



PRODUCT MANUAL

for the

IonPac[®]

Trace Cation Concentrator
(TCC-LP1, TCC-ULP1 and TCC-XLP1)

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 **DIONEX**

IC | HPLC | MS | EXTRACTION | PROCESS | AUTOMATION

PRODUCT MANUAL

FOR

TRACE CATION CONCENTRATOR (TCC)

TCC-LP1 Column – Low Pressure, 4 x 35 mm (P/N 046027)

TCC -ULP1 Column – Ultra Low Pressure, 5 x 23 mm (P/N 063783)

TCC -XLP1 Column – Extremely Low Pressure, 6 x 16 mm (P/N 063889)

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IMPORTANT INFORMATION

Several icons are used throughout this document to emphasize important points. The symbols are shown below, along with the purpose of the information.



SAFETY

Safety information can help prevent bodily harm.



WARNING

Warning information can help prevent equipment harm.



CAUTION

Caution information can help prevent problems.



NOTE

Note information can help with tips for improved use.

SECTION 1 – INTRODUCTION

The IonPac® Trace Cation Concentrator Low Pressure (TCC-LP1, P/N 046027), Ultra Low Pressure (TCC-ULP1, P/N 063783), and Extremely Low Pressure (TCC-XLP1, P/N 063889) Columns are designed primarily for high purity water analysis. The function of the columns is to strip ions from a measured volume of a relatively clean aqueous sample matrix. This process “concentrates” the desired analyte species onto the columns leading to a lowering of detection limits by 2-5 orders of magnitude. The unique advantage of the columns to the analytical chemist is the capability of performing routine Low Pressure, Ultra Low Pressure, and Extremely Low Pressure Trace analyses of sample matrix ions at µg/L levels without extensive and laborious sample pretreatment.

The TCC-LP1, TCC-ULP1, and TCC-XLP1 columns are packed with a 20 µm styrene/divinylbenzene copolymer that is grafted to yield a resin with carboxylate functional groups. Due to its highly cross-linked structure, the resin is solvent compatible. The capacity of the TCC-LP1, TCC-ULP1, and TCC-XLP1 is 260 µeq/column with a void volume of approximately 250 µL. The physical rigidity of this resin allows the TCC-LP1, TCC-ULP1, and TCC-XLP1 to be used at pressures up to 3,000 psi (20.68 MPa). The TCC-LP1, TCC-ULP1, and TCC-XLP1 can be readily converted between the acid and the salt form without significant changes in the operating pressure.

The recommended maximum flow rate is 5 mL/min. The back pressure generated by the TCC-LP1 is less than 70 psi (0.48 MPa) at 1 mL/min, the TCC-ULP1 is less than 45 psi (0.31 MPa) at 1 mL/min, and the TCC-XLP1 is less than 30 psi (0.21 MPa) at 1 mL/min. The large resin particle size (20 µm) in the TCC-LP1, TCC-ULP1, and TCC-XLP1 makes it possible to do manual injections onto the concentrator. Syringes with up to 3 mL capacities can be used to manually push samples through the TCC-LP1. It takes approximately 1 minute to manually push 3 mL of sample through the TCC-LP1, TCC-ULP1, and TCC-XLP1 columns.

The TCC-LP1, TCC-ULP1, and TCC-XLP1 columns can be used with methanesulfonic acid, sulfuric acid, and hydrochloric acid eluents, with or without solvent, to concentrate samples on 5-mm, 4-mm, 3-mm, or 2-mm analytical systems.

This manual assumes that you are familiar with the installation and operation of the DIONEX Ion Chromatograph (IC) and the suppressor. If you do not understand the operation of the system, take the time to familiarize yourself with the various system components before beginning an analysis. The TCC-LP1, TCC-ULP1, and TCC-XLP1 have 10-32 threaded PEEK end fittings for use with ferrule/bolt liquid line fittings. If you find it necessary to install a component with 1/4-28 ports and therefore need to obtain or make one or more transition lines between 10-32 and 1/4-28 threaded ThermoFlare ports, DIONEX recommends the use of Tefzel® liquid lines with a PEEK ferrule/bolt fitting on one end and a 1/4-28 ThermoFlare fitting on the other end. See, “DIONEX Liquid Line Fittings,” for detailed instructions on purchasing or making these lines.

Assistance is available for any problem during the shipment or operation of Dionex instrumentation, columns, and consumables through the Dionex North America Technical Call Center at 1-800-DIONEX-0 (1-800-346-6390) or through any of the Dionex Offices listed in “Dionex Worldwide Offices” on the Dionex Reference Library CD-ROM.

TABLE 1
IonPac TCC-LP1, TCC-ULP1, and TCC-XLP1 Concentrator Column Packing Specifications

Column	Particle Diameter	Substrate X-Linking	Column Capacity	Functional Group	Hydrophobicity
TCC-LP1 4-mm	20	55	260 µeq/col	Carboxylic Acid	Very low
TCC-ULP1 5-mm	20	55	260 µeq/col	Carboxylic Acid	Very low
TCC-XLP1 6-mm	20	55	260 µeq/col	Carboxylic Acid	Very low

TABLE 2
IonPac TCC-LP1, TCC-ULP1, and TCC-XLP1 Concentrator Column Operating Parameters

Column	Typical Backpressure MPa at 30 °C	Standard Flow Rate mL/min	Maximum Flow Rate mL/min
TCC-LP1 4-mm	< 70 (0.48)	0.50	5.0
TCC-ULP1 5-mm	< 45 (0.31)	0.50	5.0
TCC-XLP1 6-mm	< 30 (0.21)	0.50	5.0

SECTION 2 – INSTALLATION

2.1. TCC Operation Precautions



CAUTION

The columns are shipped with 2.5 mM methanesulfonic acid as the storage solution. Flush the column for 30 minutes with eluent before attempting to concentrate sample. Pump the effluent directly to a waste container while washing the column. DO NOT pump this effluent through the guard column, analytical column and/or the suppressor.

2.2. Column Description

The IonPac Trace Cation Concentrator - Low Pressure (TCC-LP1, 4x35 mm) and IonPac Trace Cation Concentrator – Ultra Low Pressure (TCC-ULP1, 5x23 mm) columns consist of the following components.

1. Bed Support Assembly (P/N 042955)
2. 10-32 Ferrule Column End Fitting (P/N 052809)
3. 10-32 Ferrule Plug (P/N 042772)

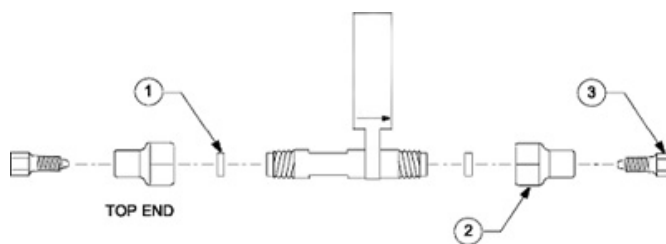
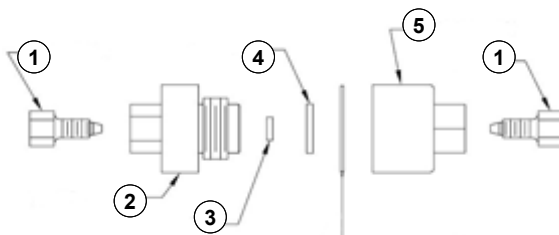


FIGURE 1
TCC-LP1, TCC-ULP1 Column Components

The IonPac Trace Cation Concentrator – Extremely Low Pressure (TCC-XLP1, 6x16 mm) column consists of the following components.

1. 10-32 Ferrule Plug (P/N 042772)
2. Column Body 6 x 16 mm (P/N 063561)
3. Bed Support (Frit) (P/N 063606)
4. Bed Support Assembly (P/N 063688)
5. 9-mm Column End Fitting (P/N 048298)



SECTION 3 – OPERATION

3.1. Sample Loading



WARNING

Always use the high pressure pulse damper (Dionex P/N 043945) after the DQP pump or DXP pump to ensure the concentrator column does not get exposed to pump pulsations. It is possible to damage the resin when exposed to high pump pulsations.



WARNING

To prevent overloading the TCC-LP1, TCC-ULP1, or TCC-XLP1, and/or loss of sample analytes, determine the concentration linearity over the desired analytical concentration range. See Section 3.4.1, “Capacity Consideration of Concentrators.”

Sample loading can be performed manually with a < 3 mL syringe. It takes approximately 1 minute to manually inject 3 mL of sample through the TCC-LP1.

Alternately, you can use a separate positive displacement pump such as the Dionex DQP pump (P/N 035250). When using a pump, ensure that a high pressure damper is used. Pump flow rates of approximately 3 mL/min can be used while maintaining sample concentration efficiencies high enough to ensure good quantification.



WARNING

The flow direction during the concentration step is critical. In order to ensure optimal system performance, it is recommended that concentration always be performed in a back flush manner.

After the sample has been loaded onto the TCC-LP1, TCC-ULP1, or TCC-XLP1 in the direction opposite to the eluent flow, it is then “back flushed” with eluent onto the guard and analytical columns (see Figure 4, “Loading the TCC-LP1, TCC-ULP1, or TCC-XLP1 Column”). This configuration concentrates the cations in a tight band at the bottom of the TCC columns. When injected, all of the ions are rapidly eluted off of the TCC columns, and onto the guard and analytical columns. If the sample is loaded onto the TCC-LP1, TCC-ULP1, or TCC-XLP1 in the same flow direction as the eluent flow, the cations are concentrated at the head of the column rather than at the bottom. When injected, the cations begin chromatographic separation on the concentrator before reaching the guard and analytical columns. Therefore, the retention time of the analytes would be significantly longer than a standard loop injection. Normally the function of the concentrator is to strip the ions of interest from the sample matrix and not to act as an analytical column.

Figure 3 shows the configuration for sample loading using a Rheodyne valve.

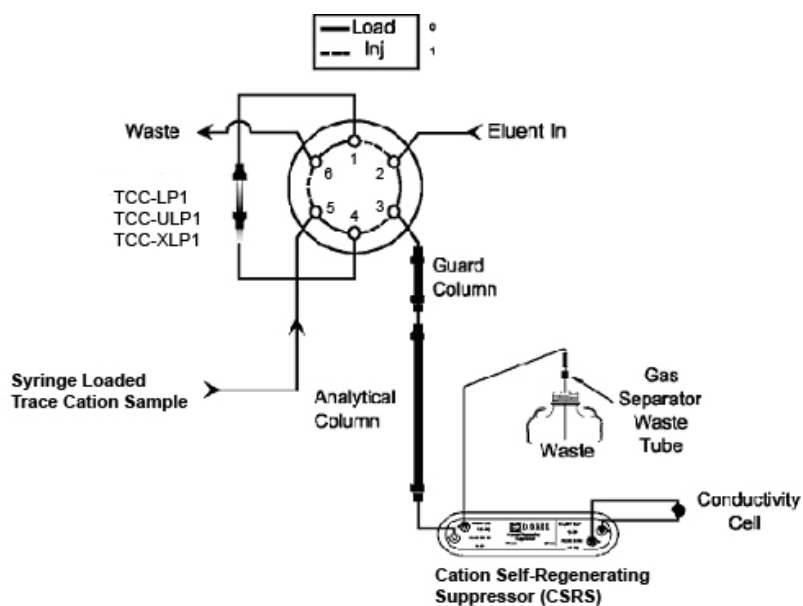


FIGURE 3
Configuration for Determining Trace Levels of Cations

Figure 4 shows the configuration for sample loading using a slider valve.

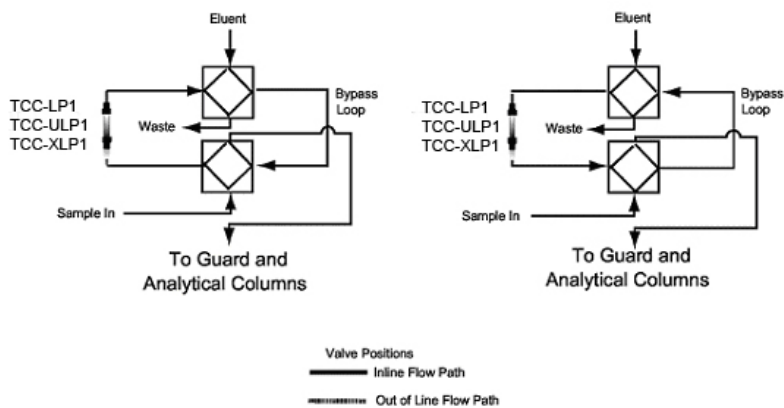


FIGURE 4
Loading the TCC-LP1, TCC-ULP1, or TCC-XLP1 Column

3.2.Reagent and Sample Handling

The use of the TCC-LP1, TCC-ULP1, or TCC-XLP1 column has certain limitations. At trace analyte concentration levels ($\mu\text{g/L}$), the results of the analysis depend on carefully following good laboratory practices. All sources of contamination must be eliminated. The following sections focus on critical points that must be observed when using the TCC-LP1, TCC-ULP1, or TCC-XLP1 concentrator columns. Proper consideration of these points will enable the analyst to obtain accurate and reproducible results at trace analyte levels.

3.2.1.1. Water Quality

All water used in the preparation of standards and eluents must be deionized water with a specific resistance of 18.2 megohm-cm. The quality of the dilution water must be determined by Ion Chromatography since even deionized water with a specific resistance of 18.2 megohm-cm may contain trace levels of the ions of interest. To do this, analyze the water in exactly the same manner as your sample.

3.2.1.2. Sample Collection and Storage



CAUTION

Never use plastic syringes with rubber pistons for any loading of trace ions. These materials cause non-reproducible results.

At trace analyte concentration levels ($\mu\text{g/L}$), chances of contamination during collection or storage are high. Every container and every procedural step constitutes a potential source of contamination. Polystyrene containers with leak-tight caps can be used to store 1 to 5 $\mu\text{g/L}$ levels of inorganic and organic cations for up to 8 days. Recommended storage vessels are Corning tissue culture flasks. The following procedure should be used for storage of $\mu\text{g/L}$ level samples.

- A. Rinse the polystyrene container and cap twice with deionized water having a specific resistance of 18.2 megohm-cm. Fill the container until it overflows, cap it securely, and soak for 4 hours.
- B. Empty the container and refill it with deionized water having a specific resistance of 18.2 megohm-cm. Cap the container securely. It should remain filled at least 24 hours before sample collection.
- C. Empty the container and rinse it twice with the sample to be collected. Fill the container with the sample until it overflows and then cap the container securely. Be sure that the sample line does not touch the container.

3.2.1.3. Standards

It is good practice to run standards at the beginning, middle, and end of each day to ensure constant instrument response. Because external standard quantification is used, it is critical that standard solutions are correctly prepared.

- A. 1,000 mg/L (1 mg/L = 1 ppm) stock standard solutions should be prepared by accurately weighing amounts of salts as described in your instrument manual. These solutions are stable over a period of several months.
- B. 1 mg/L stock standard solutions may be prepared by diluting 1 mL of 1,000 mg/L stock standard to 1,000 mL in a volumetric flask. These solutions should then be transferred to clean polystyrene containers. They may be stored for up to one month.
- C. 1 $\mu\text{g/L}$ working standard solutions may be prepared by diluting 1 mL of the 1 mg/L stock standard to 1,000 mL. These working standards are stored in polystyrene containers. They are stable up to 8 days, but Dionex recommends daily preparation since standard response is critical in the results of your analysis.

3.3. Concentrator Capacity

3.3.1.1. Capacity Considerations for Concentrators

As in all ion exchange systems, the resin has a finite capacity. It can strip a given amount of ions from water. When the capacity of the concentrator is exceeded, the stripping will not be quantitative. This condition is referred to as column overload.

When estimating the capacity of a concentrator, one must remember that the column is used in a dynamic state where the liquid containing the analytes is flowing over the resin at a finite rate. This reduces the capacity somewhat since the analyte ions have less time to interact with the resin surface.

Low concentrator column capacity creates the following practical implications:

- A. Trace analysis of an analyte is difficult in the presence of $\mu\text{g/L}$ concentrations of species which exhibit higher or similar affinities for the resin. If the dynamic column capacity is exceeded, high affinity ions will displace the analytes on the ion exchange sites and result in their elution to waste during the loading process.
- B. Conversely, qualitative analysis of ions with higher affinities for the resin in the presence of high concentrations of ions with low affinities is possible. Again, the key to successful analysis is that the ionic content of the high affinity ion to be quantitated may not exceed the effective column capacity.
- C. Do not dilute samples to be concentrated in eluent because the eluent ions elute the ions of interest.
- D. A plot of response versus concentration should be generated as in Figure 5, "Linearity of Lithium Concentrator Injection," for the determination of the maximum amount of sample or standard that can be quantitatively loaded. In Figure 4, "Linearity of Lithium Concentrator Injection," the break in the curve where linearity starts to change is at a concentration volume of 1 mL of 250 $\mu\text{g/L}$ lithium. For practical purposes the amount concentrated for a series of samples should be 75% of this value. This will ensure that there is a safety margin built into the concentration process in case a sample in a series of concentration experiments has a slightly higher ionic concentration.

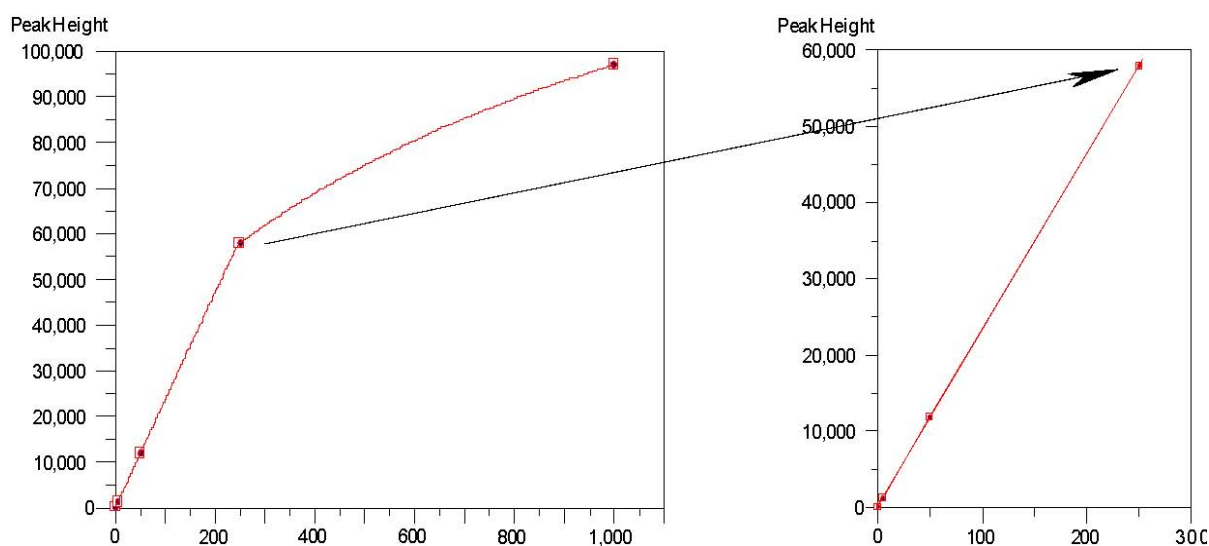


FIGURE 5
Linearity of Lithium Concentrator Injection

3.3.1.2. Determination of the Concentrator Column Breakthrough Volume

The breakthrough volume of an analyte ion is that volume of sample which causes an ion of interest to be eluted from, rather than retained or concentrated on, the concentrator column.

The breakthrough volume for a concentrator column is usually defined as the volume of sample necessary to elute the most weakly retained ions of interest in the sample. The more strongly retained ions in the sample, such as NH_4^+ , can elute the more weakly retained ions in the sample, such as Li^+ .

It is also possible for a high concentration of a weakly retained ion such as Li^+ to elute a more strongly retained ion present at low concentration. This can occur if one is attempting to concentrate trace ions in a concentrated matrix.

The breakthrough is dependent upon several factors.

- A. The volume of sample loaded.
- B. The rate at which the sample is loaded.
- C. The pH of the sample.
- D. The ionic strength of the sample.
- E. The amount and capacity of resin in the column.

The breakthrough volume is determined as follows.

- A. Prepare 1 L of a solution that closely simulates the type of sample to be analyzed. For example, if the sample contains high levels of NH_4^+ , the simulated sample should also contain NH_4^+ . The ammonium ion will act as an eluent (E2).
- B. Prepare a 1 mg/L standard of the first eluting ion of interest (e.g., Li^+).
- C. Set up the Ion Chromatograph, as shown in Figure 6, "Linearity Determinations for Concentrator Injection."
- D. Equilibrate the TCC-LP1, TCC-ULP1, or TCC-XLP1 with the eluent (E1) to be used in the analysis. Set the flow rate necessary to achieve a stable baseline and wash the column in this manner for at least 10 minutes.
- E. Switch to the simulated sample as an eluent (E2). Without delay, manually inject 50 μL of the 1 mg/L standard.
- F. Record the resulting chromatogram and calculate the breakthrough volume, as shown in Figure 7, "Typical Data Obtained in the Determination of the Breakthrough Volume."
- G. For practical purposes, the volume concentrated should be below 75% of the breakthrough volume.

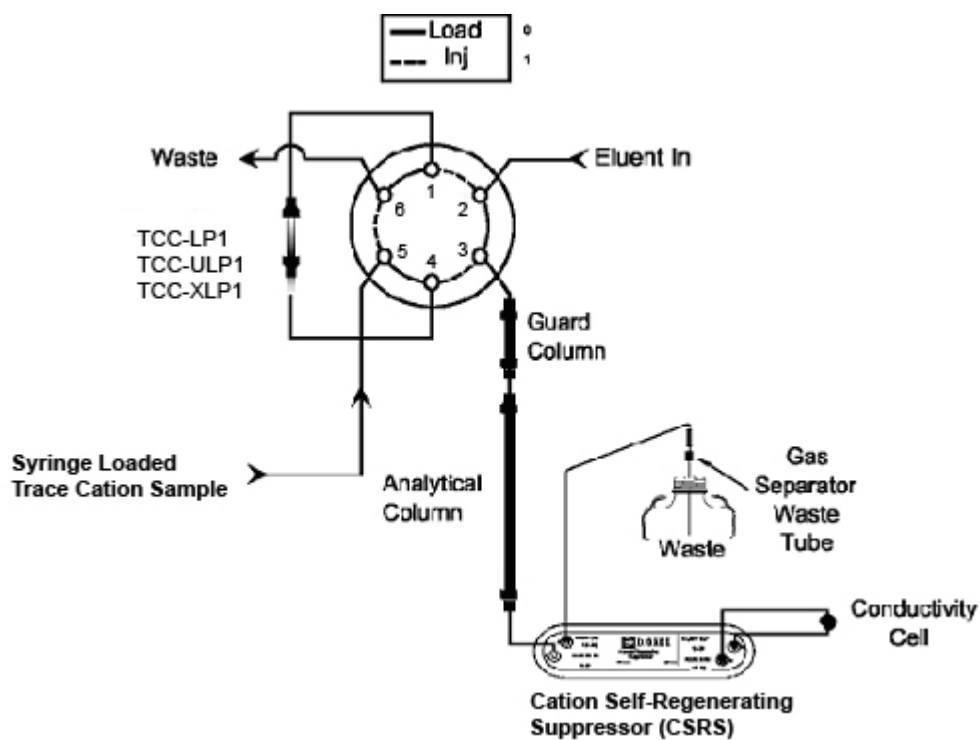
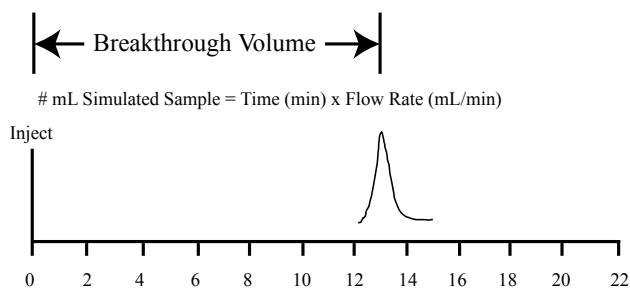


FIGURE 6
Linearity Determinations for Concentrator Injection



Time (min) that the simulated sample is pumped through the TCC-LP1, TCC-ULP1, or TCC-XLP1 after the single ion injection

FIGURE 7
Typical Data Obtained in the Determination of the Breakthrough Volume

SECTION 4 – EXAMPLE APPLICATIONS

4.1. Determination of the Common Inorganic Cations using the TCC-ULP1 Column

The following example demonstrates the use of the TCC-ULP1 for the determination of $\mu\text{g/L}$ -concentration of the common inorganic cations.

Sample Loop Volume:	See Chromatogram
Concentrator Column:	TCC-ULP1 5 x 23mm
Analytical Column:	IonPac CG12, CS12 4mm Analytical Column
Eluent:	25 mM Methanesulfonic acid
Eluent Flow Rate:	1.0 mL/min
Injection Volume:	1.0 mL
Temperature:	35 °C
SRS Suppressor:	Cation Self-Regenerating Suppressor, CSRS®-ULTRA AutoSuppression™ Recycle Mode

Peaks	$\mu\text{g/L}$ (ppb)
1. Lithium	4.6
2. Sodium	18.2
3. Ammonium	36.5
4. Potassium	18.2
5. Magnesium	18.2
6. Calcium	91.2

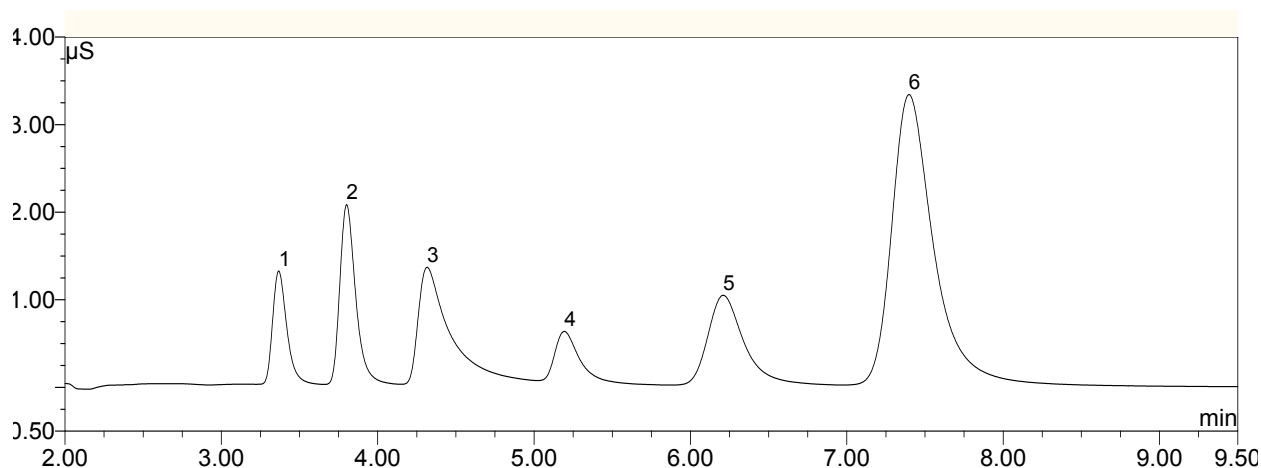


FIGURE 8
Common Inorganic Cations

4.2. Concentration in the Manual Mode

The following example demonstrates the advantages of sample concentration with low sensitivity detection versus direct injection with high sensitivity detection.

Sample Loop Volume:	See Chromatogram
Concentrator Column:	TCC-LP1 4 x 35mm
Analytical Column:	IonPac CS14 Analytical Column
Eluent:	10 mM Methanesulfonic acid
Eluent Flow Rate:	1.0 mL/min
Injection Volume:	1.0 mL
SRS Suppressor:	Cation Self-Regenerating Suppressor, CSRS®-ULTRA AutoSuppression™ Recycle Mode
or AES Suppressor	Cation Atlas® Electrolytic Suppressor, CAES
or MMS Suppressor	Cation MicroMembrane Suppressor, CMMS® III
MMS Regenerant:	100 mN TBAOH (Use Dionex Cation Regenerant Solution P/N 039602)
Expected Background Conductivity:	< 2 µS
Expected System Operating Back Pressure:	< 1,300 psi (8.96 MPa)

Peaks		µg/L (ppb)
1.	Lithium	0.5
2.	Sodium	2.0
3.	Ammonium	2.5
4.	Potassium	5.0
5.	Magnesium	2.5
6.	Calcium	5.0

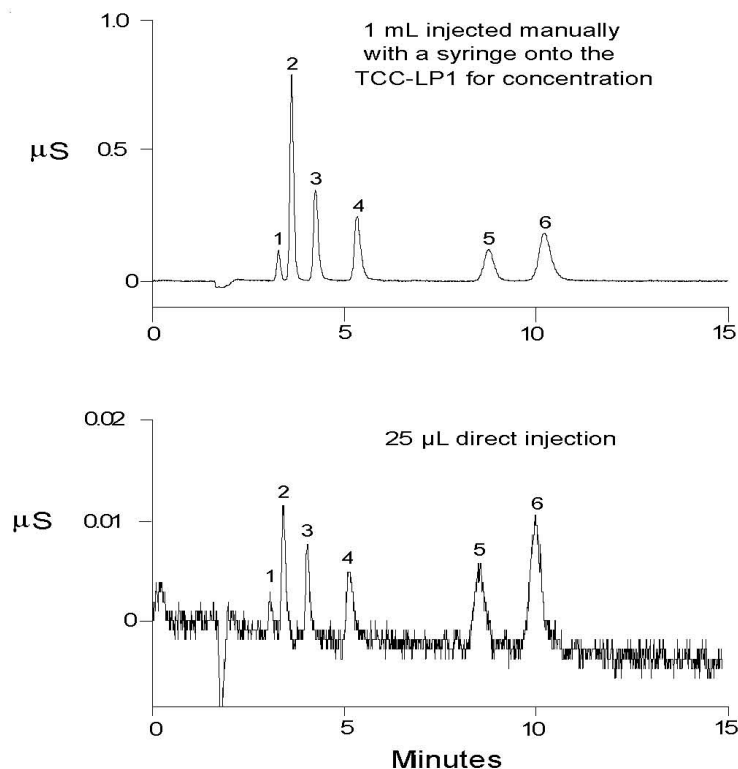


FIGURE 9
Manual Concentration versus Direct Injection

SECTION 5 – TROUBLESHOOTING GUIDE

The purpose of the Troubleshooting Guide is to help you solve operating problems that may arise while using the TCC-LP1, TCC-ULP1, and TCC-XLP1 columns. For more information on problems that originate with the Ion Chromatograph, refer to the Troubleshooting Guide in the appropriate operator's manual. If you cannot solve the problem on your own, call your nearest Dionex Regional Office (see, "Dionex Worldwide Offices" on the Dionex Reference Library CD-ROM).

5.1.High Backpressure from a Contaminated Inlet Bed Support

If the TCC-LP1, TCC-ULP1, or TCC-XLP1 column displays high backpressure, the bed support in the column inlet may be contaminated. A contaminated bed support may also lead to loss of peak asymmetry.



For proper operation in the SPI0 Auto Neutralizer, the TCC columns should generate no more than 70 psi of backpressure at a flow rate of 0.5 mL/min.



If any of the column packing becomes lodged between the end of the column and the bed support washer assembly, no amount of tightening will seal the column. Be sure that the washer and the end of the column are clean before screwing the end fitting back on to the column.

Follow the instructions below to change the bed support assembly using one of the two spare bed support assemblies included in the ship kit provided with the column.

- A. Disconnect the column from the system.
- B. Using two open-end wrenches, carefully unscrew the inlet (top) column end fitting.
- C. Turn the end fitting over and tap it against a bench top or other hard, flat surface to remove the bed support and seal assembly. If the bed support must be pried out of the end fitting, use a sharp pointed object such as a pair of tweezers, but be careful that you DO NOT SCRATCH THE WALLS OF THE END FITTING. Discard the old assembly.
- D. Place a new bed support assembly in the end fitting. Before assembling, clean the column body threads and the end fitting threads of any resin particles. If any resin remains on the threads of either the column body or the end fitting, the column may leak regardless of how tight the end fitting is turned onto the column body. Use the end of the column to carefully start the bed support assembly into the end fitting.
- E. Screw the end fitting back onto the column. Tighten it finger tight and then, using two open-end wrenches, tighten it an additional 1/4 turn (25 in x lb). Tighten further only if leaks are observed.
- F. Reconnect the column to the system and resume operation.

Column	TCC-LP1 (P/N)	TCC-ULP1 (P/N)	TCC-XLP1 (P/N)
Bed Support Assembly	042955	042955	063688
End Fitting (10-32 Ferrule Type)	052809	052809	048298

5.2. High Background, Noise, or Baseline Instability

Normally, problems such as high background, noise, or baseline instability will not be attributable to the TCC-LP1, TCC-ULP1, or TCC-XLP1 column. These problems usually originate in either the analytical column or the post-column detection chemistry. Before checking the TCC-LP1, TCC-ULP1, or TCC-XLP1 as the source of system background noise, consult the appropriate troubleshooting sections in the analytical column's Product Manual, the Ion Chromatograph Operator's Manual, and the detector manual.

If the source of the high background noise is isolated to the TCC-LP1, TCC-ULP1, or TCC-XLP1, then proceed with the following steps.

- A. Be sure that the TCC column is not leaking.
- B. Be sure that the eluents are correctly formulated.
- C. If you are using an Cation Micro Membrane Suppressor III (CMMS® III), be sure that the regenerant is formulated correctly.
- D. Be sure that the eluents are made from chemicals with the recommended purity (see Section 3, "Operation").
- E. Be sure that the deionized water used to prepare the reagents has a specific resistance of 18.2 megohm-cm.
- F. Be sure that the Cation Self-Regenerating Suppressor (CSRS® ULTRA II), the Cation Micro Membrane Suppressor (CMMS III), or the Cation Atlas® Electrolytic Suppressor (CAES) is suppressing correctly by bypassing the TCC column and making direct injections.

5.3. Poor Peak Shape

In some instances, poor peak shape in Ion Chromatography may be caused by a contaminated TCC column. To clean the TCC Column, see, "Column Cleanup of Polyvalent Cations and Acid-Soluble Contaminants" in the Column Care Appendix.

When pursuing pre-concentration with a pump, ensure that the pump has a pulse damper installed. Failure to dampen the pump pulsations may result in damage to the TCC columns.

Assistance is available for any problem during the shipment or operation of Dionex instrumentation, columns, and consumables through the Dionex North America Technical Call Center at 1-800-DIONEX-0 (1-800-346-6390) or through any of the Dionex Offices listed in "Dionex Worldwide Offices" on the Dionex Reference Library CD-ROM.

APPENDIX A

Column Care

A.1 Recommended Operating Pressures

Operating a column above its recommended pressure limit can cause irreversible loss of column performance. The maximum recommended operating pressure for the IonPac Low Pressure Trace Cation Concentrator Column (TCC-LP1) is 3,000 psi.

A.2 Column Start-up

The column is shipped with 2.5 mM methanesulfonic acid as the storage solution. Flush the column for 30 minutes with eluent before attempting to concentrate sample. Pump the effluent directly to a waste container while washing the column. DO NOT pump this effluent through the guard column, analytical column and/or the suppressor.

A.3 Column Storage

The TCC-LP1, TCC-ULP1, TCC-XLP1 columns should be stored in the acid form. Flush approximately 5 mL of any typical HCl or methanesulfonic acid eluent through the TCC-LP1, TCC-ULP1, and TCC-XLP1.

A.4 Column Cleanup of Polyvalent Cations and Acid-soluble Contaminants

- A. Prepare a 500 mL solution of 1 M HCl/0.1 M KCl.
- B. Disconnect the guard, analytical columns and the suppressor from the injection valve and the Conductivity Detector. Disconnect the Gradient Mixer or Cation Trap Column (CTC-1) from the gradient pump. Connect the TCC-LP1, TCC-ULP1, or TCC-XLP1 Column directly to the gradient pump. Direct the effluent from the TCC-LP1, TCC-ULP1, or TCC-XLP1 directly to a waste container.
- C. Set the flow rate to 1 mL/min.
- D. Pump the 1 M HCl/0.1 M KCl solution through the column for 15-30 minutes.
- E. Equilibrate the TCC-LP1, TCC-ULP1, or TCC-XLP1 with eluent for 15 minutes at 1 mL/min before resuming normal operation.
- F. Reconnect the cation guard, analytical column and the suppressor between the injection valve and the Conductivity Detector. Reconnect the Gradient Mixer or Cation Trap Column (CTC-1) between the gradient pump and the Injection Valve. Resume operation.

A.5 Column Cleanup Of Organic/Cationic Contaminants

- A. Prepare a 500 mL solution of 0.1 M HCl/80% acetonitrile.
- B. Disconnect the guard, analytical columns and the suppressor from the injection valve and the Conductivity Detector. Disconnect the Gradient Mixer or Cation Trap Column (CTC-1) from the gradient pump. Connect the TCC-LP1, TCC-ULP1, or TCC-XLP1 Column directly to the gradient pump. Direct the effluent from the TCC-LP1, TCC-ULP1, or TCC-XLP1 directly to a waste container.
- C. Set the flow rate to 1 mL/min.
- D. Pump the 0.1 M HCl/80% acetonitrile solution through the column for 15–30 minutes.
- E. Equilibrate the TCC-LP1, TCC-ULP1, or TCC-XLP1 with eluent for 15 minutes at 1 mL/min before resuming normal operation.
- F. Reconnect the cation guard, analytical column and the suppressor between the injection valve and the Conductivity Detector. Reconnect the Gradient Mixer or Cation Trap Column (CTC-1) between the gradient pump and the Injection Valve. Resume operation.