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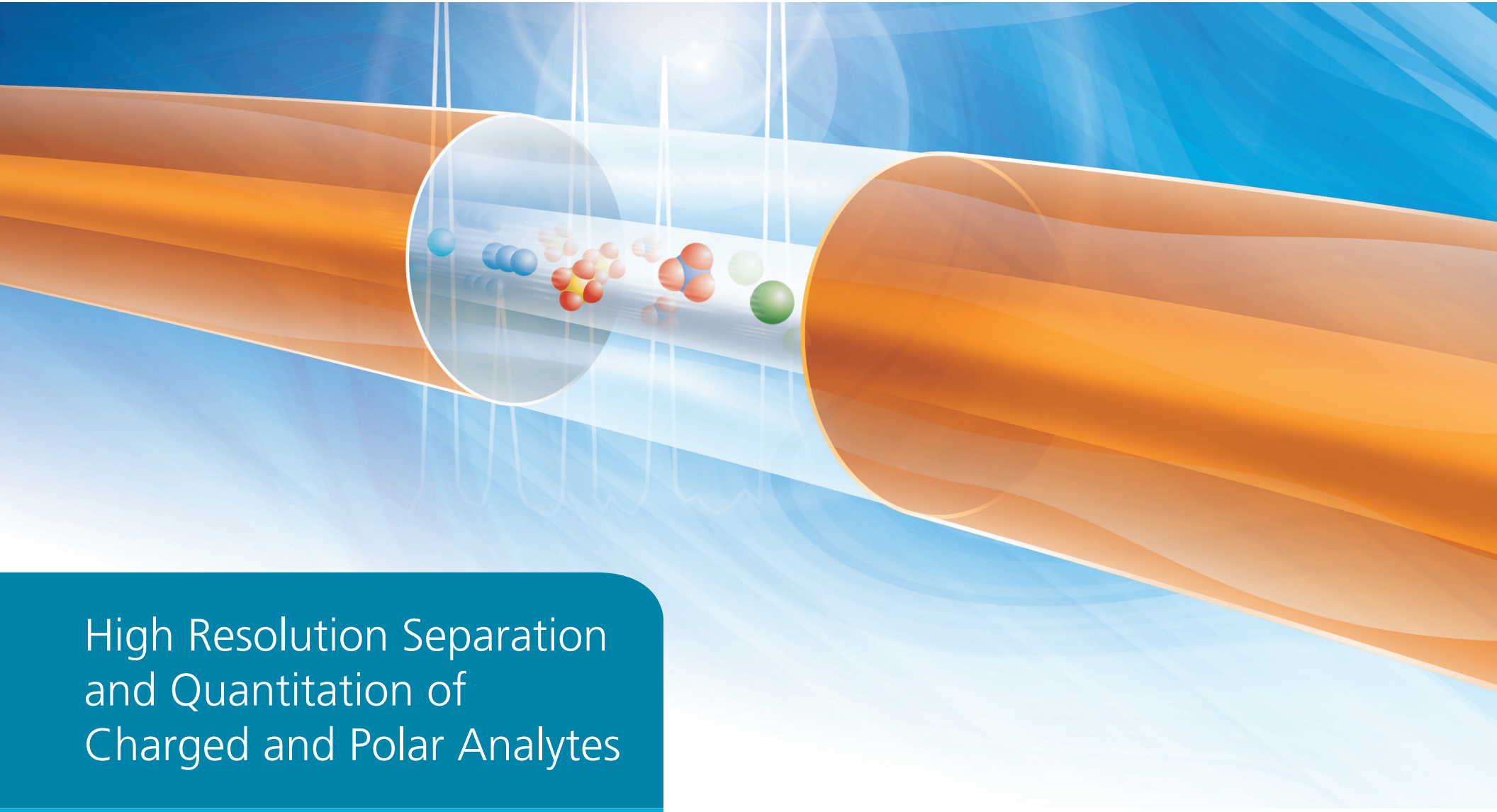

High Resolution Separation and Quantitation of Charged and Polar Analytes

P/ACE™ MDQ PLUS CAPILLARY ELECTROPHORESIS SYSTEM

SCIEX

A Robust, Automated Analytical Tool

SCIEX Capillary Electrophoresis (CE) has globally proven itself in many different research projects and industrial applications, including biological science, chemistry, forensic science, food and beverage, petrochemical, biofuels, environmental safety and more…

This can be attributed to its simplicity, accuracy, robustness, speed, versatility, and micro sample capabilities, combined with low operating costs and minimal waste production.

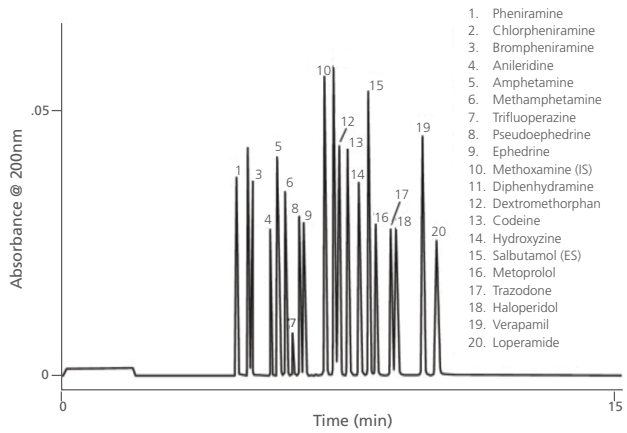

Figure 1: Highly resolved separation of 20 basic drugs using low pH, where the capillary surface is essentially neutral and the amine functional groups on the solutes are maximally ionized

Separation and matrix challenges can be addressed by a number of CE techniques:

- Capillary Zone Electrophoresis (CZE)
- Capillary Gel Electrophoresis (CGE)
- Capillary Isoelectric Focusing (CIEF)
- Isotachophoresis (ITP)
- Micellar Electrokinetic Capillary Chromatography (MECC)
- Capillary Electrochromatography (CEC)
- Non Aqueous Capillary Electrophoresis (NACE)

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P/ACE™ MDQ Plus Capillary Electrophoresis System

- Built-in auto-sampler and programmable array of 36 pairs of buffers.
- Exclusive circulating liquid, precisely regulates capillary temperature
- Sample temperature control
- Integrated interchangeable detector modules
- Multi-mode sample introduction
- Internal fluidic system generates pressure or vacuum
- Sample from vials, micro vials or 96-well plates
- Fully programmable separation methods
- Easy to maintain

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Put the P/ACE™ MDQ Plus to Work for You

Our Customers Have Found Numerous Methods and Applications in Academic Research, Industry and More

Forensics / Drug Screening

While the highly polar nature of basic pharmaceuticals makes Liquid Chromatography complex, CE has the ability to excel at such separations.

The robust nature of this tool and the ruggedness of this particular approach are appropriate for screening protocols used in forensic toxicology.

Food and Beverage Manufacturing

The P/ACE MDQ Plus, provides in-depth analysis of food compounds including anions, cations, organic acid content, and protein integrity, to better manage product process consistency, taste, quality, storage conditions, safety, adulteration and authentication.

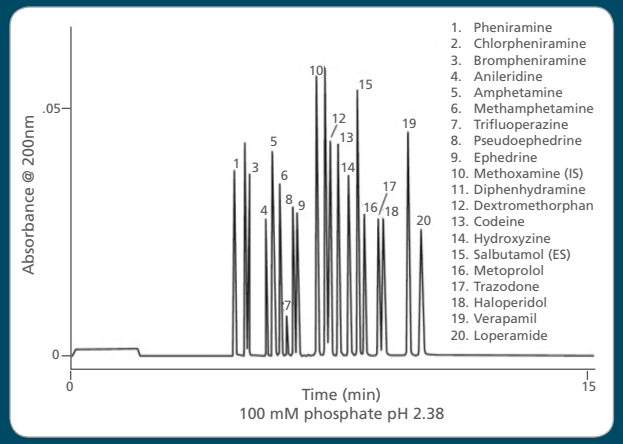

Figure 2: Highly resolved separation of 20 basic drugs using low pH, where the capillary surface is essentially neutral and the amine functional groups on the solutes are maximally ionized

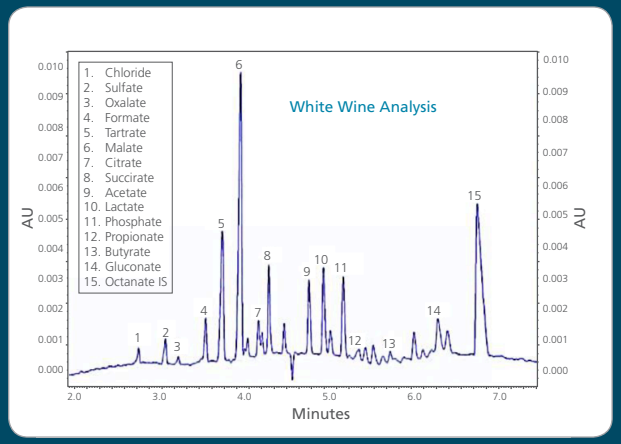

Figure 3: Analysis of white wine, revealing quantifiable compounds that effect the taste and feel.

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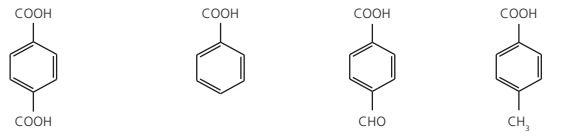
Petrochemicals

Analysis of anion and cation content gives you a better understanding of the chemical makeup of petroleum and related products. For example highly purified terephthalic acid (PTA) and its esters are major components in the production of plastics and fibers like polyethylene glycol and polyester. The purity of PTA has a direct effect on the quality and color of the end products.



Biofuels

The P/ACE MDQ Plus already excels in ion analysis and is a natural fit for biofuel production. The fermentation of lignocellulosic biomass to ethanol is an attractive route to fuels to supplement fossil fuels. Incorporating ion analysis and sugar analysis makes the P/ACE MDQ Plus invaluable for monitoring the fermentation and purification processes used in the production of ethanol.

Water Quality and Environmental

With ever-increasing water demands, quick and efficient identification of impurities, analytes or other contaminating molecules within a water sample is a key step in managing the safety of our water supply.

Water is also a vital component in industrial production of semiconductors, metal plating, and is used in large volumes in nuclear power plants and pulp and per mills. The P/ACE MDQ Plus identifies analytes that lead to corrosion as well as contaminants that contribute to downstream environmental pollution.

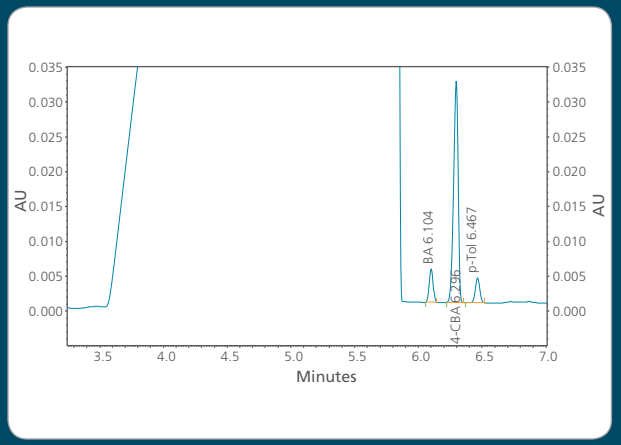


Figure 4: With the P/ACE MDQ Plus, sensitive, reproducible, high resolution separations are achieved quickly, characterizing PTA and its major impurities.

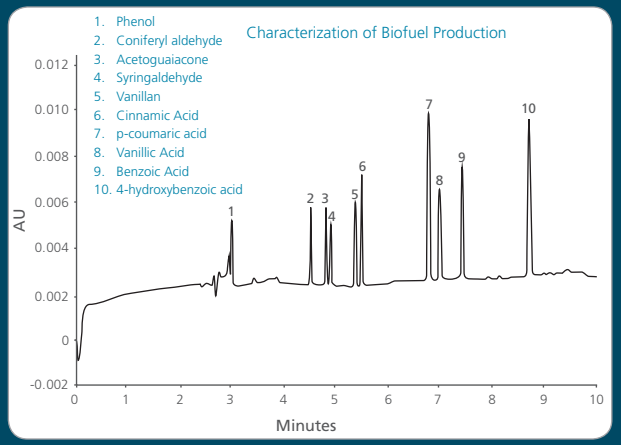


Figure 5: CE Analysis of lignocellulosic biomass derived organic acids. -Turkia et al. J Chrom A, 2013

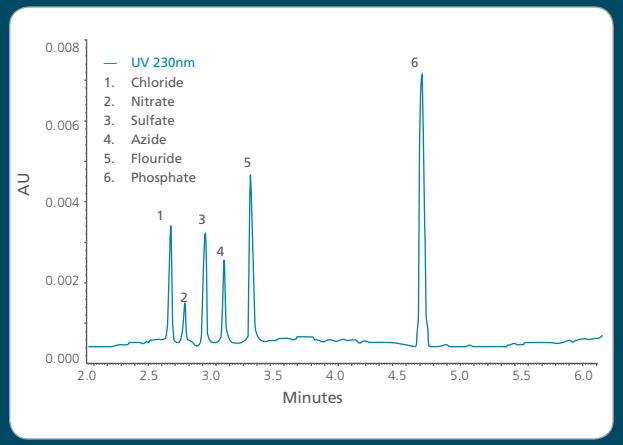


Figure 6: Separation performance of the P/ACE MDQ Plus in under 5 min demonstrating use in identifying Inorganic Anions in water.

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A Robust Solution for Demanding Analytical Requirements

Automated Sample Handling

The P/ACE MDQ Plus system offers fully automated methods and extended sample-handling capability for walkaway operation.

- Sampling can be performed using 1.8 ml universal vials, 96-well plates and micro vials.
- Precision-molded polymethylpentene universal vials accommodate run buffer, sample and micro vials

Quick-Change Electrodes

System electrodes and vial cap openers simplify user interaction, are designed to assure high strength and rigidity and are easily removed for maintenance.

Universal Vial and Cap Design

Prevents the capillary and electrode from physically interacting with the caps, creates a better seal, ultimately allowing for a robust, clean sample interface.

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With Built-in: – Auto-sampler – Pressure and Vacuum – Sample and Capillary Temperature Control

Multiple Modes of Sample Introduction and Separation

The P/ACE MDQ Plus provides electrokinetic, pressure and vacuum introduction of samples. Introduction from either end of the capillary allows both ultrafast and high-resolution analyses

- Separations can be adjusted by varying voltage, current, pressure and vacuum
- Combination of voltage and pressure ensures the buffer stays free of air bubbles which can be generated from outgassing

Sample Temperature Control

Settable temperature between 4 - 60°C helps maintain sample stability or perform functional assays

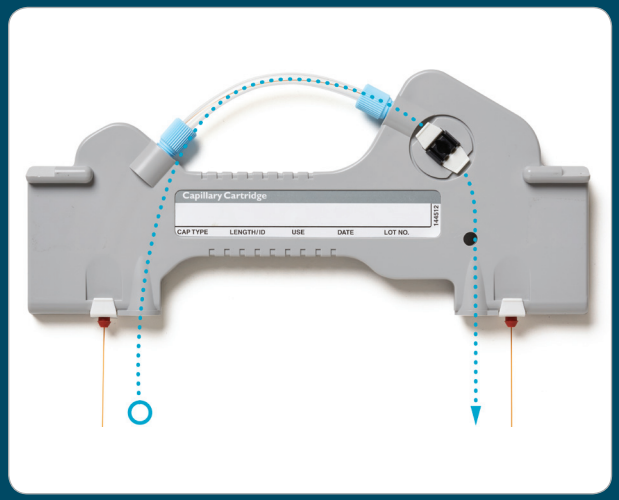
Variable Pressure and Vacuum

The internal fluidic system operates with all common rinsing protocols, regulating these with a pressure-handling capability of -5 to 100 p.s.i.

- Capillary conditioning is accomplished by moving specific volumes of electrolytes, gels, regenerants and cleaning solutions through capillary
- Gel buffers are quickly and efficiently pumped into capillary

CE-MS Ready

Capillary electrophoresis separation coupled to mass spectrometry or ultra-low flow connection to mass spectrometry (MS) combines the high-resolution separation of CE and the high-sensitivity mass determination of MS. The P/ACE MDQ Plus accommodates direct MS connection through the right-side access panel. Capillary temperature control is maintained.



Capillary Temperature Control

Efficient CE separations rely on precise capillary temperature regulation to manage Joule heating within the capillary. Proper temperature control plays important role in repeatability of analysis

- Recirculating liquid coolant provides effective capillary temperature control
  - Improved migration time reproducibility
  - Use of high ionic strength buffers for optimal resolution of complex mixtures
  - Use of large bore capillaries to accommodate larger mass loads and enhance sensitivity
- Capillary temperature can be regulated between 15 - 60°C.
- Capillaries are housed in cartridges facilitating temperature control and easy exchange of capillary dimensions and surfaces.

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Integrated Detector Modules

The Ultimate in Versatility

A Modular Approach

Supports flexible research, methods development and rugged routine use. Instrument design makes it easy to interchange high-sensitivity diode array (DAD), UV/Vis, and laser induced fluorescence (LIF) modules. External detector adapter allows the capillary to be extended to additional detection systems.

The P/ACE MDQ Plus is easily configured to run a wide variety of procedures, fast and efficiently, adapting to specific demands for a plethora of applications.

Solid State 488 nm Laser Module

And laser-induced fluorescence (LIF) detector provide robust high-sensitivity analysis of labeled molecular species. Quiet, energy-efficient compact design reduces overall system footprint. Two-color excitation and dual wavelength detector may be added.

UV/Vis Detection Module

Provides absorbance spectroscopy in the UV-visible region. Commonly used exclusion filters at 200, 214, 230, and 254 nm are provided to increase analyte specificity. Important when using photosensitive capillary surfaces.

Photodiode Array Detection Module

Lets you preform high-sensitivity analysis across a broad range of wavelengths. Allows for spectral wavelength analysis between 190 and 600 nm with baseline subtraction.

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Working in Conjunction with P/ACE MDQ Hardware

Our 32 Karat software – unique to capillary electrophoresis – provides instrument control, data acquisition and analysis.

Control and Analysis

With direct control, you get intuitive management of all system functions and ability to set run parameters in real time.

- Velocity-Calibrated Peak Area and CAESAR integration ensure reproducible quantitation at low limits of detection
- Automated fractionation of detected peak allows isolation of newly resolved compounds for external identification
- In addition to automated peak identification, mobility plots allow you to assess physical molecular interactions and simplify interpretation by removing EOF variability.

Methods Development

Methods are defined and edited in table format. All functions for the system are handled in a single window, including programming of the buffer array for the automation of methods development strategies.

- All buffer information – including descriptions and/or preparation protocols can be stored with the method.

Automation

An array of up to 36 pairs of buffers provides the flexibility for the rapid optimization of methods development. Automates the method development process by implementing strategies that analyzes your samples using an array of buffers with different pH levels, ionic strength or additives.

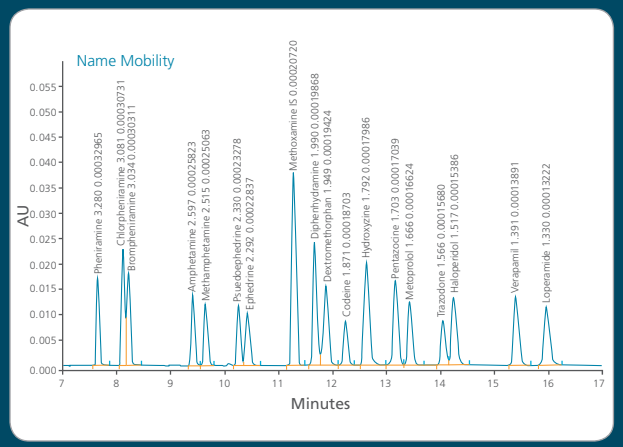

Figure 7: Advanced Peak Identification uses mobility or a powerful 2D algorithm to couple mobility with spectral signature for the ultimate in peak identification.

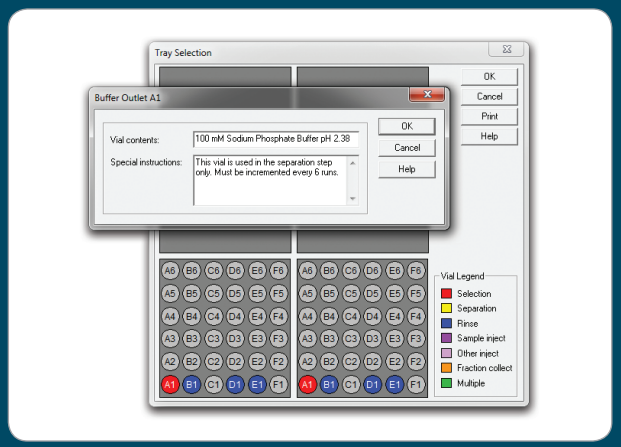

Figure 8: Buffer trays may be annotated with full descriptions – including buffer preparation protocols and saved as part of the method.

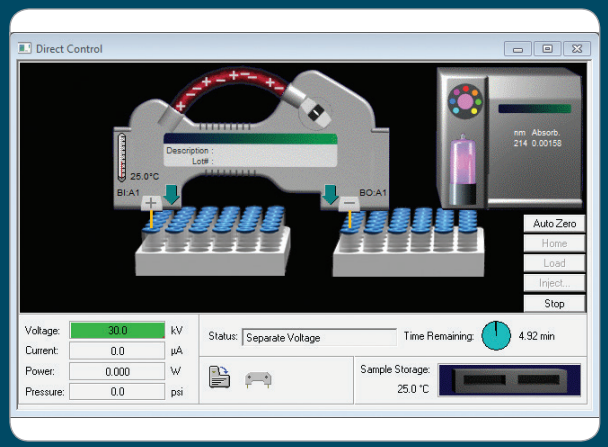

Figure 9: Direct Control – A graphical interface to select and change operating parameters with immediate real time execution and status display.

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Supplies and Resources

Items can be ordered at **www.sciex.com**

Reagents	
Anion Analysis Kit	A53537
Cation Analysis Kit	A53540
Methods Development Kit	501310
LIFLUOR dsDNA 1000 Enhance	477409
dsDNA 1000 Kit	477410
ssDNA 100R Kit	477480
Capillary Test Kit	338437

Supplies and Accessories	
Universal Vials	A62251
200 µL Microvials (pkg. of 100)	144709
Universal Vial Caps	A62250
Electrode Replacement Kit	A47775
Vial Cap Opener	A95348
Buffer Vial Tray (36 vials)	A58254
Buffer Vial Tray (48 vials)	A58255
Cartridge Assembly, 30 cm Capillary	A11147
Blank Cartridge Assembly Kit	144738
Cartridge Rebuilding Kit	144645
Cartridge Tubing Kit	144689
Capillary Coolant (450 mL)	359976

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System Specifications

Dimensions:
Height: 29.2 in (74.2 cm)
Door Open: 38.8 in (98.6 cm)
Width: 25 in (63.5 cm)
Depth: 28.4 in (72.1 cm)

Weight (uncrated):
188 lbs (85.3 kg)
(includes UV/Vis Detector)

Electrical Requirements:
Voltage: 100 - 240 V; 50/60 Hz
Voltage Range:
1 to 30 kV programmable
at 0.1 kV increments

Current Range:
3 to 300 µA programmable
at 0.1 µA increments

Pressure Delivery Range:
-5 to +100 psi

Sample Temperature Control:
4 - 60°C

Capillary Temperature Control:
15 - 60°C

System Capacity

Sample Trays:
2 x 96 well plates
2 x 48 universal vials
2 x 48 0.2 mL microvials

Buffer Tray:
2 x 36 universal vials

Detection Capability

UV/Vis (included)
200, 214, 230 and 254 nm filters
190 - 600 nm (custom filter option)

Diode Array (optional)
190 - 600 nm programmable
0.5 - 32 Hz scan collection frequency programmable

Laser Induced Fluorescence (LIF) (optional)
300 - 700 nm excitation range
350 - 750 nm emission range
0 - 1000 RFU

Source Lasers with 3 mW Power Output:
488 nm solid-state laser (included in B67326)

Ordering Information

B52521 P/ACE MDQ Plus Capillary Electrophoresis System
Includes separation module and UV/Vis detector module; system controller (Win 7) with 32 Karat software and system start up kit.

B68372 Diode Array Detector Module
Includes DAD detector module, optics cable, and board.

B67326 Solid State Laser and LIF detector module, 488nm.
Includes optics cable, solid state laser and single color detector module.

B67327 LIF 2 Color Upgrade Kit
Converts LIF detector to dual-wavelength optics.

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Your Success is Our Success

We take it personally

As a SCIEX customer you have access to a world-class customer support organization. Wherever you are, we're there with you as a trusted partner to answer questions, provide solutions, and maximize lab productivity.

Our service engineers have the experience and expertise to help you get the most from your LC, CE and MS systems. Whether you're looking to improve sensitivity, resolution, speed or throughput, they can direct you to the right solution.

When you have questions, we have answers.

Learn more at www.sciex.com

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Headquarters
500 Old Connecticut Path
Framingham, MA 01701 USA
Phone 508-383-7700
www.absciex.com

International Sales
For our office locations please call the division headquarters or refer to our website at
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