

**Thermo Scientific Dionex ICS-5000<sup>+</sup> HPIC**  
Capillary and Analytical System



**High resolution, fast analysis**  
**high-pressure**  
**ion chromatography**

**Thermo**  
SCIENTIFIC

# The latest evolution of ion chromatography

## The Dionex ICS-5000<sup>+</sup> HPIC: The World's First High-Pressure Reagent-Free Ion Chromatography System

Developed for flexibility, modularity, and ease-of-use, the Dionex ICS-5000<sup>+</sup> HPIC™ system combines the highest chromatographic resolution with convenience. The Dionex ICS-5000<sup>+</sup> HPIC system brings a new level of resolution and speed to ion chromatography analysis with high operating pressures.

- Continuous operation up to 5000 psi when configured as a Reagent-Free™ (RFIC™) system
- Increased productivity with fast run times without compromising resolution
- Improved separations and higher resolution with small-particle columns
- Unmatched application range with standard bore, microbore and capillary formats
- Outstanding flexibility and configurability with single and dual systems, wide range of detector options, and IC x IC (2D-IC) formats

### Did You Know?

RFIC systems use deionized water to electrolytically generate precise eluent concentrations, and to regenerate suppressors, trap columns, and carbonate removal devices. This improves reproducibility, reduces labor, and limits contamination.

### Application Range for the Dionex ICS-5000<sup>+</sup> System

Format	Capillary	Microbore	Standard Bore
Flow Rate Range	0.001–0.100 mL/min in 0.1 µL/min increments Typical range: 5–20 µL/min	0.001–10.000 mL/min in 0.001 mL/min increments Typical range: 0.2–0.5 mL/min	0.001–10.000 mL/min in 0.001 mL/min increments Typical range: 1–2 mL/min
Max. Pressure	5000 psi (eluent generation) 6000 psi (pump pressure range)	5000 psi (eluent generation) 6000 psi (pump pressure range)	5000 psi (eluent generation) 6000 psi (pump pressure range)
Column i.d.s Supported	0.2–0.6 mm	1–3 mm	3–7 mm
Yearly Eluent Usage (continuous operation)	5.25 L (10 µL/min)	131 L (0.25 mL/min)	525 L (1 mL/min)

## System Highlights

The Dionex ICS-5000<sup>+</sup> HPIC system provides performance and flexibility unmatched by any other IC system.

- High resolution with small-particle columns
- Fast separations without compromising resolution
- Up to two times faster separation with Fast IC columns
- Ultimate sensitivity with IC x IC (2D-IC)
- Superior specificity with IC-MS and IC-MS/MS
- Capillary, microbore, and standard bore flow rates and columns for application flexibility
- Always ready with minimal calibration and equilibration times in capillary mode

Unrivalled speed and performance for fast analyses with increased productivity.

- Eluent generation permits 18 months of continuous operation in capillary mode
- Always on, always ready capability saves time and increases productivity, reducing cost of ownership
- Consumes 5.25 L of water per year in capillary mode (10 µL/min), greatly reducing eluent disposal costs
- Easy configuration with the Thermo Scientific IC Cube capillary consumables cartridges

***“The increased mass sensitivity is perfect for small samples collected in the field”***

—Forensics lab

***“Having a system that is always equilibrated and ready to run makes it much easier to process rush samples”***

—Environmental lab

***“Why would anyone buy an analytical system now that capillary [IC] exists?”***

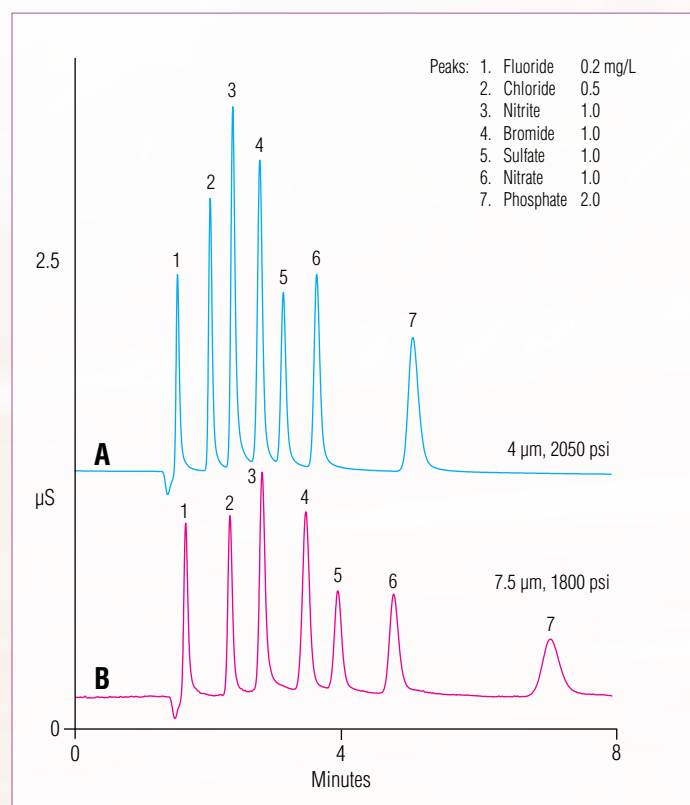
—Municipality water lab

# High resolution and speed

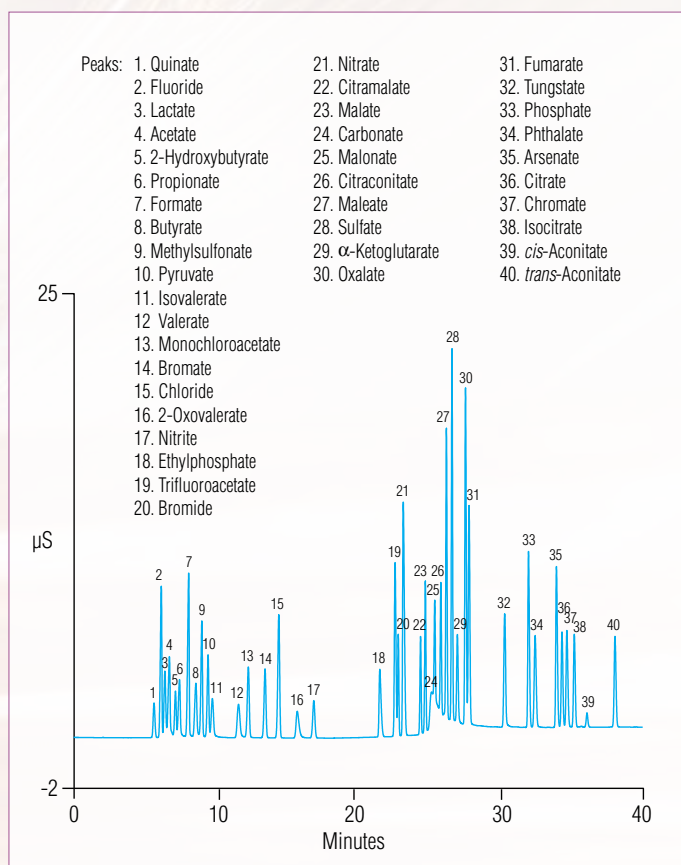
## Small-Particle Columns for High Resolution

The high-pressure Dionex ICS-5000<sup>+</sup> HPIC system supports columns with smaller resin particles (e.g., 4  $\mu\text{m}$ ) that increase chromatographic resolution without increasing separation time.

- High pressure capability permits use of standard (250 mm) length columns with small diameter particles
- Superior chromatographic resolution, improving quantification accuracy for complex samples
- Find peaks you've never seen before — separates previously unresolved peaks without increasing analysis time



Comparison of resolution of seven inorganic anions using Dionex IonPac A) AS18-4 $\mu\text{m}$  0.4 x 150 mm and B) AS18-Fast 0.4 x 150 mm columns. The small-particle column increases response and produces sharper peaks due to high efficiency.



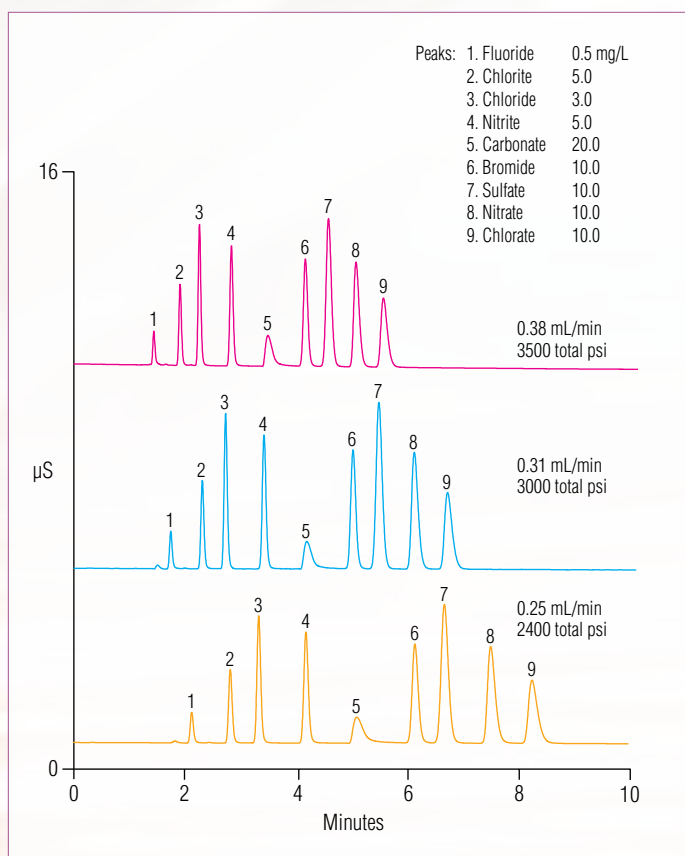
Gradient separation of 40 anions in under 40 minutes at 15  $\mu\text{L}/\text{min}$  using the Dionex IonPac AS11-HC-4 $\mu\text{m}$ , 0.4 x 250 mm capillary column.



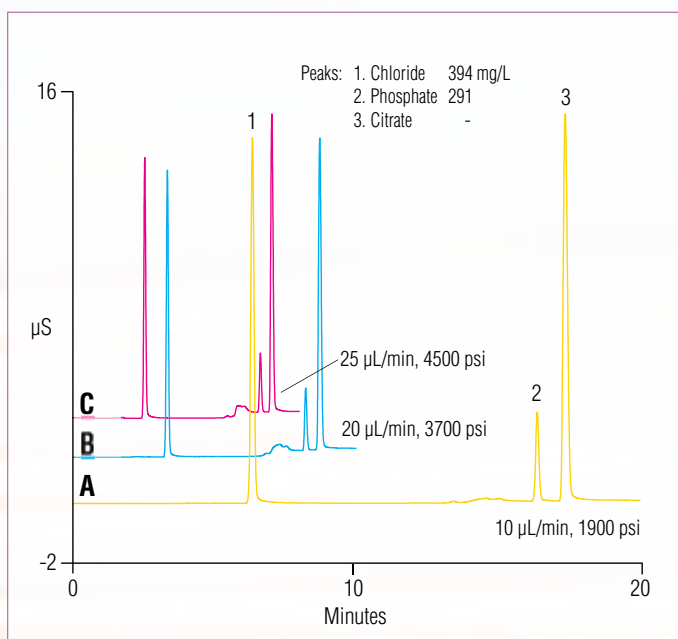
## Optimized Separations for Fast Results

Optimizing column dimension and increasing flow rate can dramatically decrease run times without compromising resolution. Fast IC columns with decreased lengths, higher pressure tolerances, and/or smaller particle sizes facilitate separation up to 2x faster than conventional columns.

- Improve throughput with Fast IC columns by a factor of 2x
- Increase laboratory productivity
- Deliver results faster for rush samples



Determination of nine inorganic anions using a Dionex IonPac AS18-4μm, 2 × 150 mm anion-exchange column. A flow rate of 0.38 mL/min results in a run time of only 6 min with good baseline resolution.



Fast determinations of inorganic anions and citrate in a sports beverage using a capillary HPLC system with a Dionex IonSwift MAX-200 capillary column.

## Dionex ICS-5000<sup>+</sup> system features

- Automated sample preparation and handling
- New sample conductivity and pH accessory
- Reduced cost of ownership: system's time-saving features free up lab staff to perform important tasks, increasing productivity

- IC Cube™ cartridges house all capillary consumables and injection in close proximity, reducing dead volume
- Fewer connections and precut, color-coded tubing for low dead volume and ease of use
- Separate thermal zones for each IC Cube Column Cartridge.



- Self-contained conductivity or electrochemical detectors to fit your application
- Innovative palladium hydrogen reference electrode for superior reproducibility in electrochemical detection
- Optional UV-vis detector module
- Thermal compartment for standard bore and microbore columns and injection valves

Dionex AS-AP Autosampler



Detector/Chromatography Module

### Single or Dual Pump Module



- Pump pressure up to 6000 psi (5000 psi maximum for an RFIC system)
  - Capillary, microbore, and standard bore flow rates for application flexibility
  - Single or dual pump to fit your lab's needs and budget
- 
- Generates precise eluent concentrations electrolytically from deionized water
  - Consistent results, day to day, operator to operator and lab to lab
  - Consumes just 5.25 L of water per year at capillary flow rates (10  $\mu$ L/min), greatly reducing eluent disposal costs
  - EG cartridge lasts for 18 months of continuous operation at typical capillary flow rates and conditions

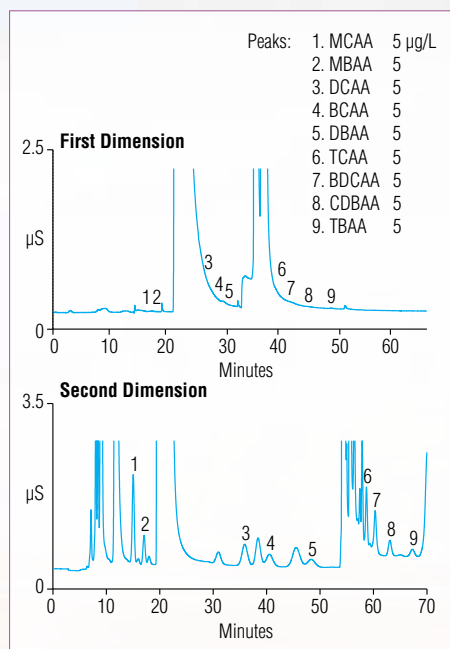
### Eluent Generator Module

# Advanced application capabilities

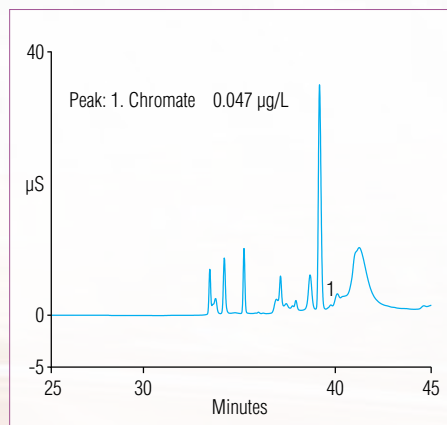
## Sensitivity and Format Versatility to Fit Your Application Needs

The Dionex ICS-5000<sup>+</sup> HPIC system can be configured with two standard/microbore channels, two capillary channels, or as a hybrid analytical/capillary system, to give you the flexibility to meet the changing needs of your laboratory

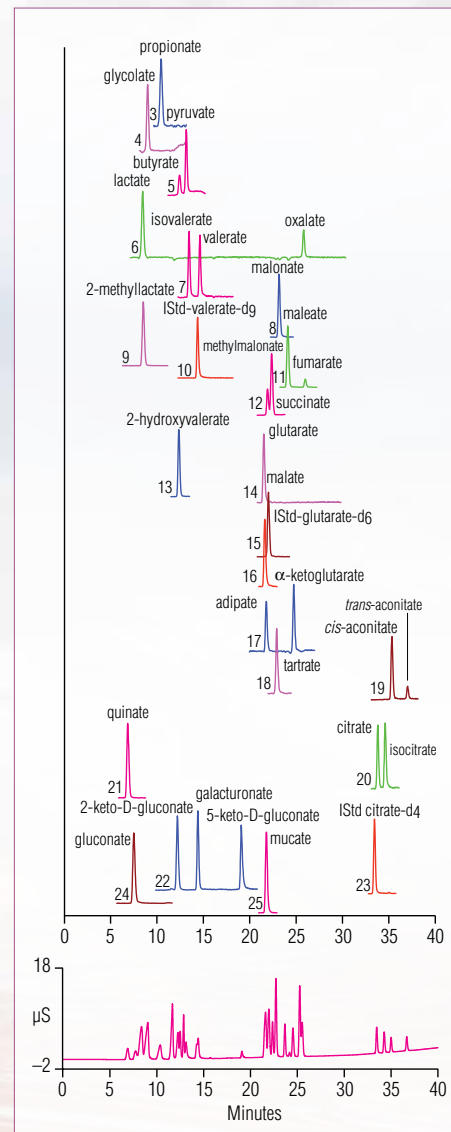
- Run two different analyses simultaneously on a single sample, analyze two different samples concurrently, or perform advanced IC × IC (2D-IC) techniques for trace level determinations in the presence of high matrix concentrations
- Using a standard bore or microbore column in the first dimension to separate analytes from the matrix, followed by a capillary column in the second dimension to resolve the analytes, provides sensitivity with conductivity detection limits comparable to MS detection.
- Wide range of detector options, including conductivity, electrochemical, UV-vis absorbance and mass spectrometry



Separation of haloacetic acids in simulated drinking water using 2D-IC. Quantification of 5 ppb levels with conductivity detection is now possible.



Determination of hexavalent chromium in municipal drinking water using 2D-IC. Detection limits below 10 ppt can be achieved. The above municipal water sample contained 47 ppt hexavalent chromium.



Accurately identify coeluting species with direct injection IC-MS, as in this low-molecular-weight organic acids example.



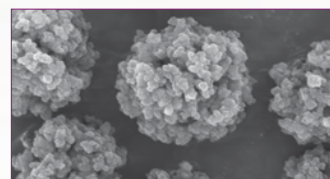
# Separation challenges resolved

## Chemistries for Challenging Separations

World class columns for anion, cation, organic acids, amine, carbohydrate, and amino acid separations, offering multiple chemistries for different application needs. Suppressors, Continuously Regenerated Trap Columns (CR-TC), and carbonate removal devices (CRD) to reduce noise and improve detection limits, ensuring the best results obtainable for a wide range of applications

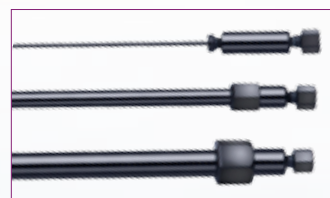
## Smaller Particle Resins Produce Higher Performance

- Smaller particle resins produce increased resolution power
- Fast run times are possible using 150 mm columns and/or high flow rates
- High resolution is obtained using 250 mm columns with standard flow rates



## Capillary-Based Dionex IonPac Anion and Cation-Exchange, CarboPac, and AminoPac Columns

- Same performance as the equivalent 4 and 2 mm columns
- Improved mass sensitivity with smaller cross-sectional area
- Increased resolution power with smaller particle size columns
- Reduced operating costs with lower flow rates



## Electrolytic Suppressors: SRS 300 and CES 300

- Electrolytically regenerated Reagent-Free suppression
- Suppresses conductive eluents to less conductive species for sensitive detection
- Converts moderately conductive analyte salts into highly conductive acids and/or bases for sensitive detection
- CES 300 suppressors optimized for flow rates typically used in capillary systems (3–30  $\mu\text{L}/\text{min}$ )



## Carbonate Removal Device: CRD 200

- Optimized for the removal of carbonate from hydroxide eluent systems
- Reduces the carbonate peak contributed by the sample
- Improves integration and quantitation of analyte peaks that elute close to carbonate
- Capillary CRD 200 uses same carbonate-permeable membrane as the standard and microbore CRD



## Eluent Generators: Eluent Generator Cartridges (EGCs) and Continuously Regenerated Trap Columns (CR-TCs)

- Provides contaminant-free eluent
- Very low baseline drift for improved integration and increased sensitivity
- No need to regenerate the trap column off-line
- Capillary EGCs and CR-TCs designed for use with capillary hydroxide and MSA eluent generators exclusively



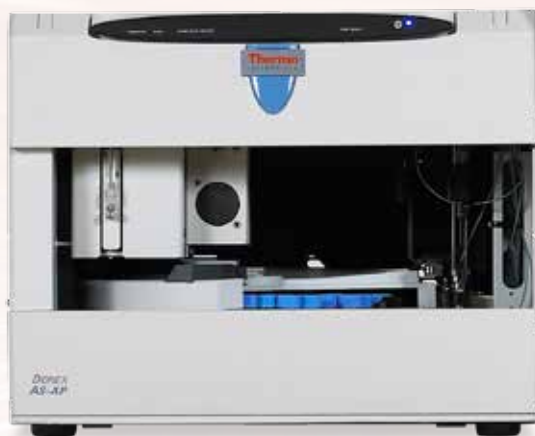
# Reliable sample handling

## Versatile Sample Preparation and Automation Solutions

Thermo Scientific Dionex autosamplers integrate seamlessly with the Dionex ICS-5000<sup>+</sup> system, providing effortless automation and advanced sample preparation capabilities. All wetted surfaces are nonmetallic and chemically inert, protecting columns and sensitive samples from contamination.

### Dionex AS-DV

- Affordable automation
- Precise mechanics for high reproducibility
- Sample filters integrated into vial caps
- Optional high-pressure valve for automated sample preparation
- Random access and sample overlap capabilities



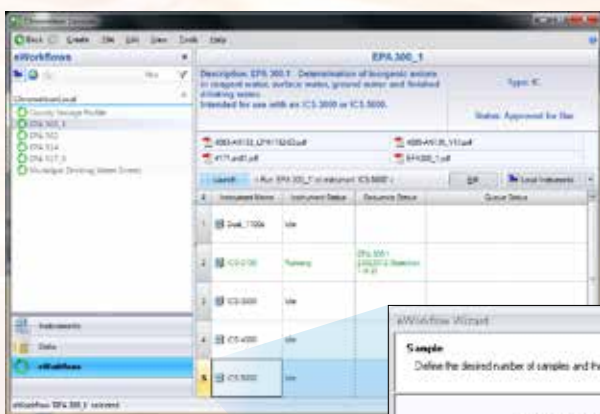
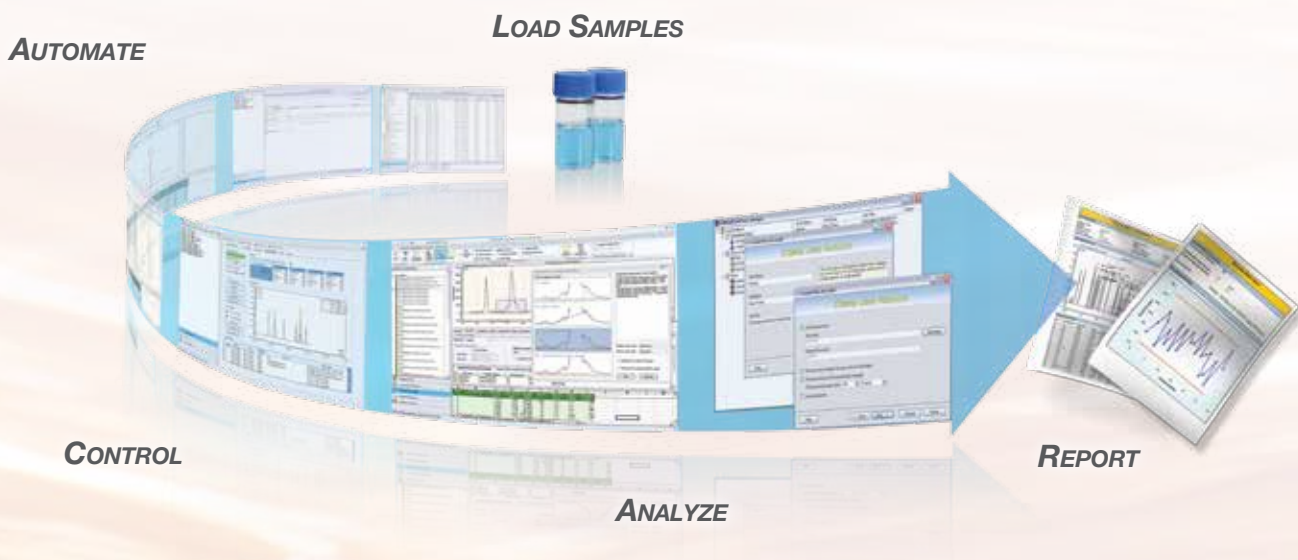
### Dionex AS-AP

- Advanced performance autosampler with full-loop, partial-loop, capillary mode, and limited-sample injections
- Automated sample preparation (dilution, concentration, matrix elimination, precolumn derivatization)
- Temperature control for thermally labile samples
- Fast injection cycle time, < 30 s per 5  $\mu$ L
- Flexible formats—0.45 mL well plates to 10 mL vials
- Optional sample conductivity and pH accessory with conditionals

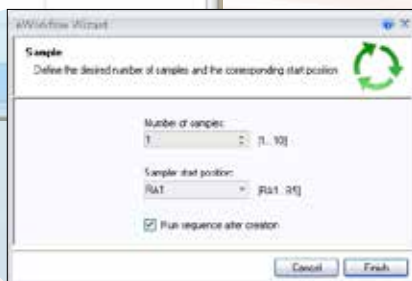
# Simply intelligent software

## Powerful Capabilities and Outstanding Usability

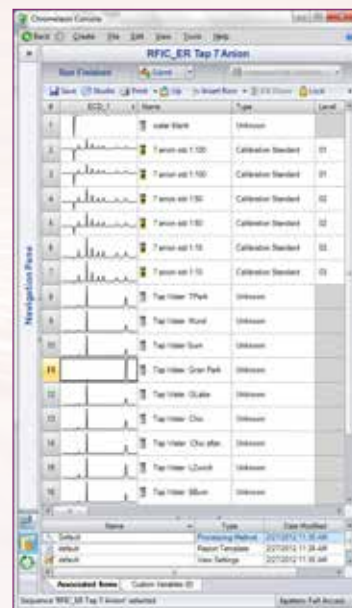
The natural complement to your IC system is Thermo Scientific Dionex Chromeleon, the world's leading chromatography data system. With its inviting user interface and time-saving innovations, Chromeleon™ software streamlines your path from samples to results. You'll find all the tools you need to tackle your toughest challenges without getting distracted from your goals. Get both rich functionality and outstanding usability with Chromeleon – the Simply Intelligent™ chromatography software.



Use eWorkflows to perform complete analyses perfectly, from sequence setup to final report, with just a few mouse clicks.



Gain an instant and intuitive understanding of your data at a glance with the Chromeleon 7 software's unique MiniPlots and Interactive Charts.





## Discover the Dionex ICS-5000<sup>+</sup> system and High-Pressure IC

The Dionex ICS-5000<sup>+</sup> HPIC system is the next generation of high-end ion chromatography system, offering the ability to operate as a Reagent-Free system at up to 5000 psi. The high-pressure capability offers the flexibility to use small-particle columns for higher resolution without sacrificing speed, or higher flow rates with standard length or shorter (150 mm) columns for high throughput.

As a capillary system, the reduced eluent flow rate reduces eluent consumption and produces less waste. The IC Cube redefines ease-of-use by color-coding fittings and reducing the number of connections in the system; all with an array of detectors and options that add up to a very flexible system.

For more information or to place an order, contact the Thermo Scientific Dionex Products office nearest you or your local distributor. Phone numbers and addresses for worldwide subsidiaries can be found in the About Us section of [www.thermoscientific.com/dionex](http://www.thermoscientific.com/dionex).

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