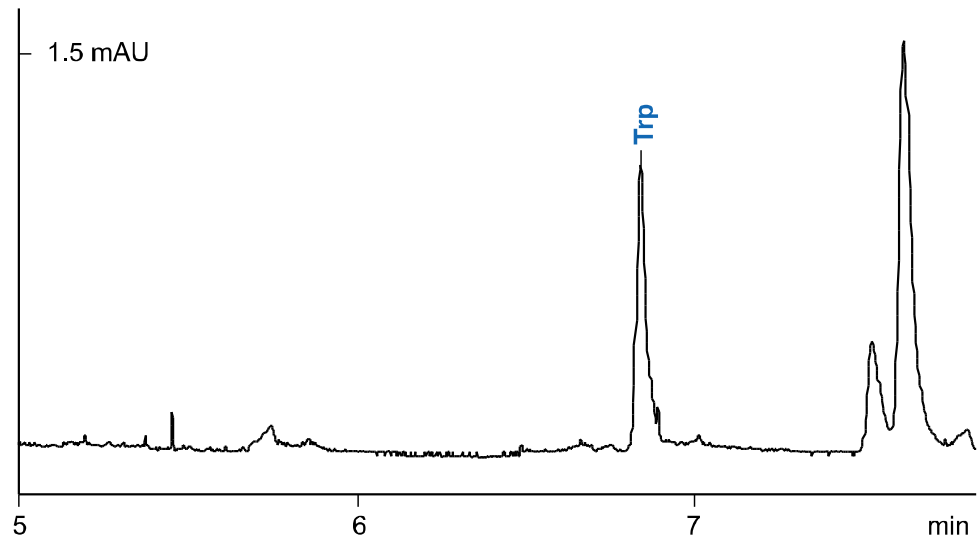


**BGE:** borate  
**Capillary:**  $L_{\text{eff}}/L_{\text{tot}}$  65/75 cm, ID 50  $\mu\text{m}$   
**Injection:** 150 mbar x sec  
**Voltage:** + 25 kV  
**Temperature:** + 30  $^{\circ}\text{C}$   
**Detection:** 219 nm

**Sample:** fish meal

### Measurement results:

**Trp** – 0.65%



The contents on this paper are subject to change without notice.

To get more specific information, please contact the representative by [sales@lumexinstruments.com](mailto:sales@lumexinstruments.com)