

Cation Solution Kit for the Agilent 7100 CE System

Technical Note



Introduction

The Agilent 7100 Capillary Electrophoresis (CE) system is a powerful separation tool for the analysis of anions. This Technical Note demonstrates the performance of the Agilent 7100 CE system using the Cation Solution Kit. This kit contains necessary supplies for the separation of cations. The kit permits the analysis of cations in indirect UV detection mode. It is also suitable for the separation of low-molecular weight amines. The cation buffer and all other reagents provided in this kit are ready-to-use. A complete cation analysis CE method with statistical analysis on migration time is described.



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Experimental

Cation analysis was performed using the Agilent 7100 CE system equipped with DAD detection using 56-cm effective length capillary. The method is based on the Agilent Cation Solutions Kit (p/n 5064-8206).

- The buffer should be replaced every second run when using 1 mL polypropylene vials, since the buffer used for indirect UV detection has limited buffering capacity.
- The buffer should be stored at 4 °C.
- The Cation Test Mixture stock should be stored at 4 °C. Prior to use, the test sample should be diluted 1:10 with CE grade water.
- Prior to first use, a new capillary should be conditioned with run buffer for 15 minutes.
- Between analyses, it is recommended that the capillary is flushed with run buffer (2 min) from the flush vial.

Cation Solutions Kit (Part No.: 5064-8206)

Cation Test Sample

(Includes 100 ppm each of ammonium, potassium, sodium, calcium, magnesium)

25 mL 5064-8205

Cation buffer 250 mL 5064-8203

Ultra pure CE water 500 mL 5062-8578

Bare fused-silica capillary, extended light path BF3 (50 mm id, l_{eff}=56 cm, L=64.5 cm) 2/pk G1600-61232

Product literature 1 5968-2977E

Parts required (not included in the kit)

CE buffer vials (1 mL, polypropylene) 100/pk 5182-0567

CE sample vials (100 mL, polypropylene) 1000/pk 9301-0978

CE vial caps (polypropylene) 100/pk 5181-1507

Alignment interface for 50 mm id Extended Light Path capillary, BF3 (color code: red) 1 G7100-60230

Instrument set-up

Vial contents

Inlet home vial (cation buffer)
Outlet home vial (cation buffer)
Conditioning: flush vial (cation buffer)
Wash vial (CE water)

Carousel location

1
2
3
4

Note: The default cation method is available in the Agilent CE-ChemStation software method folder as: "cation.m"

Method Summary

Instrument: Agilent 7100 Capillary Electrophoresis System

Mode: Capillary Zone Electrophoresis (CZE)

Cation Separation with the Agilent Cation Solutions Kit (p/n 5064-8206)

DAD settings

| Signal A | Wavelength 310 [nm] | Bandwidth 20 [nm] | Reference 215 [nm] | Bandwidth 10 [nm] |
|----------------|---|----------------------|-----------------------|----------------------|
| Peak width | > 0.05 min (1.0 sec response time) (5 Hz) | | | |
| Stoptime | 8:00 min (as CE) | | | |
| Posttime | Off | | | |
| Spectrum store | None | | | |
| Indirect UV | 100 mAU (margin for negative absorbance) | | | |
| Autobalance | | | | |
| Prerun | On | | | |
| Postrun | Off | | | |

CE settings

Inlet home Vial 01
Outlet home Vial 02 *Note: Vial locations are exemplary only.*

Cassette temperature 25 °C

High voltage Enabled

Voltage 30 KV (positive. polarity, ramp: in 0.3 min to 30 KV)

Current 300 µA

Power 6 W

Low current alarm 2 µA

Stoptime 8:00 min

Posttime Off

Replenishment system Not used

Preconditioning
Flush 120 sec Inlet: 3 Outlet: 4
Note: Times may be varied as necessary.

Postconditioning Not used

Injection
Apply pressure 50 mbar 5 sec from Inject vial to Outlet vial
Apply pressure 50 mbar 2 sec Inlet vial

Timetable Not used

Analysis of the Cation Test mixture

The electropherogram in figure 1 shows a typical separation of the Cation Test sample (1:10 dilution) demonstrating the performance of the Agilent 7100 CE system. The mixture of five – cations was well resolved within 5 minutes.

Migration time and peak area reproducibility is highly dependent on the use of fresh buffer and capillary conditioning. The 7100 CE software allows to easily program and reuse conditioning methods to customize and automate any required procedures. Figure 2 provides data on observable differences in CV of migration times for changed run temperatures. In general changes of $\pm 1^\circ\text{C}$ did not show a significant effect on migration time reproducibility ($n = 5$). The coefficients of variations of migration time were all less than 1 %. The results are comparable to those using the earlier Agilent 1600 CE system.

Tap water analysis

Monitoring of cations is important for the classification of drinking water. We analyzed absolute values of tap-water using the Agilent Cation Solutions kit. Peak identification was performed via migration time comparison with the Cation Test sample. The % CV values for migration time were less than 0.9 % as shown in figure 3.

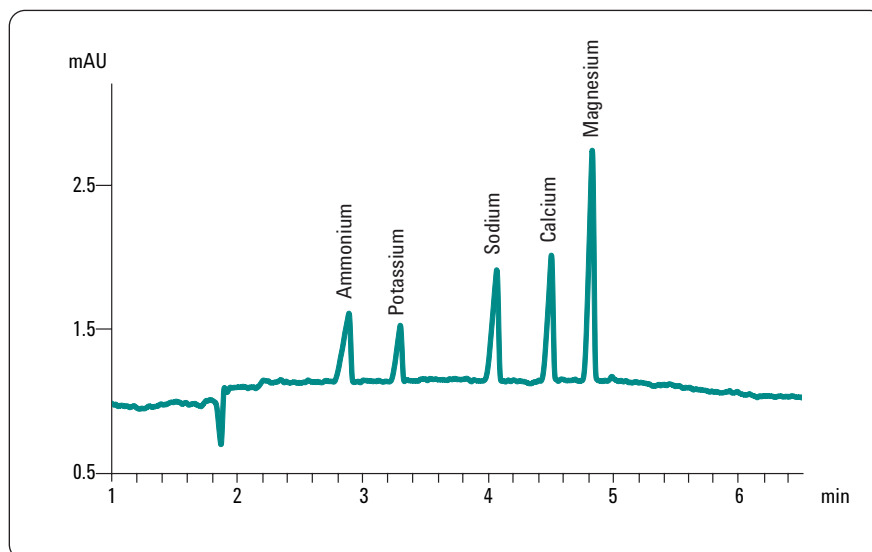


Figure 1
Electropherogram of Cation Standard.

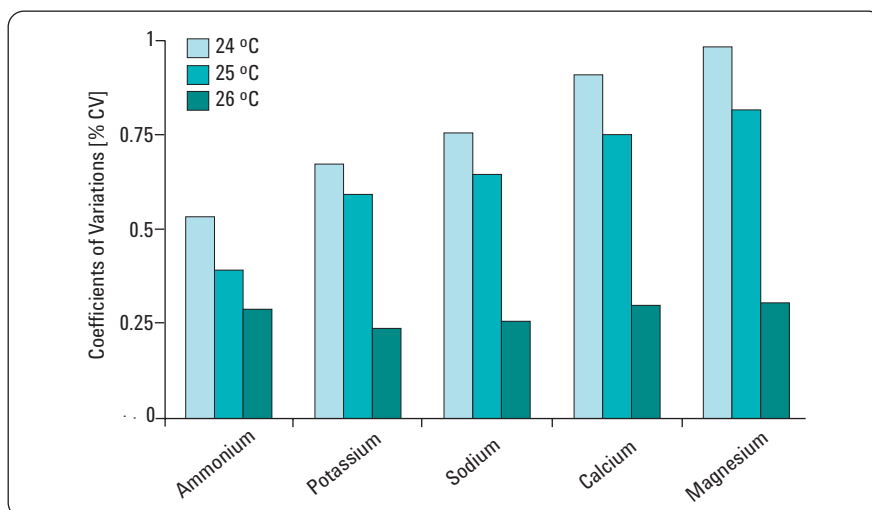


Figure 2
Effect of temperature on migration time reproducibility ($n=5$).*

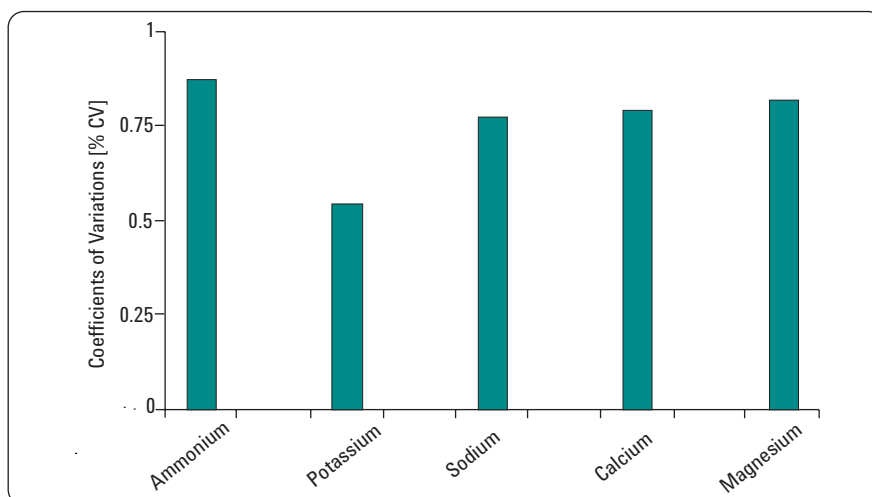


Figure 3
Migration-time reproducibility for CE analysis of tap water ($n=5$).*

* Raw data are used to plot the data. No internal standard is considered for calculations.

www.agilent.com/chem/CE

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