IDENTIFICATION AND DETERMINATION OF SYNTHETIC DYES IN ALCOHOLIC BEVERAGES

INTRODUCTION

The method allows identification and determination of synthetic dyes in samples of alcoholic beverages by capillary electrophoresis.

MEASURING METHOD

The Capillary Electrophoresis (CE) method for the determination of synthetic dyes is based on their differential migration in a narrow quartz capillary under the influence of the applied electric field. Identification and quantitative determination of dyes is performed by measuring the UV absorbance at 254 nm wavelength.

CONCENTRATION RANGES

The synthetic dyes that can be determined in alcoholic beverages using this method are listed in table below.

Name (C. I.)	E number	Measurement range, mg/l	
		254 nm	215 nm
Tartrazine (C. I. 19140)	E102	0,8 – 100	0,50 – 60
Sunset Yellow FCF (C. I. 15985)	E110	1,0 – 100	0,25 – 60
Carmoisine (C. I. 14720)	E122	0,8 – 100	0,25 – 60
Amaranth (C. I. 16185)	E123	0,8 – 10	0,50 – 10
Ponceau 4R (C. I. 16255)	E124	0,8 – 100	0,25 – 60
Erythrosine (C. I. 45430)	E127	1,0 – 50	0,50 – 60
Red 2G (C. I. 18050)	E128	1,0 – 100	0,50 – 60
Allura Red AC (C. I. 16035)	E129	1,0 – 60	0,50 – 60
Patent Blue V (C. I. 42051)	E131	1,0 – 10	0,50 – 10
Indigotine (C. I. 73015)	E132	1,0 – 60	0,50 – 60
Brilliant Blue FCF (C. I. 42090)	E133	5,0 – 10	0,50 – 10
Green S (C. I. 44090)	E142	1,0 – 40	0,50 – 60
Brilliant Black BN (C. I. 28440)	E151	0,8 – 10	0,50 – 10

If concentration of one or several dyes is higher than the upper limit of the range, it is possible to dilute the sample by distilled water.

PREOPERATIONAL PROCEDURES

Preparation should include the following steps:

- sampling and sample pre-treatment
- preparation of solutions
- calibration of the CE system
- capillary conditioning

Sampling is done according to the existing protocol.

Sample pre-treatment should include the following steps:

- SPE of dyes from the sample
- desorption by ammonia
- subsequent evaporation of ammonia

Calibration of the CE system is done by measuring the signal of the standard solutions. The stability of calibration is controlled prior to the sequence of analysis by performing the analysis of one of the calibration solution.
The dyes are identified by analyte addition technique, which involves adding aqueous solutions of mixtures of the dyes that are expected to be found in the sample. Identification is made by comparing the migration time of each of the dye of the multi-component mixture with the migration times for corresponding standard samples.

MEASUREMENT PROCEDURE

No less than two aliquot specimens should be analyzed for each sample. Sample dilution must be done prior to analysis if the measured concentrations of dyes are higher then the upper limit of the calibration.

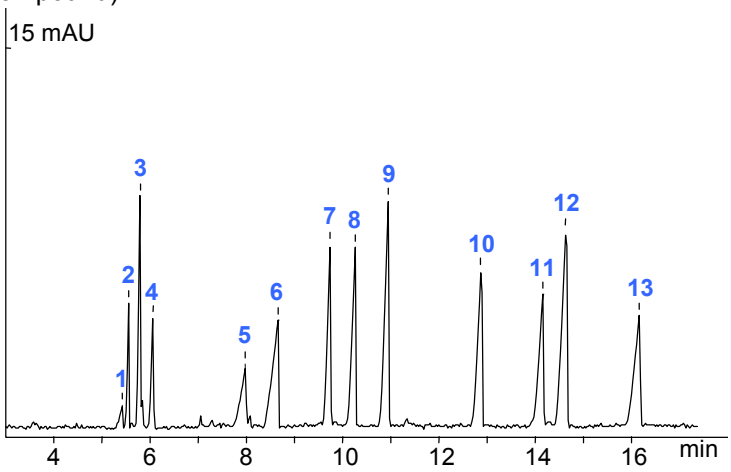
DATA PROCESSING

Data analysis is done by the Chrom&Spec® software. Results are expressed as a customized report where concentrations of all analyzed dyes in mg/ml are listed.

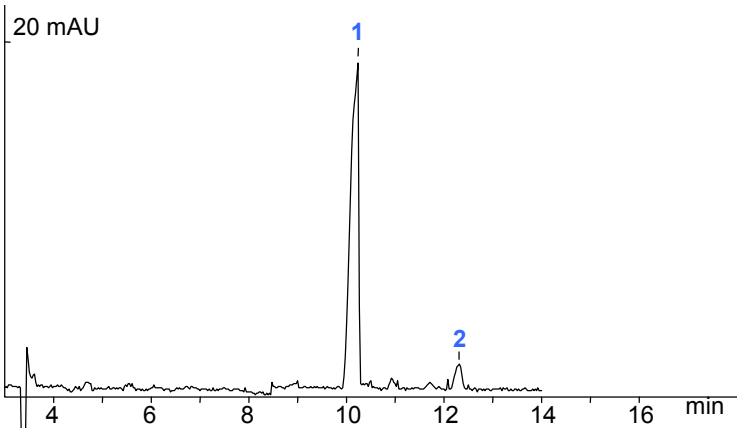
EXAMPLE OF A REAL ANALYSIS

Buffer: carbonate, pH 11.8
Capillary: L_{EFF}/L_{TOTAL} 50/60 cm, ID 75 µm
Injection: 300 mbar*sec
Voltage: +25 kV
Temperature: 20 °C
Detection: 215 nm (direct)

Sample: test solution (10 mg/l of each compound)
1 – Brilliant Blue FCF (E133)
2 – Patent Blue V (E131)
3 – Green S (E142)
4 – Erythrosine (E127)
5 – Indigotine (E132)
6 – Allura Red AC (E129)
7 – Red 2G (E128)
8 – Sunset Yellow FCF (E110)
9 – Carmoisine (E122)
10 – Ponceau 4R (E124)
11 – Brilliant Black BN (E151)
12 – Amaranth (E123)
13 – Tartrazine (E102)



Sample: low-alcohol cocktail
Measurement results:
1 – Carmoisine (E 122) (33.8 mg/l)
2 – Ponceau 4R (E 124) (1.8 mg/l)



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