PRODUCT MANUAL

METPAC® CC-1 CONCENTRATOR COLUMN

(CC-1 (2 Pack), P/N 042156)

QUICKSTART STEPS AND LINKS
Click blue text below to get started.

1. See Section 2, "Operation" for chemical requirements and concentration methods.

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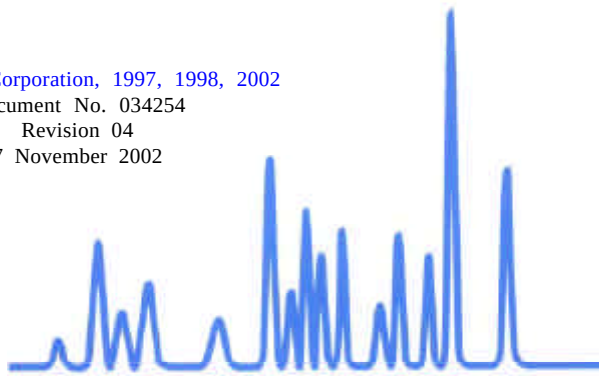

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SECTION 1 - INTRODUCTION

The MetPac CC-1 Concentrator Column is used in Chelation Ion Chromatography and in the Ion Chromatography/Inductively Coupled Plasma (IC/ICP) interface. This manual describes the operation of the MetPac CC-1. The following DIONEX Technical Notes describe important applications which require the MetPac CC-1.

Technical Note #	Description
25	Determination of Transition Metals in Complex Matrices by Chelation Ion Chromatography™
27	Determination of Lanthanide Metals in Digested Rock Samples by Chelation Ion Chromatography
28	Ion Chromatography/Inductively Coupled Argon Plasma (IC/ICP): A New Technique for Trace Metal Determinations

The MetPac CC-1 is packed with a 17 µm macroporous vinylbenzyl/divinylbenzene copolymer which is covalently bonded with iminodiacetic acid functional groups. The capacity of the MetPac CC-1 is 0.4 µeq/column. The physical rigidity of this chelating resin allows the MetPac CC-1 to be used at pressures up to 1,500 psi. The MetPac CC-1 can be readily converted between the acid and the salt form without significant changes in the operating pressure. The recommended maximum flow rate is 4.0 mL/min.

The MetPac CC-1 is specially designed for the concentration of transition and lanthanide elements. The column has very high selectivity for transition and lanthanide elements relative to the alkali and alkaline-earth metals. This selectivity permits trace transition and lanthanide elements to be concentrated from sample matrices which have high concentrations of alkali, alkaline-earth metals, acids or bases. The MetPac CC-1 can be used for a variety of matrices including natural waters, seawaters, salts, acids, bases and acid digested biological and geological materials. The metals which are quantitatively retained by the MetPac CC-1 are given in Table 1, “Retention Characteristics of the MetPac CC-1 Concentrator Column.”

Table 1

Retention Characteristics of the MetPac CC-1 Concentrator Column

Metal Ion	Quantitative	Metal Ion	Quantitative
Ti (IV)	YES	Cd (II)	YES
V (IV,V)	YES	In (III)	YES
Cr (III)	NO	Y (III)	YES
Mn (II)	YES	Lanthanides	YES
Fe (II,III)	YES	Hg (II)	YES
Co (II)	YES	Pb (II)	YES
Ni (II)	YES	Al (III)	YES
Cu (II)	YES	Tl (I,III)	NO
Zn (II)	YES	AS (III,V)	NO
Ag (I)	YES	Se (IV,VI)	NO

SECTION 2 - OPERATION

2.1 Chemicals Required

The chemicals and water required to prepare the reagents and eluents should be of the highest purity available. Use deionized water with a specific resistance of 18.2 megohm-cm. Prepared reagents can be purchased from DIONEX. See Technical Note No. 25, 27 or 28 for reagent ordering information and preparation procedures.

2.2 Solutions Required

Table 2

Chelation Concentration Reagents

	1 liter	6 Pack
2 M Nitric Acid	P/N 033442	P/N 033443
2 M Ammonium Acetate	P/N 033440	P/N 033441
0.1 M Ammonium Nitrate	P/N 033444	P/N 033445 (for CIC only)

2.3 Concentration Methods

The MetPac CC-1 Concentrator Column will concentrate lanthanide metals and most cationic transition metals from a variety of sample matrices (see Table 1, "Retention Characteristics of the MetPac CC-1 Concentrator Column").

The optimum selectivity is obtained at a pH between 5.2 and 5.6. Thus the sample pH must be adjusted, preferably with a buffer before concentration. This is readily accomplished by adding 2 M ammonium acetate, pH 5.4 to the sample matrix. Use DIONEX 2 M ammonium acetate (pH 5.4 $\pm$ 0.1) Chelation Concentration Reagent (P/N 033440 or 033441) for the most reliable results.

NOTE
The MetPac CC-1 Concentrator Column will not concentrate metals from samples below pH 3.

The concentrated alkali and alkaline-earth metals can be selectively eluted from the MetPac CC-1 using 6-10 mL of 2.0 M ammonium acetate, pH 5.4. Under these conditions, the transition metals are retained on the column.

To elute the concentrated transition metals for analysis by Chelation Ion Chromatography, use at least 4-6 mL of 0.55 M nitric acid. For the elution of transition metals in the IC/ICP technique, use about 4-8 mL of 1.5 nitric acid. If the mass of metals loaded on the MetPac CC-1 is above 50 µg, higher nitric acid concentrations may be required to completely elute the more strongly held metal ions such as Fe(III). Use 10 mL of 1.5 M nitric acid to completely regenerate the column. The concentrated transition metals can be eluted from the concentrator column using nitric acid. Use DIONEX 2.0 M Nitric Acid Chelation Concentration Reagent (P/N 033442 or 033443) for the most reliable results.

CAUTION
Samples containing concentrations of Cr(III) above 10 mg/mL will poison the column since Cr(III) cannot be readily eluted.

SECTION 3 - TROUBLESHOOTING GUIDE

The purpose of the Troubleshooting Guide is to help you solve operating problems that may arise while using the MetPac CC-1 Concentrator Column. For more information on problems that originate with the Sample Concentration Module or the Ion Chromatograph, refer to the Troubleshooting Guide in the appropriate operator's manual. If you cannot solve the problem on your own, call the nearest DIONEX Office (see, "DIONEX Worldwide Offices").

3.1 High Back Pressure from a Contaminated Inlet Bed Support

If the MetPac CC-1 displays high back pressure, the bed support in the column inlet may be contaminated. 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. Carefully unscrew the inlet (top) column end fitting using two open-end wrenches.

C. Remove the old bed support. Turn the end fitting over and tap it against a benchtop 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. Use the end of the column to carefully start the bed support assembly into the end fitting.

Bed Support Assembly	P/N 042310
Seal Washer	P/N 039835
Bed Support	P/N 041375
End Fitting	P/N 041353

E. Screw the end fitting back onto the column. Tighten it fingertight 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.

NOTE

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. Make sure that the washer and the end of the column are clean before screwing the end fitting back onto the column.

F. Reconnect the column to the system and resume operation.

3.2 High Background, or Noise

Normally, problems such as high background, noise or baseline instability will not be attributable to the MetPac CC-1. These problems usually originate in either the analytical column or the post-column detection chemistry. Before checking the MetPac CC-1 as the source of system background noise, consult the appropriate troubleshooting sections in the analytical column Product Manual, the Ion Chromatograph Operator's Manual and the detector manual.

If the source of the high background noise is isolated to the MetPac CC-1 , then proceed with the following steps:

A. Make sure that the eluents and regenerant are correctly formulated.

B. Make sure that the eluents are made from chemicals with the recommended purity (see Section 2, "Operation").

C. Make sure that deionized water used to prepare the reagents has a specific resistance of 18.2 megohm-cm.

3.3 Poor Peak Shape

In some instances, poor peak shape in Chelation IC may be caused by a contaminated TMC-1. To clean the TMC-1, wash with 2.0 M HNO_3 for 10 minutes at 3.0 mL/min. Following the HNO_3 wash, rinse the column with deionized water for 3 min at 3.0 mL/min. Replace the cleaned column in the Chelation IC System and run through the Chelation IC program once before doing an analytical run.