



## DETERMINATION OF **CAFFEINE** AND **THEOBROMINE** IN TEA, COFFEE, COCOA, AND HERBAL PRODUCTS

**Lumex Method M 04-60 (2009)**

### INTRODUCTION

The determination of caffeine and theobromine content in tea, coffee, cocoa, foodstuffs and in herbal products ensures safety and quality control of the products and identification of adulterants.

### MEASUREEEMNT METHOD

The method is based on extraction of the components to be determined from the sample into hot distilled water, their separation and quantitative determination by capillary electrophoresis using the micellar electrokinetic chromatography technique. The components are detected in the UV spectral range at a wavelength of 254 nm.

### MEASUREMENT RANGE

The measurement ranges of caffeine and theobromine are **0.1–100 g/kg (ppm)** for a sample of **1 g** weight. The determination of the components is not hindered by the presence of other food ingredients/additives (sweeteners, preservatives, dyes, vitamins, sodium glutamate, vanillin) if their concentrations are characteristic of the analyzed product.

### ADVANTAGES OF CAPILLARY ELECTROPHORESIS

As compared with the HPLC method of determination of caffeine and theobromine, the capillary electrophoresis method shows the following advantages:

- High separation efficiency that is unachievable with HPLC.
- Rapid analysis.
- Low analysis cost.
- No need for expensive chromatographic columns.

### EQUIPMENT AND REAGENTS

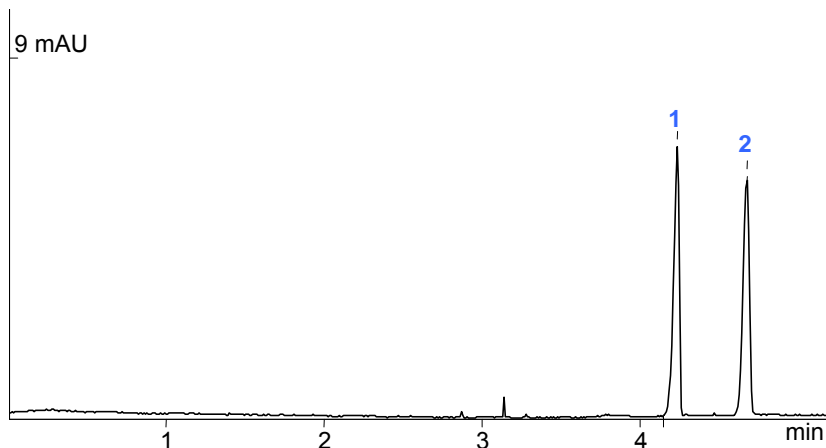
Any of the CAPEL®-103RT/104T/105M capillary electrophoresis systems with a high-voltage unit of positive polarity is used for the measurements.

Data acquisition, processing and output are performed using a personal computer running under "WINDOWS® 2000/XP" operating system with installed dedicated data acquisition and processing software. All reagents must be of analytical grade or higher.

### EXAMPLE OF REAL ANALYSIS

**Buffer:** borate with SDS  
**Capillary:**  $L_{\text{eff}}/L_{\text{tot}} = 50/60$  cm, ID= 75  $\mu\text{m}$   
**Sample injection:** 150 mbar\*sec  
**Voltage:** +25 kV  
**Temperature:** +20°C  
**Detection:** 254 nm

**Sample:** mixture of the components (40 mg/l each)  
**1** – theobromine  
**2** – caffeine

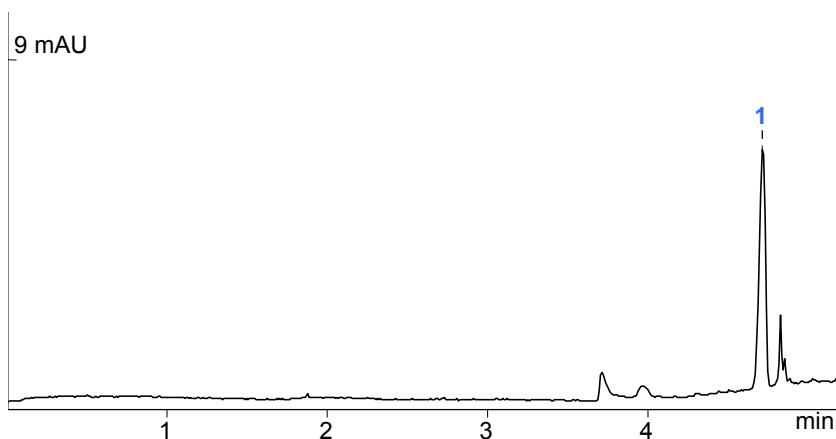




**Sample:** instant coffee

**Results of analysis:**

1 – caffeine (39 g/kg)

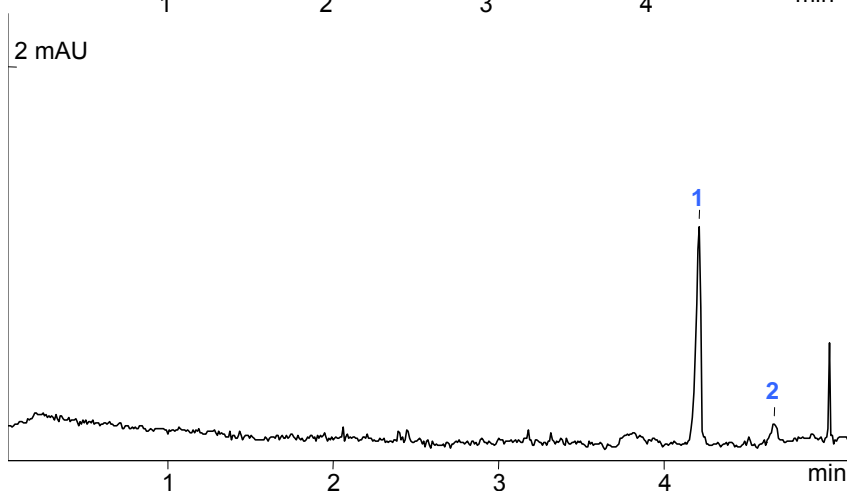


**Sample:** cocoa powder

**Results of analysis:**

1 – theobromine (2.5 g/kg)

2 – caffeine (0.3 g/kg)



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