

# PRODUCT MANUAL

## for the

# Continuously Regenerated Trap Column (CR-TC)

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# PRODUCT MANUAL

## for the

# Continuously Regenerated Trap Column (CR-TC)

CR-ATC, P/N 060477
CR-CTC II, P/N 066262
CR-ATC (Capillary), P/N 072078
CR-CTC (Capillary), P/N 072079

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# SECTION 1 – INTRODUCTION

The CR-TC is a high-pressure electrolytically regenerated trap column designed for use with Eluent Generator Devices. The CR-TC can operate long-term without the need for frequent chemical regeneration. The device, when plumbed after the Eluent Generator, removes all anionic or cationic contaminants in the eluent or water continuously and provides low drift during gradient operations. The CR-TC is available in formats for anion or cation applications using analytical or capillary scales, as shown below.

| | |
|---|---|
| CR-ATC | Continuously Regenerated Anion Trap Column, P/N 060477 |
| CR-CTC II | Continuously Regenerated Cation Trap Column, P/N 066262 |
| CR-ATC (Capillary) | Continuously Regenerated Anion Trap Column (Capillary), P/N 072078 |
| CR-CTC (Capillary) | Continuously Regenerated Cation Trap Column, (Capillary) P/N 072079 |

A single format CR-TC is used for 2-mm, 3-mm, 4-mm and 5-mm ID columns.

## 1.1. CR-ATC Trap Column Theory

The CR-ATC consists of an anion exchange bed with a cathode at the eluent outlet as illustrated in Figure 1. An anion exchange membrane interface separates the anode from the eluent pathway. Anionic impurities from the basic eluent are retarded by the anion exchange bed and are driven towards the anode. The anions are swept through the anion exchange membrane as illustrated in Figure 1. The hydroxide generated at the cathode continuously regenerates the anion exchange bed while the hydronium ions generated at the anode combine with the removed anionic contaminants to form acids. The base eluent solution coming out of the CR-ATC device is thus free of anionic impurities.

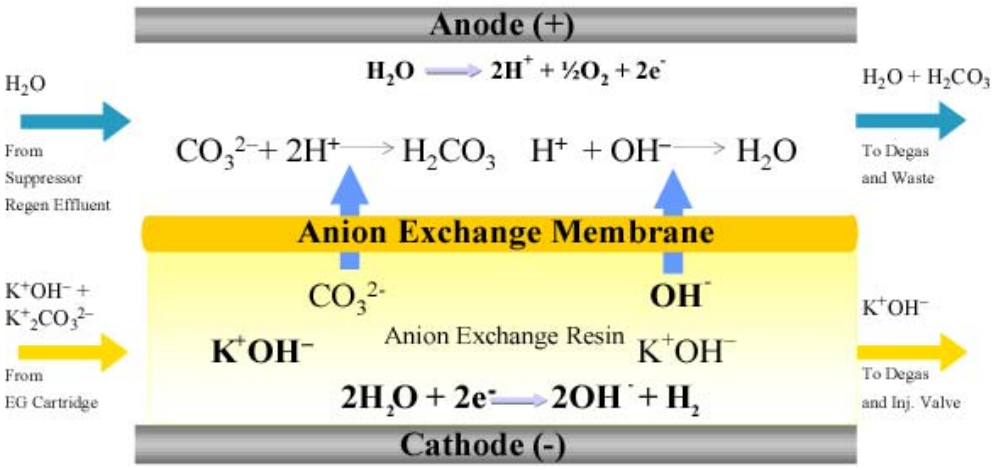



**Figure 1**
**Operational Schematic for CR-ATC Continuously Regenerated Anion Trap Column**

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## 1.2. CR-CTC II and CR-CTC (Capillary) Trap Column Theory

The CR-CTC II consists of a carboxylate based cation exchange bed with an anode at the eluent outlet as illustrated in Figure 2. The CR-CTC (Capillary) uses a sulfonate based cation exchange bed. A cation exchange membrane interface separates the cathode from the eluent pathway. Cationic impurities from the acidic eluent are retarded by the cation exchange bed and are driven towards the cathode. The cations are swept through the cation exchange membrane toward the cathode. The hydronium ions generated at the anode continuously regenerate the cation exchange bed while the hydroxide ions generated at the cathode combine with the removed cationic contaminants to form bases. The acid eluent solution coming out of the CR-CTC device is thus free of cationic impurities.

The CR-CTC II can also be used for sample preparation for anion applications by removing cation matrix ions, for example remove lithium from borated waters. Since the CR-CTC II consists of a carboxylate based cation exchange bed, the sulfate blanks are eliminated thus allowing excellent quantitations of sulfate. The CR-CTC (Capillary) should not be used for sample preparation.

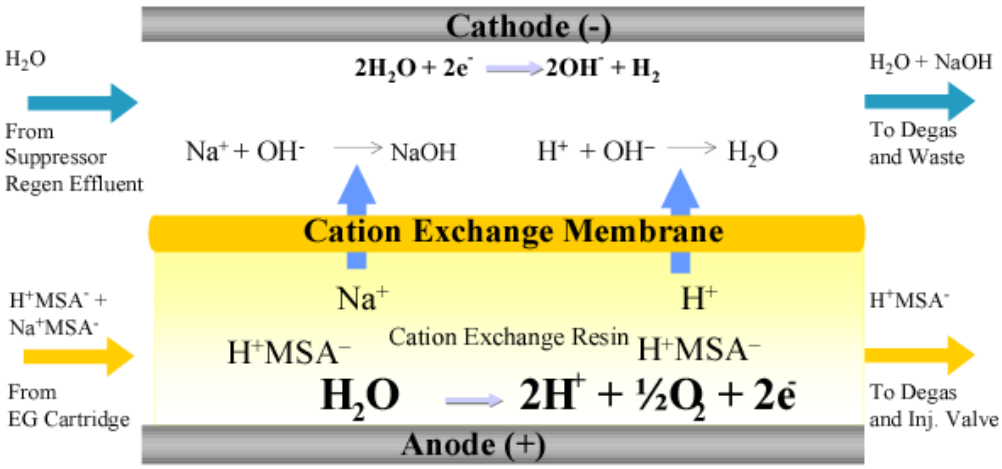



**Figure 2**
**Operational Schematic for CR-CTC II and CR-CTC (Capillary) Continuously Regerated Cation Trap Columns**

**WARNING**

***Do not use the P/N 060478 (CR-CTC) or P/N 072079 (CR-CTC, Capillary) for sample preparation applications.***

**Always remember that assistance is available for any problem that may be encountered during the shipment or operation of DIONEX instrumentation 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 Reference Library CD-ROM.**

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# SECTION 2 – EQUIPMENT REQUIREMENTS AND SETTINGS

A dedicated power controller is used to power the CR-TC unit. All EG modules with the exception of the EG40 are shipped with built in CR-TC control. The EG40 module requires a stand alone power controller supplied in the EG40 CR-TC Add-on Kit (P/N 060476).

## 2.1. Power Connections

### 2.1.1. All EG modules except EG40

For all EG modules, except the EG40, current to the CR-TC is provided when the CR-TC power is turned on. No TTL or relay control is needed. For operational instructions, refer to the EG module Operator's Manual.

### 2.1.2. EG40

For the EG40, the external A/C power needs to be connected to the universal power supply adapter unit using a suitable power cord. Upon connecting the A/C power, the power adapter unit will have the green LED ON. Connect the 24 V DC power output line from the power adapter to the CR-TC controller. See the EG40 CR-TC Add-on Kit Manual (Document No. 031921) for installation details.

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# SECTION 3 – CR-TC INSTALLATION

## 3.1. System Flow Diagram of Eluent Generator with CR-TC

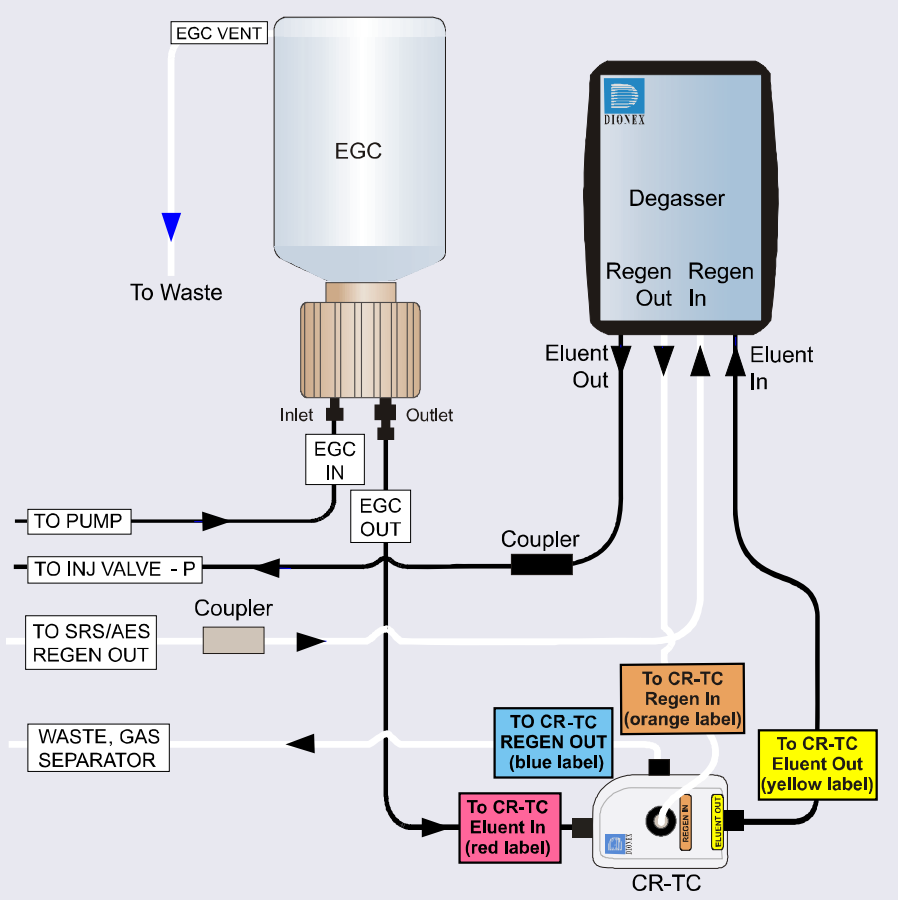



**Figure 3**
**System Flow Diagram of Eluent Generator with CR-TC**

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## 3.2. System Flow Diagram of Eluent Generator with CR-TC (Capillary)

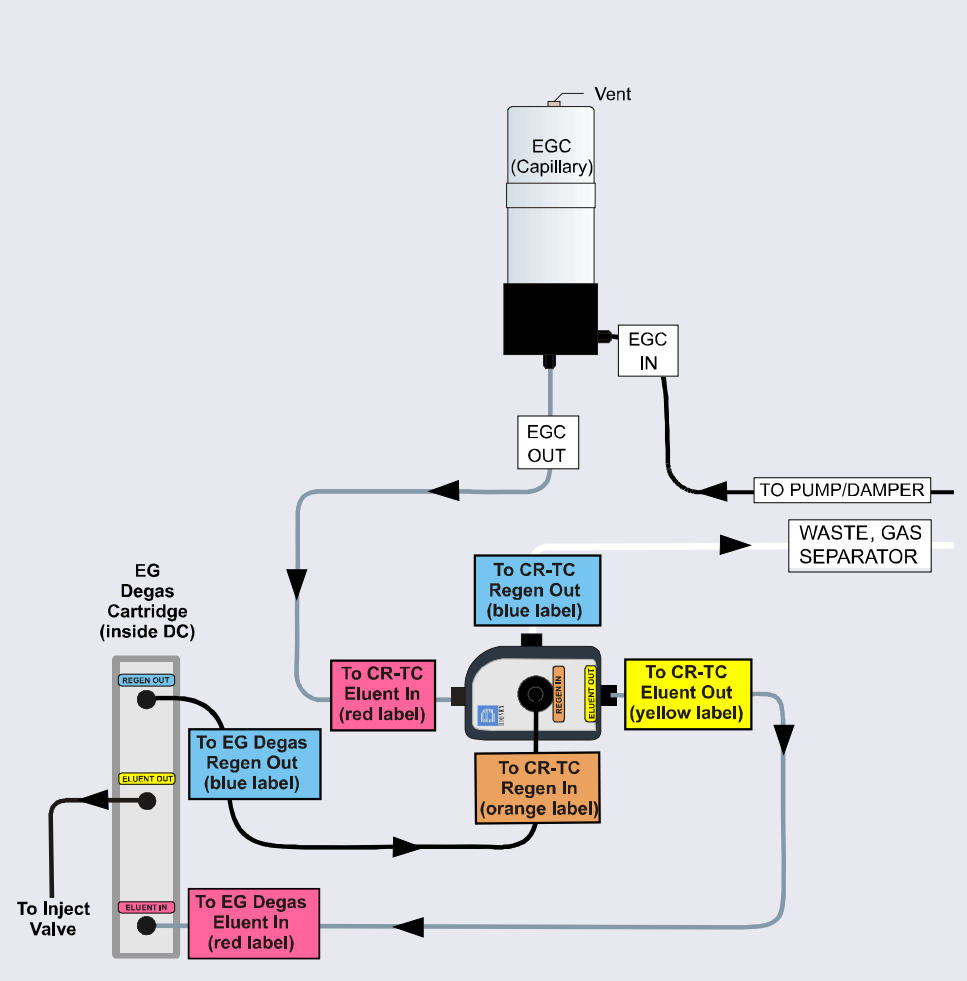



**Figure 4**
**System Flow Diagram of Eluent Generator with CR-TC**

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## 3.3. Plumbing the CR-TC

**EG40, EG50, ICS-3000 or ICS-5000 Plumbing:**

1. The Flow Diagram for an IC system using an Eluent Generator and a CR-TC Trap Column is shown above in Figure 3 and Figure 4. The CR-TC connections for a system using an EG40 with EG40 CR-TC Add-on- Kit are outlined in Figure 5. The required tubing to install the CR-TC is provided in the EG50, ICS-3000 or ICS-5000 Ship Kit or the EG40 CR-TC Add-on Kit (P/N 060476).
2. Match the colored tubing labels with the colored port labels on the CR-TC. All fittings should be finger tight plus 1/4 turn.

**RFC-30, ICS-2000 or ICS-2100 Plumbing:**

1. The RFC-30, ICS-2000 and ICS-2100 are shipped with tubing installed for the CR-TC connections. Connect the CR-TC as outlined in Figure 6. Match the colors of the tubing labels with the colored port labels on the CR-TC.

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**NOTE**

***We recommend that the CR-TC be installed after the EGC cartridge; however, the CR-TC may also be installed in front of the Eluent Generator for purifying the DI water stream.***

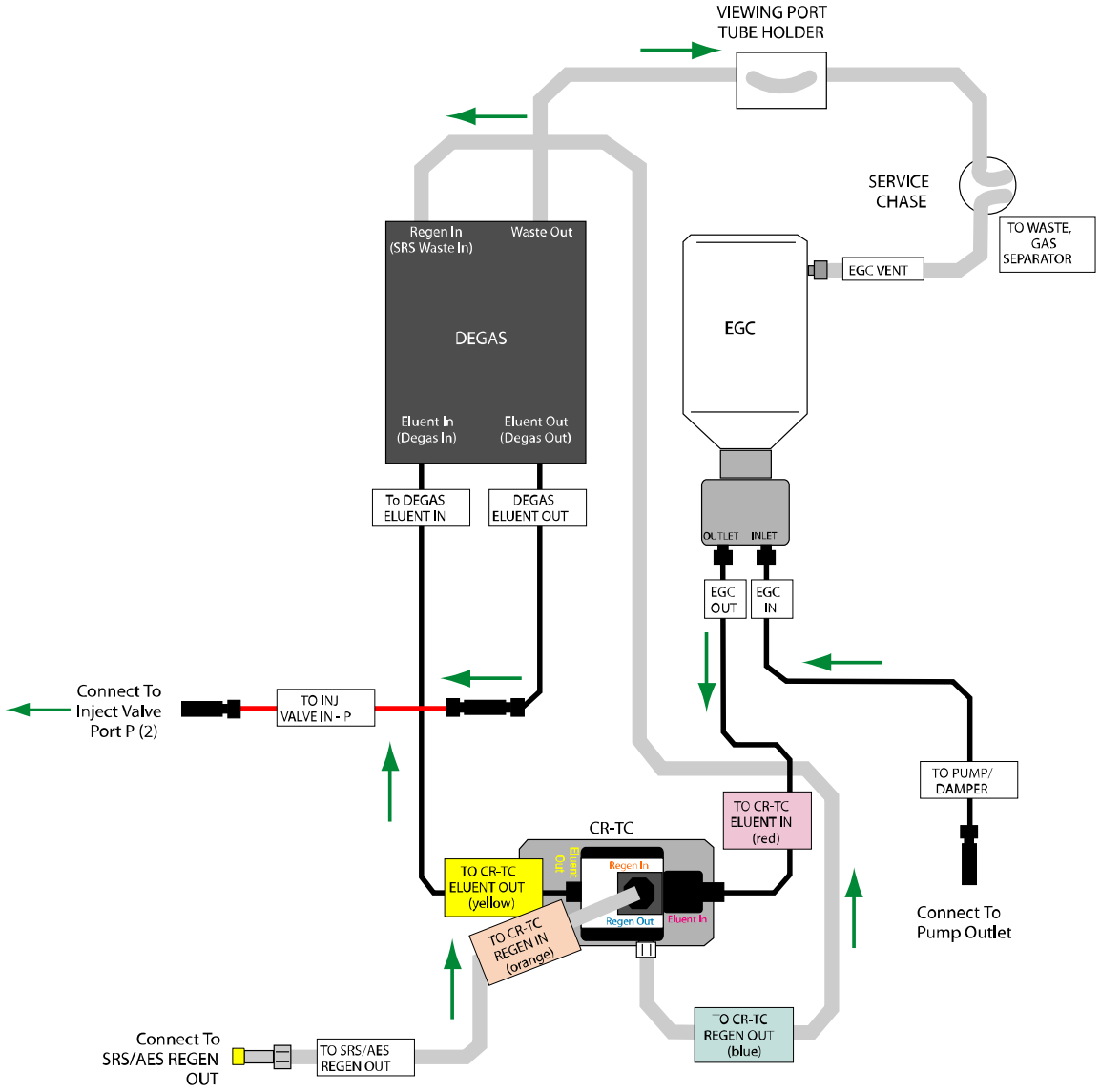



**Figure 5**
**Flow Diagram of the EG40, EG50, ICS-3000 or ICS-5000 with CR-TC**

**NOTE**

***Please note the labels indicated on the Degas Module. The connector labels for older EG40 Degas Assemblies are indicated in parenthesis, for example (DEGAS IN), (DEGAS OUT) and (SRS WASTE IN).***

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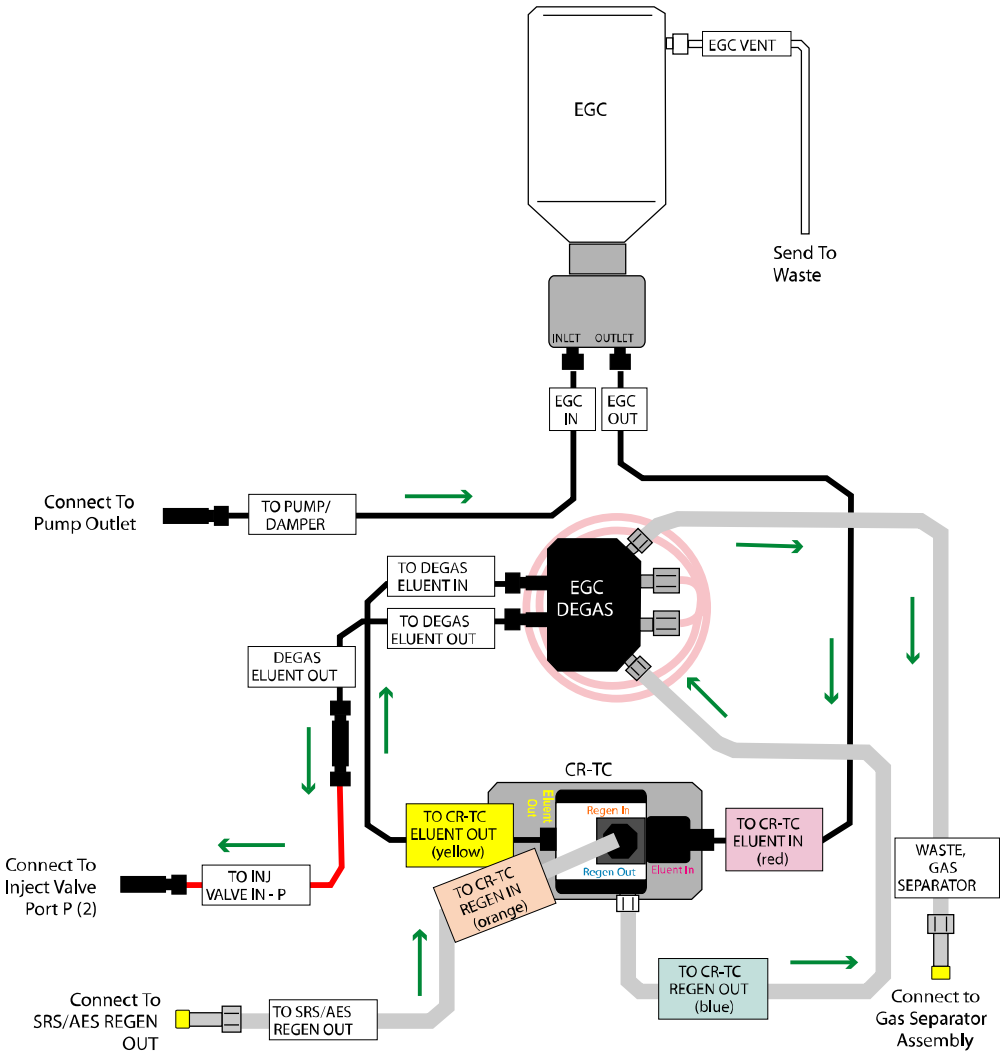



**Figure 6**
**Flow Diagram of RFC-30 with CR-TC**

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## 3.4. Plumbing the CR-TC Trap Column

Follow sections 3.3, 3.4 and 3.5 to install the CR-TC. The CR-TC has color-coded labels to direct you in the installation of the CR-TC in the Eluent Generator modules. All fittings should be finger tight plus 1/4 turn.

A. The CR-TC is installed between the EGC cartridge and the Degas Module as shown in Figures 3 through 6. Ensure that the Eluent Generator is properly installed on the system. If the Eluent Generator is not installed, follow the Eluent Generator installation instructions listed in the EG Module's Product Manual.

B. To begin installation of the CR-TC tubing:
   1. Turn off the pump and the suppressor (SRS/AES/ICES) before making any connections.
   2. If present, disconnect all trap columns (ATC or CTC) installed between the Eluent Generator and the Degas Assembly and all trap columns (ATC or CTC) installed between the pump and the Eluent Generator module.
   3. Remove the plugs in the CR-TC ports. Note: Do not loosen or remove the fittings with the electrical connections (fittings with wires attached).

C. Identify the tubing with the red label in the ship kit and connect the white label end marked **EGC OUT** to the outlet port of the EGC cartridge. The red label end of the tubing should be connected to the **Eluent In** port of the CR-TC.

D. Connect the tubing with the Orange label to the CR-TC **Regen In** port.

E. Connect the tubing with the Blue label to the CR-TC **Regen Out** port.

F. Connect the tubing with the Yellow label to the CR-TC **Eluent Out** port.

G. The CR-TC is now ready for the hydration step.

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## 3.5. Hydrating the CR-TC Trap Column

The CR-TC should be hydrated prior to operation, at first installation, or after long-term storage. This process ensures that the CR-TC resin and membranes are fully hydrated and ready for operation

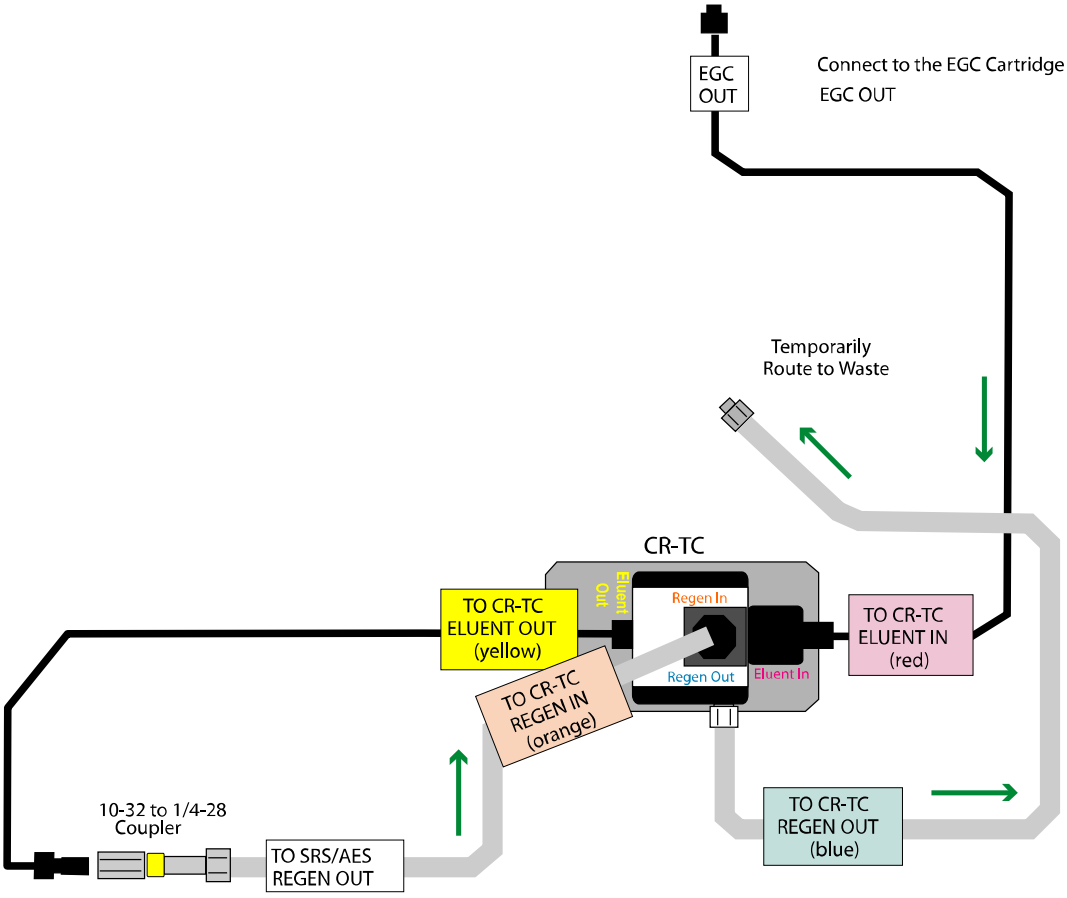



**Figure 7**
**CR-TC Plumbing Diagram for Hydration of CR-TC Trap Column**

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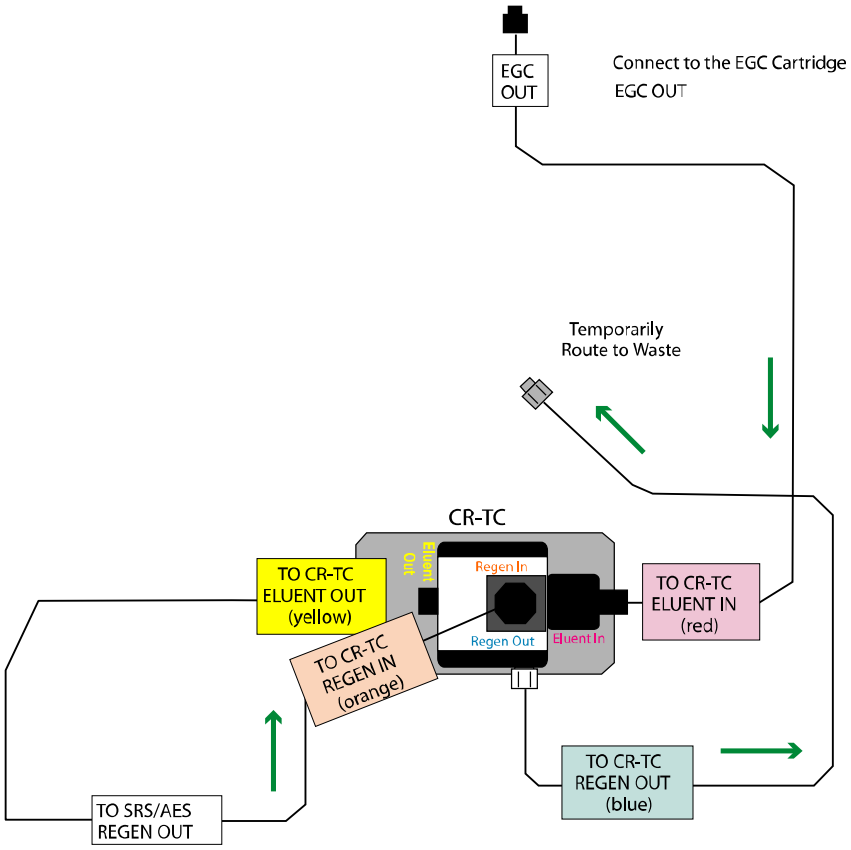



**Figure 8**
**CR-TC (Capillary) Plumbing Diagram for Hydration of CR-TC (Capillary) Trap Column**

A. For the EG40 with EG40 Add-on-Kit use a 10/32 to 1/4-28 coupler (P/N 042806) supplied with the EG40 Add-on Kit to temporarily connect the tubing between the CR-TC **Outlet** port and the CR-TC **Regen In** port. The line from the **Regen Out** port of the CR-TC should be diverted to waste. See Figure 8 above.

B. For all other modules except ICS-5000 with IC Cube, temporarily disconnect the **ELUENT OUT** line out of the Degas Assembly at the end labeled **TO INJECTION VALVE IN-P** and connect this end to a 10-32 to 1/4-28 coupler (P/N 042806). Connect the free end of the tubing labeled **TO SRS/AES REGEN OUT** to the 1/4-28 end of the coupler. The line labeled **TO WASTE OUT** should be diverted to waste.

C. For the ICS-5000 with IC Cube, temporarily disconnect the **ELUENT OUT** line of the Degas Assembly at the end labeled **TO INJ VALVE IN-P** and connect this end to a 10-32 coupler. Connect the end of the tubing labeled **TO DEGAS REGEN OUT** to the 10-32 coupler.

D. After the above hydration step, disconnect the coupler and complete the CR-TC installation by following the steps in Section 5. For EG50 and RFC-30 modules, ensure that the tubing labeled **TO INJECTION VALVE IN-P** is connected to the injection valve. An optional restrictor tubing may be inserted before the injection valve.

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## 3.6. Connecting the CR-TC Trap Column for Operation

A. Verify that the tubing with the Red label **(TO CR-TC ELUENT IN)** is connected to the **Eluent In** port of the CR-TC. See Figure 9. Verify that the other end of this tubing with the White label **(EGC OUT)** is connected to the **OUTLET** port of the EGC Cartridge.

B. Verify that the tubing with the Yellow label **(TO CR-TC ELUENT OUT**) is connected to the CR-TC **Eluent Out** port. See Figure 9.

**NOTE** ***For the EG40, connect the other end of this tubing with the White label (TO DEGAS ELUENT IN) to the ELUENT IN port on the EG40 Degas Assembly. This port may be labeled DEGAS IN on older EG40 Degas Assemblies. For the RFC-30 and EG50 modules, this connection to the Degas Assembly is already made.***

C. Verify that the tubing with the Orange label **(TO CR-TC REGEN-IN)** is connected to the CR-TC **Regen In** port. See Figure 9. Connect the other end of this tubing with the White label **(TO SRS/AES, REGEN OUT)** to the SRS or AES **REGEN OUT** port.

D. Verify that the tubing with the Blue label **(TO CR-TC REGEN-OUT)** is connected to the CR-TC **Regen Out** port. See Figure 9.

**NOTE** ***For the EG40, connect the other end of this tubing with the White label (TO DEGAS REGEN IN) to the REGEN IN port of the Degas Assembly. This port may be labeled SRS WASTE IN on older EG40 Degas Assemblies. For the RFC-30 and the EG50 modules, this connection to the Degas Assembly is already made.***

E. Connect the line **TO WASTE** to a Gas Separator Waste Tube and then divert it to waste.

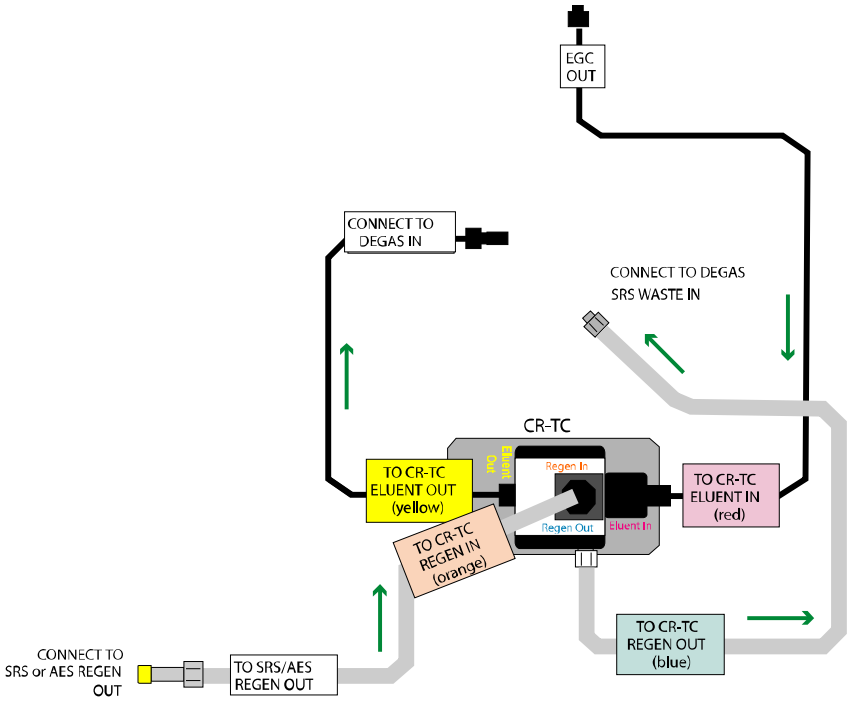



**Figure 9**
**Connecting the CR-TC Trap Column for Operation**

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# SECTION 4 – OPERATION

## 4.1. Sample Preparation Application- CR-CTC II

A. The CR-CTC II in addition to be useful for removing cationic impurities from eluent stream during cation analysis, was also designed to remove cations from sample streams during anion analysis such as from borated waters in the nuclear power industry.

B. In most Pressurized Water Reactor's (PWR's) the primary coolant water contains matrix components that are predominantly borate and lithium ions and analysis of trace anions such as fluoride, chloride and sulfate is usually pursued at trace levels. Depending on the level of borate ions the analysis is pursued either using EGC generated hydroxide eluents or with EGC generated borate eluents (refer to Application Note 166). Typically when the level of borate ion in the sample matrix is high, borate eluents are preferred.

C. When lithium is present in the above matrix, Lithium borate being fully dissociated acts like an eluent eluting off trace components off the concentrator column leading to poor recovery for weakly held species such as fluoride. The CR-CTC II was designed for the above application to remove cations from the sample streams while converting the sample matrix ions (borate) to a weakly dissociated species (boric acid). Being weakly dissociated the boric acid does not act like an eluent and complete recovery is achieved with the CR-CTC II installed. The advantage of a carboxylated resin based CR-CTC II over a sulfonated resin based CR-CTC is that there is no issue with sulfate leachables from the trap column leading to improved quantitation of sulfate.

D. The advantage of using the CR-CTC II as a sample polisher is that the trap column is continuously electrolytically regenerated and does not require frequent offline regeneration as polisher columns or standard trap columns would.

E. An example setup is shown in Figure 10, using an ICS 3000 two channel system. One channel in the ICS 3000 is used for sample preparation while the other channel is used for analysis. The pump in channel 1 is used for pumping a DI water stream or sample carrier stream. A CR-ATC trap column is used to remove any anionic contaminants in the DI water stream. An ATC-HC trap could be used in place of the CR-ATC trap column.

F. The purified DI water is then diverted into a 6 port valve which has a sample injection loop for the sample (located between 1 and 4). When loading the loop the autosampler (AS or AS-HV) loads the loop from port 5 to 4 to 1 to 6 to waste. During this time port 2 is connected to port 3 and the DI water flows through the CR-CTC II and is then diverted into the injection valve on the IC system and is then diverted back into the CR-TC regenerant ports and then diverted to waste. An EG degas module is used in the above plumbing to remove any electrolytic gases from the DI water stream.

G. During the injection step the DI water is diverted from port 2 to 1 and displaces the large sample loop (previously loaded) via port 4 and 3 and the sample slug is diverted into a CR-CTC which traps all cations including lithium, the lithium free sample stream containing all anions of interest is then diverted into a concentrator column in the injection valve in a standard IC system.

H. This setup eliminates the lithium hence there is no issue with recovery or peak shapes for the early eluting anions and good quantitation of all anions is expected. Since the CR-TC's are continuously regenerated there is no need for any regeneration steps. If there are metals in the sample stream a cleanup for the CR-CTC II trap column is recommended on a bi-weekly basis with 200 mN sulfuric acid followed by 200 mM oxalic acid and DI water as outlined in section 7.2.

I. In experimental setups that pump the sample stream directly into the concentrator column using a sample pump, the CR-CTC II is installed in the sample stream. The setup is similar to figure 10 except the anion trap column should be removed and the sample stream is directly pumped into the CR-CTC II. All other plumbing requirements are similar to what is shown in figure 10.

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Setup for Sample pretreatment and analysis for Borated Water Samples
using a CR-CTC II

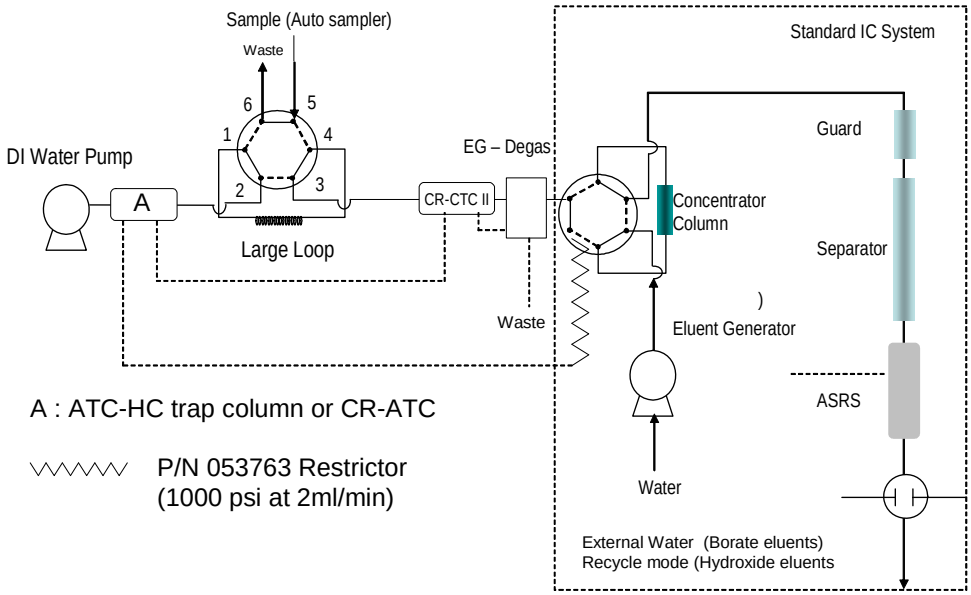



**Figure 10**
**ATC HC Trap Column or CR-ATC**

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## 4.2. Operational Precautions

A. The recommended maximum operating pressure for the CR-TC in conjunction with the Eluent Generator module is 3000 psi (21 MPa). This pressure limit protects the degas tubing assembly in the Eluent Generator from mechanical failure. For the CR-TC (Capillary) the maximum operating pressure is 5000 psi (34.5 MPa)

B. Due to the high backpressure, do not use solvents when operating the CR-ATC and Eluent Generator module with the following columns: the IonPac® AS11-HC or CarboPac™ PA10. Excessive backpressure may cause the degas tubing assembly in the Eluent Generator to rupture.

C. Solvents may be used if the flow rate is reduced to achieve a system backpressure of less than the recommended maximum operating pressure.

D. Due to the high column backpressure, do **not** operate the CR-ATC with the Eluent Generator module using any of the following columns: IonPac AS5A, IonPac AS10, OmniPac® PAX-100 or OmniPac PAX-500 unless the flow rate has been reduced to lower the system pressure to less than the recommended maximum operating pressure. Excessive backpressure may cause the degas tubing assembly in the Eluent Generator to rupture.

E. Do not operate the CR-ATC in conjunction with the EGC KOH cartridge with solvents other than methanol (maximum 25% methanol) for anion separations.

F. Solvents should **not** be used with the EGC MSA cartridge, CR-CTC Trap Column or CR-TC (Capillary) Trap Column.

G. To prevent the buildup of hydrogen and oxygen gases, install the CR-TC/Eluent Generator module in a well ventilated site.

H. Background and Drift:

1. A system functioning correctly with equilibrated consumables (pump/Eluent Generator/CR-TC/column/suppressor), the expected background for most Eluent Generator applications (up to 50 mM KOH) is < 1 µS/cm. For higher eluent strengths, the background may be slightly higher. Note the background may be higher at start-up with new consumables (EGC cartridge, suppressor, columns).
2. The expected baseline drift values using the EGC KOH cartridge and CR-ATC are shown below:

| | |
|---|---|
| AS11 standard gradient (0.5 - 38.3 mM KOH) | < 100 nS/cm per run |
| AS15 standard gradient (1- 50 mM KOH) | < 140 nS/cm per run |

3. The expected baseline drift values using the EGC MSA cartridge and CR-CTC are shown below:

| | |
|---|---|
| CS12A standard gradient (11 - 57 mM MSA) | < 100 nS/cm per run |
| CS17 standard gradient (1 - 50 mM MSA) | < 50 nS/cm per run |

I. Carbohydrate Applications:
The Eluent Generator with CR-ATC installed may be used for carbohydrate applications. See the EG Module manual for installation requirements for carbohydrate applications.

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# SECTION 5 – TROUBLESHOOTING

## 5.1. General Troubleshooting

### 5.1.1. LED Light is OFF on the CR-TC Controller on the EG Module

A. Ensure that the TTL connector is plugged in and is configured correctly. Refer to TTL control section in the EG40 CR-TC Add-on-Kit (Document No. 031921), RFC-30 Getting Started (Document No. 031895) and the Reagent-Free Controller Operator's Manual (Document No 031880).

B. Ensure that the CR-TC power-supply is ON and the pump is ON.

C. If (a) and (b) are true then the problem may be associated with the CR-TC Controller or with the Pump TTL output.

1. The pump TTL output can be checked with a voltmeter across the TTL pins. If the TTL is on, the voltage should be 0 V. If the TTL is switched off, the voltage should be 5.0 V.
2. If in the voltmeter test in Step 1 the TTL output is functional, then the CR-TC controller must be replaced.

## 5.2. Unstable Pressure or High Noise

Unstable pressure can cause high baseline drift and noise.

### 5.2.1. Unstable Pressure

A. Ensure that the pump is properly primed.

B. Disconnect the tubings to ensure that there are no trapped bubbles and reconnect the tubings.

C. Check the system pressure. If the total system pressure is < 2000 psi, add sufficient backpressure, preferably using 0.003" ID tubing between the degas assembly and the injection valve and ensure that the total system pressure is between 2000 – 3000 psi.

### 5.2.2. High Noise

A. Ensure that the system pressure is stable. If the system pressure is unstable refer to previous Section 6.2.1.

B. For analytical systems, if system pressure is stable and the total system pressure is < 2000 psi, add sufficient backpressure, preferably 0.003" ID tubing between the degas assembly and injection valve and ensure that the total system pressure is now between 2000 – 3000 psi. For capillary systems, ensure total system pressure is 1000-5000 psi.

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## 5.3. High Background and Drift

A. Check if the CR-TC unit is powered.

B. If the CR-TC was operated without any power and with eluent flowing, the capacity of the device is depleted. Under these conditions follow the cleanup procedure outlined in Section 5.

C. Check the backpressure to the SRS or AES suppressor and ensure that it is approximately 40 psi.

D. Check the system backpressure.

1. If the total system pressure has decreased to a lower value after installing the CR-TC, bypass the CR-TC eluent channel by coupling the **TO CR-TC ELUENT IN** (red) line to **TO CR-TC ELUENT OUT** (yellow) line and check the backpressure.

If the system pressure is higher (without the CR-TC) than before (with the CR-TC), this suggests that the CR-TC has an internal leak. Verify the pressure drop by reconnecting the CR-TC eluent channel. If the pressure is lower, the CR-TC must be replaced.

## 5.4. Leakage

A. Always operate analytical RFIC-EG systems with the system backpressure between 2000 – 3000 psi. Lower the backpressure if the system pressure exceeds 3000 psi. Check the pressure restrictor after the Degas module. Capillary RFIC-EG systems should be operated between 1000-5000 psi.

B. If leakage is observed at the **Regen In** and **Eluent Out** fittings where the electrodes are located, do not tighten the fittings. Replace the CR-TC unit.

C. If the tubing pops from a fitting during high pressure operation, the tubing may be deformed. The fitting should be removed. For analytical systems, cut new tubing using the tubing cutting tool (P/N 049584) and remake the fitting. Do not cut tubing on capillary systems; replace tubing with factory pre-cut tubing. All fittings should be finger tight plus 1/4 turn.

## 5.5. Lower System Pressure

A. If the total system pressure is changed to a lower value after the CR-TC was installed. Bypass the CR-TC eluent channel by coupling the **TO CR-TC ELUENT IN** (red) line to **TO CR-TC ELUENT OUT** (yellow) line and check the backpressure.

B. If the system pressure is lower (without the CR-TC) than before (with the CR-TC) examine individual components of the system (including pump and consumables) and ensure that they are working correctly.

C. If the system pressure is higher (without the CR-TC) than before (with the CR-TC), this suggests that the CR-TC has an internal leak. Verify the pressure drop by reconnecting the CR-TC eluent channel. If the total system pressure is lower then replace the CR-TC unit.

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## 5.6. High Pressure CR-TC (Eluent Channel)

If the CR-TC develops a pressure > 100 psi in the eluent channel, the column inlet bed support of the CR-TC may need to be replaced. To change the inlet bed support assembly, refer to the following instructions, using one of the two spare inlet bed support assemblies included in the Ship Kit. Be sure to filter DI water used for eluents before use to eliminate the DI water as a source of particulates.

A. Disconnect the CR-TC column from the system.

B. Using two open end wrenches, carefully unscrew the inlet (top) column fitting.

C. 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 bed support assembly.

D. Place a new bed support assembly into the end fitting. Make sure that the end of the column tube is clean and free of any particulate matter so that it will properly seal against the bed support assembly. Use the end of the column to carefully start the bed support assembly into the end fitting.

| **Product** | **(P/N)** |
|---|---|
| CR-ATC | 060477 |
| CR-CTC | 066262 |
| Bed Support Assembly | 042955 |
| End Fitting | 052809 |



**CAUTION** ***If the column tube end is not clean when inserted into the end fitting, particulate matter may obstruct a proper seal between the end of the column tube and the bed support assembly. If this is the case, additional tightening may not seal the column but instead damage the column tube or the end fitting.***

E. Screw the end fitting back onto the column. Tighten it fingertight, then an additional 1/4 turn (25 in x lb). Tighten an additional 1/4 turn further only if leaks are observed. If a leak still is observed, remove the end fitting and reclean the sealing surfaces.

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



**CAUTION** ***Do NOT replace the CR-TC outlet bed support in the CR-TC Eluent Out port.***

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## 5.7. High Pressure CR-TC (Regen Channel

If the CR-TC develops a pressure > 20 psi in the regen channel due to particulate matter, then

A. Fill a 5 mL syringe with DI water and push 5 mL of DI water into the CR-TC **Regen Out** port. If liquid flows out of the **Regen In** port, then the particle has been dislodged.

B. Reverse the flow by pushing 5 mL of DI water from the **Regen In** port to the **Regen Out** port.

C. If liquid does not flow out of the Regen ports in step A or B, the CR-TC Trap Column must be replaced.

## 5.8. Blockage Between Suppressor and CR-TC

If no gas stream is observed out of the SRS/AES suppressor when the CR-TC is installed and powered,

A. Check for leaks.

B. The CR-TC Regen flow may be blocked, troubleshoot following the steps in Section 5.7.

C. Check whether the EG Degas Assembly has developed high pressure in the **REGEN IN** (**SRS WASTE IN**) or **WASTE OUT** channel.

D. Check if the SRS/AES has developed high pressure in the regenerant channel. Refer to appropriate suppressor Product Manual.

**Always remember that assistance is available for any problem that may be encountered during the shipment or operation of DIONEX instrumentation 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.**

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# SECTION 6 – CLEAN-UP

## 6.1. CR-ATC Cleanup

The CR-ATC for normal day-to-day operation does not require a cleanup. However if the CR-ATC is exposed accidentally to high levels of anionic contaminants or is converted from the $OH^-$ form to other anionic forms such as carbonate then the device requires a cleanup using 2.0 M NaOH.

A. Disconnect all the lines to the CR-ATC.

B. Connect a line from the **Eluent In** port to the **Regen In** port on the CR-ATC. Direct the **Regen Out** port to waste.

C. Prepare a fresh solution of 2.0 M NaOH from a 50% w/w NaOH solution (available from Fisher Scientific Catalogue No. SS254) with at least the following purity specifications: iron < 5 ppm, Chloride < 0.005%; and sodium carbonate $\leq$ 0.1%.

D. Use the Trap Column / Suppressor Clean-up Kit (P/N 059659) to deliver 100 mL of 2.0 M NaOH solution through the **Eluent Out** port of the CR-ATC column, or 10 mL to a CR-ATC capillary column.

E. Rinse the CR-ATC unit with 10 mL (1.0 mL for CR-ATC Capillary) DI water before plumbing it back into the system.

## 6.2. CR-CTC Cleanup

The CR-CTC for normal day-to-day operation does not require a cleanup. However if the CR-CTC is exposed accidentally to high levels of cationic contaminants or is converted from the hydronium ion form to other cationic forms such as ammonium, then the device requires a cleanup using 1.0 M methanesulfonic acid (MSA).

A. Disconnect all the lines to the CR-CTC.

B. Connect a line from the **Eluent In** port to the **Regen In** port on the CR-CTC. Direct the **Regen Out** port to waste.

C. Prepare a fresh solution of 1.0 M MSA from a concentrated MSA solution.

D. Use the Trap Column / Suppressor Clean-up Kit (P/N 059659) to deliver 100 mL of 1.0 M MSA solution through the **Eluent Out** port of the CR-CTC column or 10 mL to a CR-CTC capillary column.

E. Rinse the CR-CTC unit with 10 mL (1.0 mL for CR-CTC Capillary) of DI water before plumbing it back into the system.

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# APPENDIX A - SPECIFICATIONS

| | |
|---|---|
| Dimensions: | (H x W x L) 5.1 cm x 5.5 cm x 8.4 cm (2.0 in x 2.15 in x 3.3 in) |
| Weight: | 50 g (0.13 lb.) |
| Current Output: | < 125 mA |
| Void Volume: | < 100 µL |

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