DIONEX

ICS-2100 Ion Chromatography System Installation Instructions

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DISCLAIMER OF WARRANTY AND LIMITED WARRANTY

TRADEMARKS

PRINTING HISTORY

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Contents

Installation

This document provides instructions for the initial installation of the ICS-2100 Ion Chromatography System

> **NOTE** **The order of the steps is important. It is especially important to install the Chromeleon® Chromatography Management System before connecting the USB cable and turning on the system power.**

1.   Facility Requirements

- Make sure the installation site meets the following environmental specifications:

  Main Power: 100 to 240 Vac, 50 to 60 Hz (Auto-sensing power supply; no manual voltage or frequency adjustment required)

  Operating Temperature: 4 to 40 °C (40 to 104 °F)

  Humidity: 5% to 95% relative humidity, noncondensing

- Provide a sturdy workbench for the system of a height that ensures convenient access to the interior of the ICS-2100.

- Allow at least 15 cm (6 in) behind the system for power connections and ventilation. For optimal performance, install the system in a draft-free location, out of the path of air conditioning and heating vents.

- (Optional) For pressurization of the eluent reservoir, provide a clean gas source regulated to between 0.55 and 0.83 MPa (80 and 120 psi). An air regulator accessory (P/N 060054) is required to regulate the pressure to between 0.03 and 0.04 MPa (5 and 6 psi).

⚠ **CAUTION**

Do not pressurize the eluent reservoir above 0.07 MPa (10 psi).

⚠ **MISE EN GARDE**

Ne mettez jamais les réservoirs d'éluants sous une pression supérieure à 0,07 MPa (10 lb/po²).

⚠️ **VORSICHT**

Setzen Sie den Eluentbehälter auf keinen Fall einem Druck über 0,07 MPa aus.

• Use ASTM filtered, Type I (18-megohm) deionized water when preparing eluent and regenerant.

2. Unpacking the IC System

1. Open the shipping box (see Figure 1) and remove the top layer of foam.
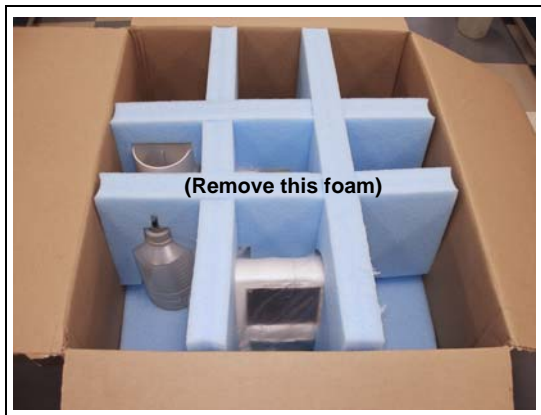
Figure 1. Unpacking the ICS-2100

2. Open the plastic bag that covers the IC system (see Figure 2).
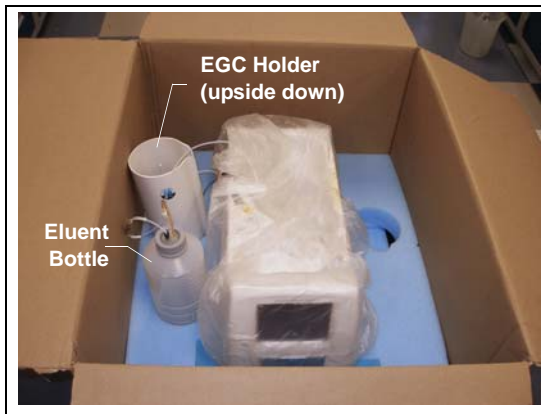
Figure 2. IC System Enclosed in Bag

3. Set the eluent bottle on top of the ICS-2100 (see Figure 3).

4. **TURN OVER THE EGC HOLDER,** and set it on top of the ICS-2100.

Figure 3. ICS-2100 After Installing Eluent Bottle and EGC Holder

5. Remove the next layer of foam and remove the Ship Kit (P/N 064375) (see Figure 4).

6. The bottom layer of foam has two cutouts on either side of the module; use these as handholds when lifting the IC system.

Figure 4. IC System with Ship Kit

7. Lift the IC system off the bottom layer of foam and out of the box. Set it on a workbench.

⚠ **CAUTION**

Two or more persons should lift the IC system, which weighs 30 kg (66 lb). Lift the IC system only from each side of the cabinet bottom. Lifting from the front door will damage the door hinges.

⚠ **MISE EN GARDE**

Au moins deux personnes peuvent soulever le chromatograph ionique: il pèse 30 kg (66 lb). Ne soulevez le chromatograph ionique que par chaque côté du fond de l'armoire. Son soulèvement par la porte du panneau avant endommagera les charnières de la porte.

⚠ **VORSICHT**

Das IC system wiegt über 30 kg. Daher sollte das Gerät nur von zwei oder mehr Personen angehoben werden. Greifen Sie dazu an beiden Seiten unter das Gerät. Heben Sie den Ionenchromatographen nicht an der Vordertür an, da dadurch die Türangeln beschädigt werden könnten.

8. Inspect the system for any shipping damage. Remember to save the shipping container and all packing material. You will need them in future if the IC system is shipped.

3. Connecting an Autosampler (Optional)

To connect an AS-DV or AS Autosampler to the injection valve in the IC system, follow the instructions in the appropriate section below.

Notes:

*   If an optional auxiliary valve is installed in the ICS-2100, it can be used as the injection valve, instead of the standard valve configured with each system. After connecting the autosampler to the auxiliary valve (as described in the appropriate section below), configure the valve as the injection valve in Chromeleon. For instructions, refer to *Installing the ICS-1100/1600/2100 Auxiliary Valve* (Document No. 065288). The document is provided with the valve.

*   To connect an AS-HV Autosampler, refer to the instructions in the *AS-HV Autosampler Operator's Manual* (Document No. 065125). The manual is provided on the Dionex Reference Library CD-ROM (P/N 053891).

3.1 Connecting an AS-DV Autosampler

1. Place the AS-DV to the left of the IC system on the workbench.

2. Open the IC system and the autosampler doors.

3. Route the sample outlet line from the AS-DV through the left side slot, at the front of the IC system.

4. Connect the outlet sample line from the AS-DV to port **S (5)** on the injection valve (see Figure 5).
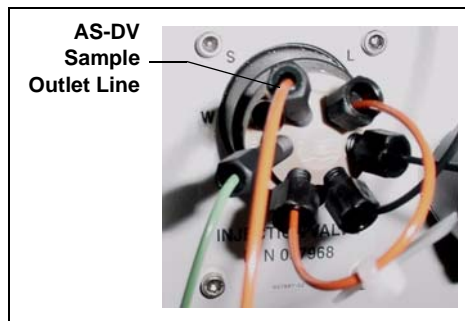
Figure 5. IC System Injection Valve

3.2   Connecting an AS Autosampler

NOTE   Dionex recommends using AS models that do not have injection valves. If a valve is installed in the autosampler, it is switched at the same time as the valve in the IC system. This causes unnecessary wear on the autosampler valve. If your AS has an injection valve, contact Dionex for assistance.

1. Place the autosampler to the left of the IC system on the workbench.

2. Open the IC system and the autosampler doors.

3. Route the needle seal line that extends from the autosampler inject port through the autosampler right side slot (see Figure 6) and then through the IC system left side slot to the injection valve.
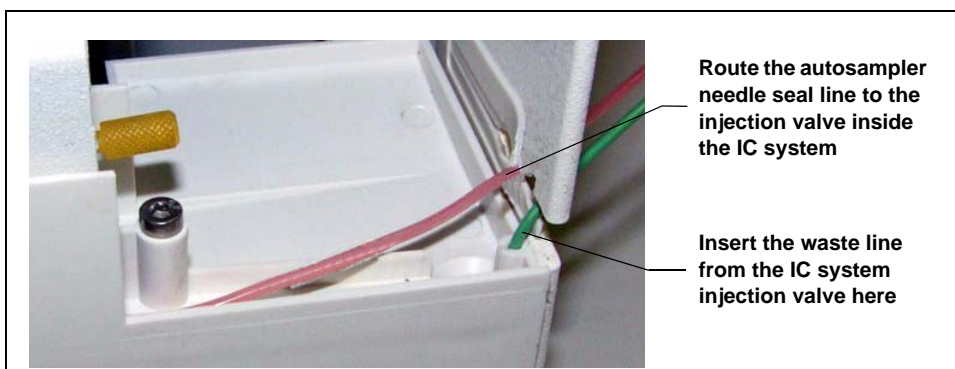
Figure 6. AS Autosampler Drip Tray and Right Side Slot

IMPORTANT	**The needle seal line from the AS autosampler inject port to the IC system injection valve is specially constructed. It consists of two tubes (one inside the other) that are sealed at the end. This seal must be maintained.**

In addition, the line is calibrated for use with the IC system. To ensure correct autosampler function, this line MUST NOT BE CUT! If replacement is required, refer to the AS operator's manual for the required part number and replacement instructions.

4. Connect the needle seal line to port **S (5)** on the injection valve (see Figure 7).
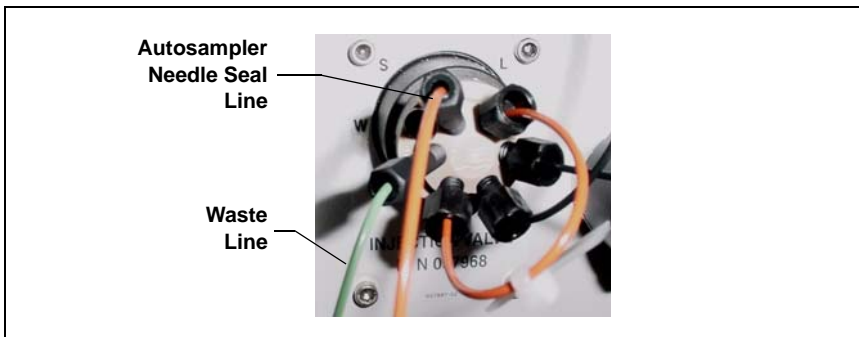
Figure 7. Injection Valve

A coupler (see Figure 8) connects the green waste line from port **W (6)** to a 3-mm (1/8-in) ID PTFE waste line. The waste line is routed through the tubing chase to the IC system rear panel.
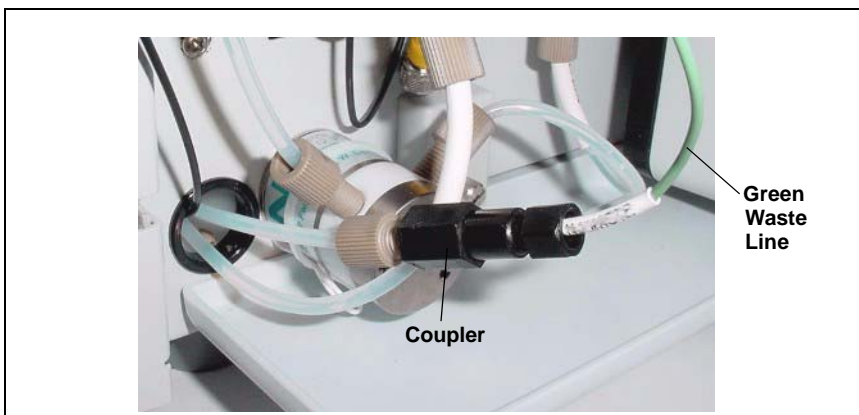
Figure 8. Injection Valve Waste Line Coupler

5. If the coupler is not visible, grasp the green waste line where it exits the tubing chase and pull it toward the front of the system until the coupler is outside the chase.

6. Disconnect the green waste line (labeled **TO AS50 TRAY**) from the coupler and route the line to the drip tray in the autosampler compartment.

    You can either leave the disconnected PTFE waste line and coupler in the tubing chase, or pull the line out from the front.

7. Bend the green waste line about 5 mm (0.2 in) from the end (to ensure it stays in the AS drip tray). When bending the tubing, be sure not to restrict the inner diameter.

8. Push the end of the green waste line into the small round opening on the right side of the AS tray (see Figure 6).

IMPORTANT   **Make sure the injection valve waste line is not elevated above the injection valve at any point between the valve and the autosampler drip tray.**

> NOTE **After the AS is configured for use with the ICS-2100 (see Section 12.2), all AS injection types are supported. In addition, all injection valve commands (whether issued from Chromeleon or the AS front panel) can control the injection valve.**

4. Unpacking the PC

1. Remove the PC and all documentation from the PC box and place them on a workbench.

2. Follow the instructions in the PC installation guide to connect the PC components.

5. Installing Chromeleon

> **NOTE** **If you purchased Chromeleon and a PC from Dionex, omit this section and go directly to "Starting the Chromeleon Server" on page 12.**

1. To verify that the PC meets current system specifications, go to http://www.dionex.com, select **Software** under **Products**, and click the **Specifications** link.

2. Verify that the Chromeleon disk contains Chromeleon version 6.80 SR6a (or later).

3. For a local PC: Log onto Windows® XP or Windows® Vista® as an **administrator**.

   For a network PC: Log on as a user with local PC administrator privileges.

4. Verify that at least 250 MB of free disk space is available on the drive on which you plan to install Chromeleon.

   More than 250 MB may be needed to store the large amounts of data that Chromeleon can generate. Data can also be stored at a different location (for example, on a network).

5. Insert the Chromeleon disk into the PC drive.

The Chromeleon Setup screen appears (see Figure 9).
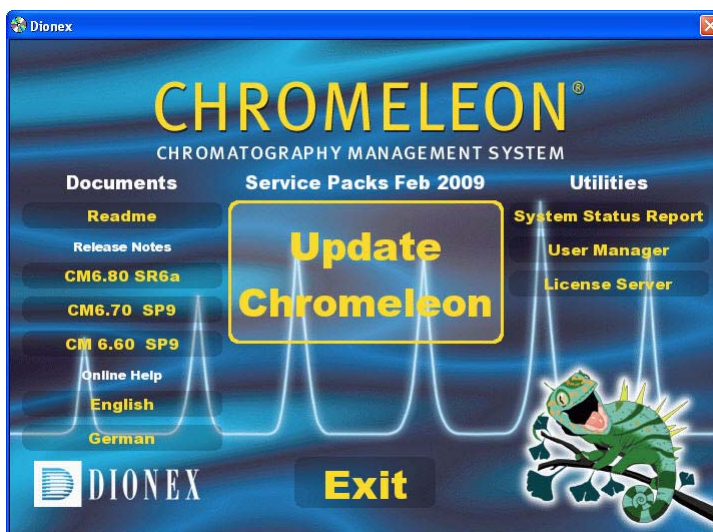
Figure 9. Chromeleon Setup screen

6. If you are installing Chromeleon on a PC that has an earlier release of Chromeleon 6.80 already installed, click **Update Chromeleon** and follow the on-screen instructions.

7. If you are installing Chromeleon on a PC that does not have an earlier release of Chromeleon 6.80 installed, follow these steps to install Chromeleon:

   a. On the Chromeleon Setup screen, click **Exit**.

   b. Go to the following folder on the Chromeleon disk: CM680SRx (where x is the service release number). For example, if you are installing Chromeleon 6.80 SR6a, go to the CM680SR6a folder on the disk.

   c. Double-click **setup.exe** and follow the on-screen instructions.

8. When asked whether to add the Server Monitor program to the Startup group, select **Yes** if the PC will be physically connected to devices or **No** if the PC will never be connected to devices.

9. After installing the software, restart the PC.

6. Installing the Chromeleon Software License Dongle

NOTE If your software license is provided through a Chromeleon License Server, omit this section. Instead, follow the instructions in the Chromeleon Help to install the software license. Then, go on to <u>"Connecting to the Chromeleon PC" on page 13</u>.

1. If your software license is issued with a USB dongle, plug the dongle into a USB port on the PC. **Always connect the USB dongle to the PC, not to a Dionex module.**

    Microsoft® Windows automatically detects the USB dongle and launches the Found New Hardware Wizard (see Figure 10).

Figure 10. Windows Found New Hardware Wizard

2. Complete the wizard by selecting the following options:

    *   If asked whether Windows can connect to Windows Update to search for software, select **No, not this time**.

    *   Accept the default option (**Install the software automatically (Recommended)** option and click **Next >**. It is not necessary to insert a

> hardware installation disk. When the wizard has completed installing the software, click **Finish**.

3. Store the Chromeleon disk in a safe place, away from heat and moisture.

7.   Installing the Software License

To activate the licensed features in Chromeleon, enter the license key code (an alphanumeric series) provided on the Software License key code sheet. **Store the key code sheet in a safe place**.

1. Click **Start** on the Windows taskbar and select **All Programs > Chromeleon > Chromeleon** to start the Chromeleon client.

2. Select **Help** > **About Chromeleon**.

3. Click the **Preferences** button and select the **License** tab (see Figure 11).
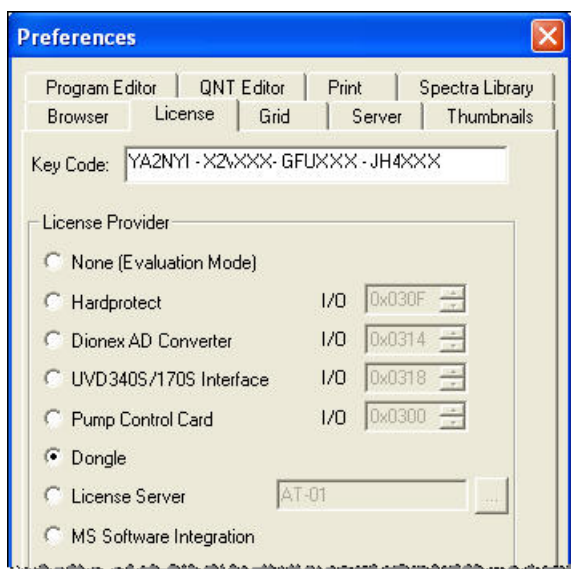
Figure 11. Chromeleon License

4. Under **Copy Protection Location**, select **Dongle** and then enter the key code, exactly as it appears on the key code sheet. Click **OK**.

5. The About Chromeleon Client screen should now display the serial number of the dongle, and all purchased license features (devices controlled, number of timebases, and software options) should be labeled **On**.

6. Click **OK** to close the screen.

8.   Starting the Chromeleon Server

Check the Chromeleon Server icon on the Windows taskbar to determine if the server is already running:

- If the icon is crossed out in red 🦎, the server is not running. Right-click the icon and select **Start Server**.

- If the icon is gray 🦎, the server is already running.

If the Server Monitor icon is not on the Windows taskbar, follow these steps to start the Chromeleon server:

1. Click **Start** on the Windows taskbar and select **All Programs > Chromeleon > Server Monitor**.

   The Server Monitor window appears.
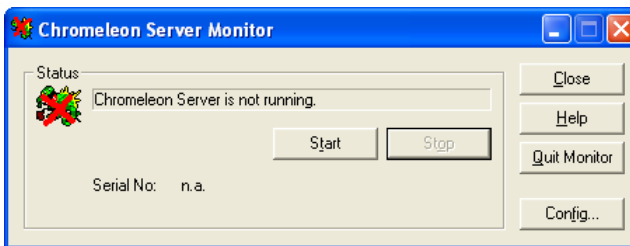
Figure 12. Server Not Running

2. Click **Start** to start the server.

3. Click **Close** to close the Server Monitor window.

   The Server Monitor icon appears on the taskbar.

> **NOTE   Clicking the Quit Monitor button quits (or exits) the Server Monitor program, but does not stop the server. To stop the server, click the Stop button.**

9. Connecting to the Chromeleon PC

The IC system rear panel provides a USB receptacle for connecting to a USB port on the Chromeleon PC. The rear panel also provides two USB ports for connecting other Dionex USB-compliant modules to the system.

IMPORTANT **Do not turn on the power to the ICS-2100 or other USB module(s) until after you connect the USB cable.**

Before connecting the USB cable, verify that Chromeleon is installed. If not, Windows will be unable to identify the new USB device when the power is turned on. To install Chromeleon, see Section 5.

9.1 Connecting the IC System to the PC

1. Locate the USB cable (P/N 960779) in the IC system Ship Kit.

2. Plug the cable's "A" connector into a USB port on the Chromeleon PC and plug the cable's "B" connector into the USB receptacle (labeled **FROM PC**) on the IC system rear panel (see Figure 13).
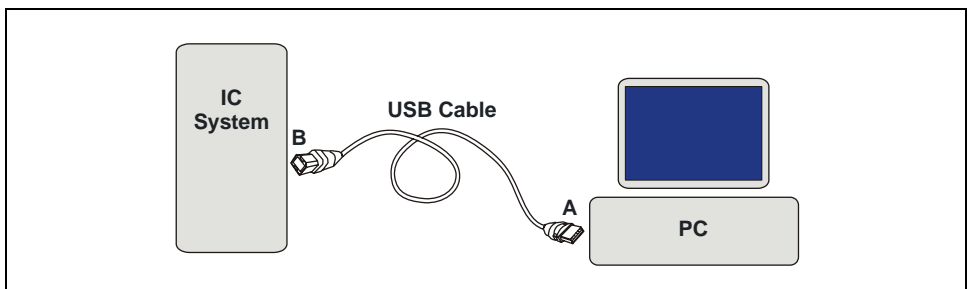
Figure 13. Example USB Connections: One IC System Connected to the PC
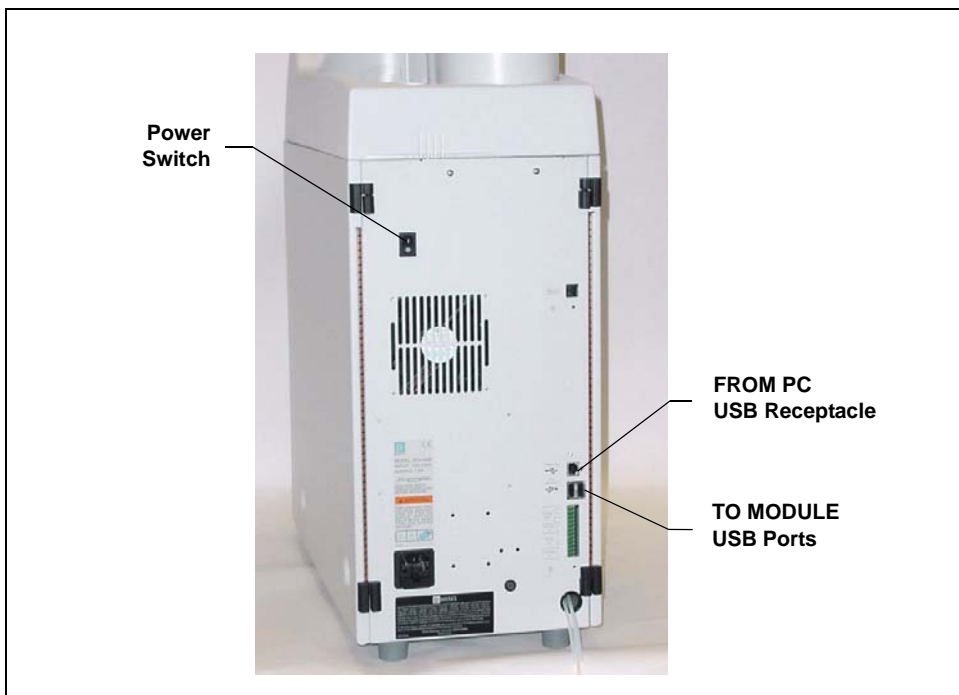
Figure 14. IC System Rear Panel

9.2   Connecting Additional USB Devices

Two USB ports on the IC system rear panel are provided for connecting additional Dionex USB-compliant modules (for example, an autosampler) to the system.

To connect an additional USB module, plug the "A" connector on a USB cable into an "A" port (labeled **TO MODULE**) on the ICS-2100 rear panel

(see Figure 14) and plug the cable's "B" connector into the USB receptacle on the other USB module (see Figure 15).
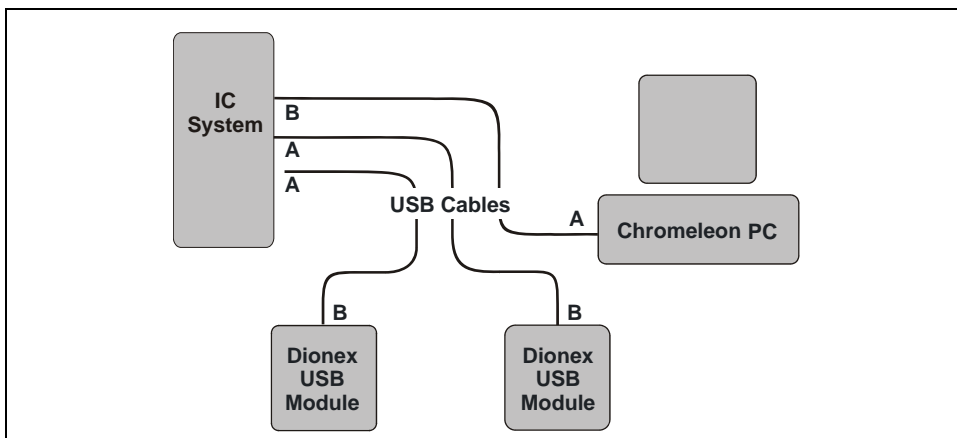
Figure 15. Example USB Connections: Two Dionex USB Modules Connected to the IC System

A USB 2.0 external hub can be used to connect the modules to the PC. Refer to the manual provided by the hub vendor for complete installation instructions. One or more hubs is required in the following situations:

• Use a hub if the number of USB devices in the system exceeds the number of available USB ports.

• Use a hub if the IC system or other USB device is more than 5 meters (16 ft) from the PC.

IMPORTANT

The USB standard limits the USB cable length to 5 meters (16 ft). Each USB device can be separated from the PC by no more than five hubs. Thus, each USB device can be located no more than 30 meters (32 yds) from the PC.

10.   Connecting the Power Cord

1. Verify that the main power switch on the rear panel of the ICS-2100 (see Figure 14) is turned off. (The main power switch may be turned on accidentally when the module is unpacked.)

2. Connect the power cord (IEC 320 C13) (ordered separately) from the main power receptacle on the rear panel to a grounded power source. The IC system power supply is auto-sensing, so no adjustment is required to select the line voltage.

SHOCK HAZARD—To avoid electrical shock, use a grounded receptacle. Do not operate the IC system or connect it to AC power mains without an earthed ground connection.

The power supply cord is used as the main disconnect device. Make sure the socket-outlet is located near the IC system and is easily accessible.

Operation at AC input levels outside of the specified operating voltage range may damage the IC system.

DANGER D'ÉLECTROCUTION—Pour éviter toute électrocution, il faut utiliser une prise de courant avec prise de terre. Ne l'utilisez pas et ne le branchez pas au secteur C.A. sans utiliser de branchement mis à la terre.

Le cordon d'alimentation principal est utilisé comme dispositif principal de débranchement. Veillez à ce que la prise de base soit située/installée près du module et facilement accessible.

STROMSCHLAGGEFAHR—Zur Vermeidung von elektrischen Schlägen ist eine geerdete Steckdose zu verwenden. Das Gerät darf nicht ohne Erdung betrieben bzw. an Wechselstrom angeschlossen werden.

Das Netzkabel ist das wichtigste Mittel zur Stromunterbrechung. Stellen Sie sicher, daß sich die Steckdose nahe am Gerät befindet und leicht zugänglich ist.

11.   Installing the ICS-2100 Device Driver

IMPORTANT **Before turning on the system power, verify that Chromeleon software is installed. If Chromeleon is not installed first, Windows will be unable to identify the new USB device. For Chromeleon installation instructions, see Section 5.**

1. If you have not already done so, turn on the PC power.

2. For a local PC: Log onto Windows XP or Windows Vista as an **administrator**.

   For a network PC: Log on as a user with local PC administrator privileges.

3. If the Chromeleon Server is not running, start the server (see Section 8).

4. Press the power switch on the ICS-2100 rear panel (see Figure 14) to turn on the power.

5. Turn on the power to the autosampler (if installed).

6. Windows automatically detects the new USB devices. A message flashes on the screen to inform you that new hardware was found.

   The Found New Hardware Wizard appears (see Figure 16). This wizard installs the new hardware into the Windows Device Manager.

Figure 16. Windows Found New Hardware Wizard: IC System Device

7. Complete the wizard for each new device by selecting the following options:

- If asked whether Windows can connect to Windows Update to search for software, select **No, not this time**.

- Accept the default option (**Install the software automatically**) and click **Next >**. It is not necessary to insert a hardware installation disk.

8. If any additional devices were found (for example, an autosampler) complete the wizard for the device.

12. Setting Up Chromeleon

> **NOTE** **This section provides brief instructions for setting up Chromeleon. For details about any of these steps, refer to the Chromeleon Help.**

12.1 Creating a Timebase

1. Click **Start** on the Windows taskbar and click **All Programs > Chromeleon > Server Configuration** to start the Chromeleon Server Configuration program.

2. Select **Edit > Add Timebase**.

   The New Timebase dialog box appears.

3. Type a name for the timebase (for example, **ICS-2100**) (see Figure 17).
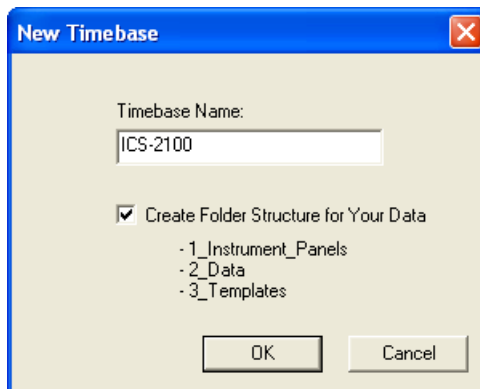
Figure 17. Example New Timebase Dialog Box

4. (Optional) Select the **Create Folder Structure for Your Data** check box. This creates a standardized folder structure in the Chromeleon Browser for the data related to your timebase.

5. Click **OK**.

   The new timebase appears under the server name.
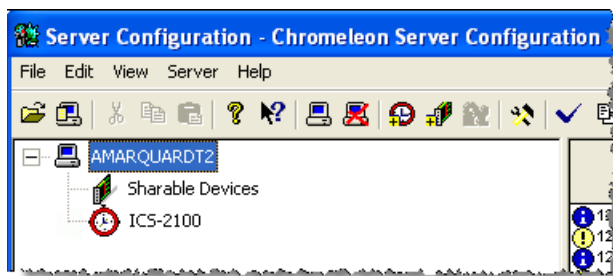
Figure 18. Example Server Configuration with New Timebase

6. Right-click the new timebase and select **Add Device**.

   The Add device to timebase dialog box appears.

7. Under **Manufacturers**, select **Dionex IC: Integrated Systems**.

8. Under **Devices**, select **ICS-2100 IC System** and click **OK**.

   The Properties dialog box for the IC system appears. The **General** tab page shows the Device Name (**Pump_ECD)** and the Mode (**Live**).

9. Click the arrow next to **Module Serial No.** In the list, select the serial number of the system you are configuring (see Figure 19).
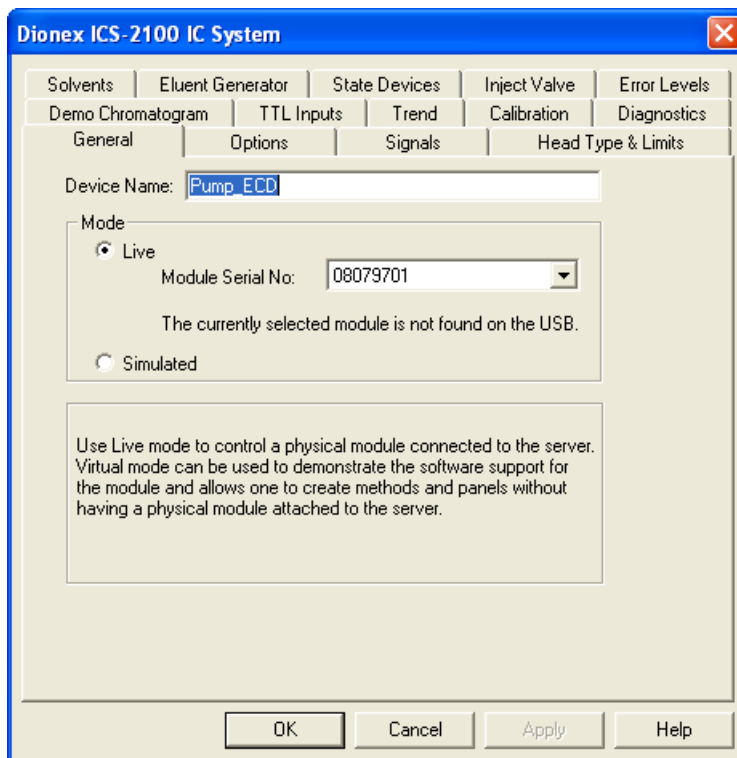
Figure 19. Example Properties Dialog Box: General Tab Page

12.2 Configuring the Device Properties

> **NOTE For details about the settings on any of the Properties tab pages, click the Help button.**

1. Click the **Options** tab and verify that the options installed in your IC system are enabled.
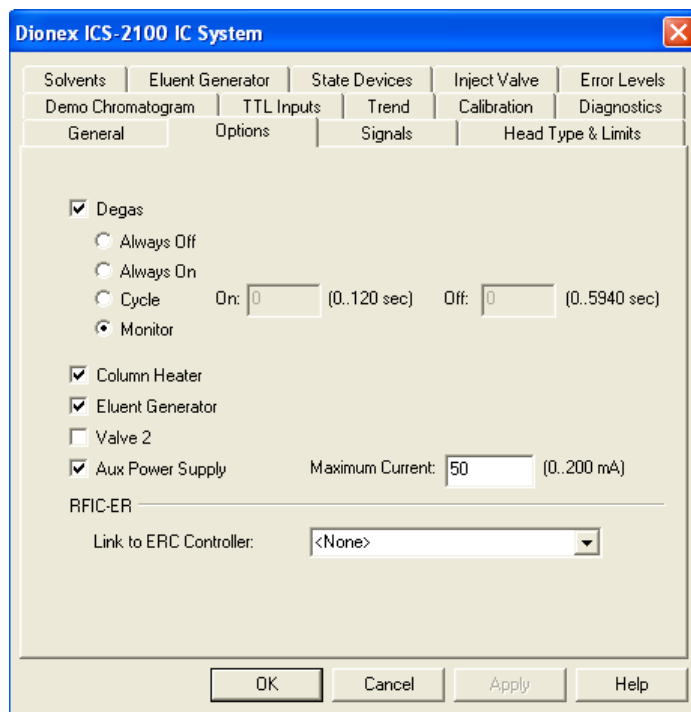
Figure 20. Example Properties Dialog Box: Options Tab Page

To configure an auxiliary power supply (optional):

To operate an electrolytic device such as a water polisher, you can configure the EGC-2 power supply as an auxiliary power supply. The power supply operates in constant current mode and can be configured from 0 to 200 mA, with a maximum voltage of 35 V.

- On the Options tab page, select the **AuxPower Supply** check box (see Figure 20) and enter the **Maximum Current** allowed for the

electrolytic device (refer to the documentation provided with the device).

• Connect the device to the **EGC-2** connector on top of the ICS-2100.

After the auxiliary power supply is configured, information about the power supply (current, on, off, etc.) is displayed in Chromeleon and on the front panel touch screens.

2. Click the **Inject Valve** tab and verify that the correct device is assigned to control the injection valve in the ICS-2100.

• If the timebase will include an AS or AS-DV, the **Controlled By** setting for **Pump_InjectValve** must be **AS** (see Figure 21).
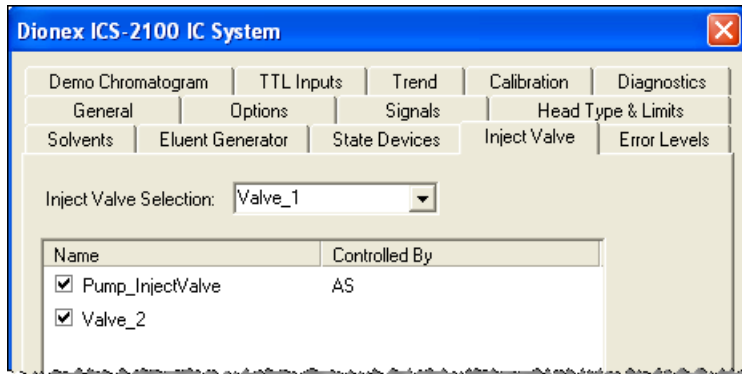
Figure 21. Inject Valve Properties: Inject Valve Controlled by the AS

- If the timebase will include another model of autosampler (or no autosampler), the **Controlled By** setting must be **ICS-2100** (see Figure 22).
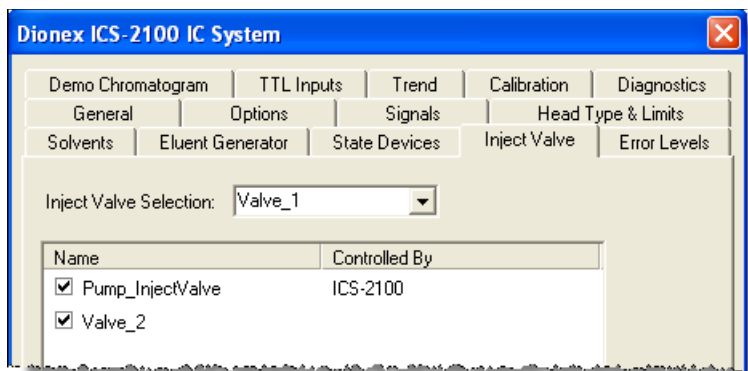
Figure 22. Inject Valve Properties: Inject Valve Controlled by the IC System

To change a **Controlled By** setting, select the **Pump_InjectValve** name, press **F2**, and select the device.

3. After selecting the device properties, click **OK** to close the dialog box. The IC system is added to the timebase (see Figure 23).
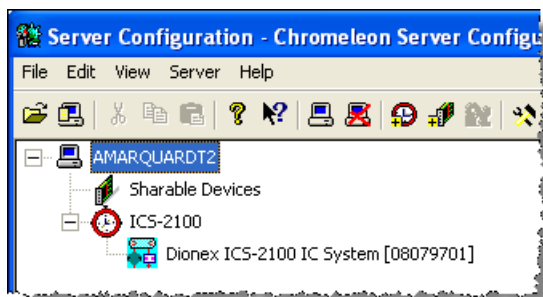
Figure 23. Example Server Configuration with IC System Added to the Timebase

4. If you are configuring an autosampler, add the autosampler to the timebase, as described for the IC system.

5. When the timebase is complete, select **File > Save Installation**.

6. You can ignore the "no inject device installed" warning, if it appears. This simply means that the timebase does not include an autosampler. This message appears if you are using manual injections. Close the Server Configuration Check dialog box.

7. Exit the Server Configuration program.

12.3 Connecting to the Panel Tabset

1. Click **Start** on the Windows taskbar and select **All Programs > Chromeleon > Chromeleon** to start the Chromeleon client.

   The Chromeleon main window and Browser appear (see Figure 24).
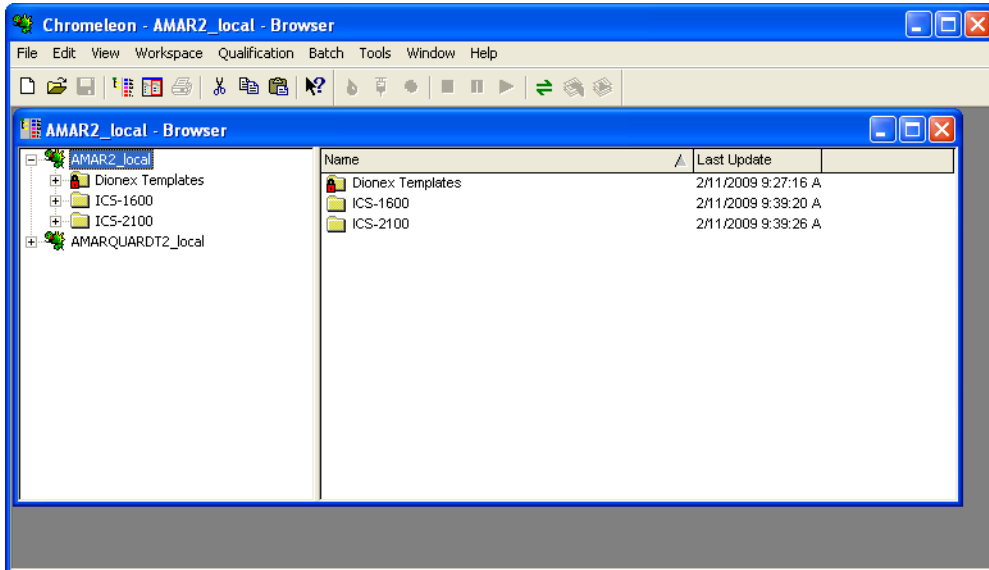
Figure 24. Chromeleon Main Window and Browser

2. Select **View > Default Panel Tabset** to display the panel tabset.

3. Click the **ICS-2100** tab on the panel tabset to view the IC system panel (see Figure 25).
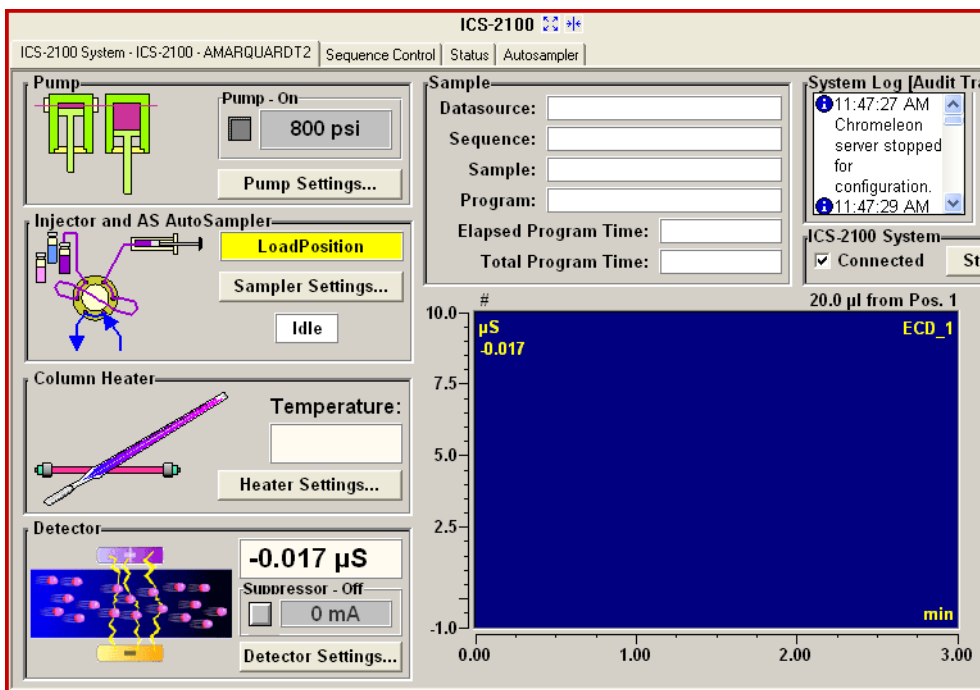
Figure 25. IC System Panel on the Chromeleon Panel Tabset

NOTE If an autosampler is installed, a separate Control panel for the autosampler is included in the panel tabset.

12.4   Verifying Chromeleon Communication

Verify that Chromeleon is communicating with the IC system by clicking the **Inject** and then the **Load** button on the panel. If communication is occurring, you will hear the valve actuate as it changes position.

13. Installing and Plumbing the Columns and Suppressor

This section provides brief installation and plumbing instructions for the columns and suppressor. For detailed start-up and installation instructions, refer to the column and suppressor manuals. The manuals are provided on the Dionex Reference Library CD-ROM (P/N 053891).

For reference, Figure 26 shows the system flow schematic after all plumbing is completed.
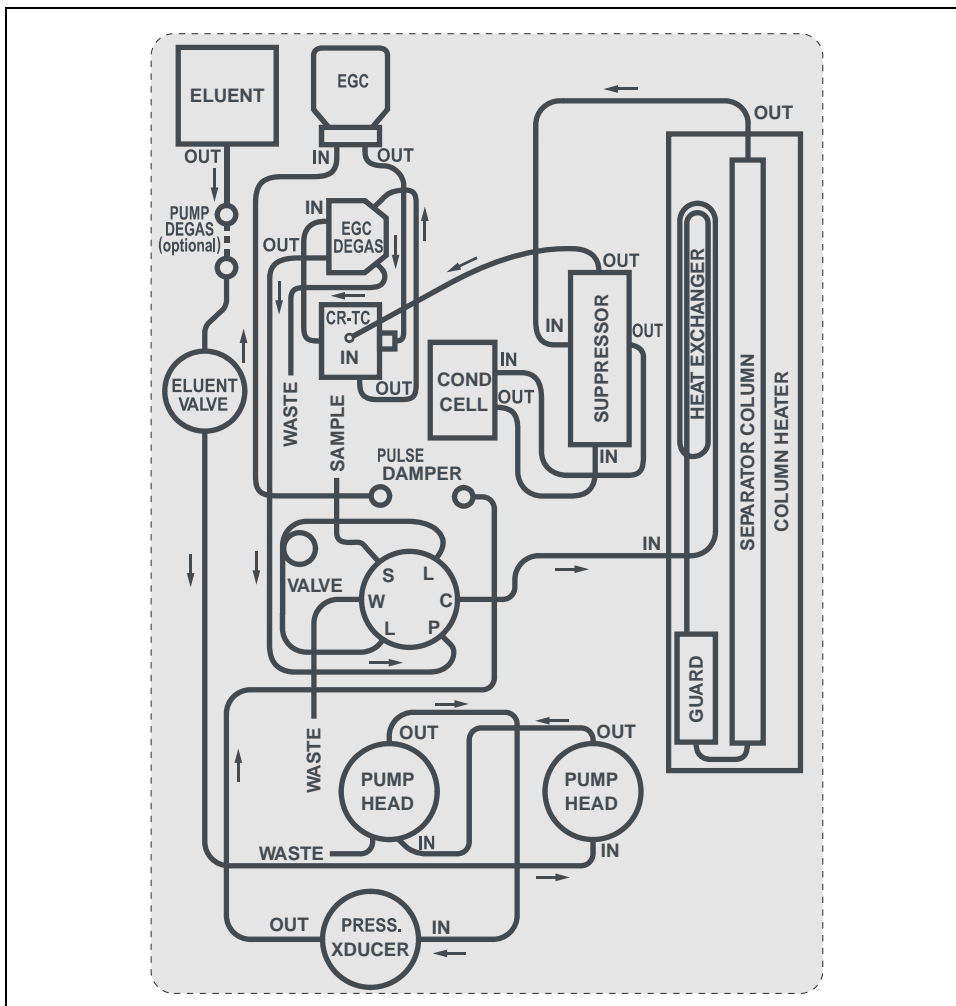
Figure 26. IC System Plumbing Schematic

13.1 Unpacking the Columns and Suppressor

1. Remove the guard column, separator column, and suppressor from their boxes.

2. Remove the fitting plugs from the ends of each column and from all ports on the suppressor.

3. Discard any tubing temporarily connecting the suppressor ports.

13.2 Setting Up the Column Heater

Note for 2-mm columns:

For best results with 2-mm columns, install a microbore heat exchanger (P/N 060943) in the column heater. In addition, use red 0.125-mm (0.005-in) ID PEEK™ tubing (P/N 044221), rather than the standard black PEEK tubing, for tubing connections between the following components:

-   Injection valve and column heater heat exchanger

-   Guard column and separator column

-   Separator column and detector cell

To set up the column heater

1. Cut off the two shipping ties from the column heater and remove them (see <u>Figure 27</u>).
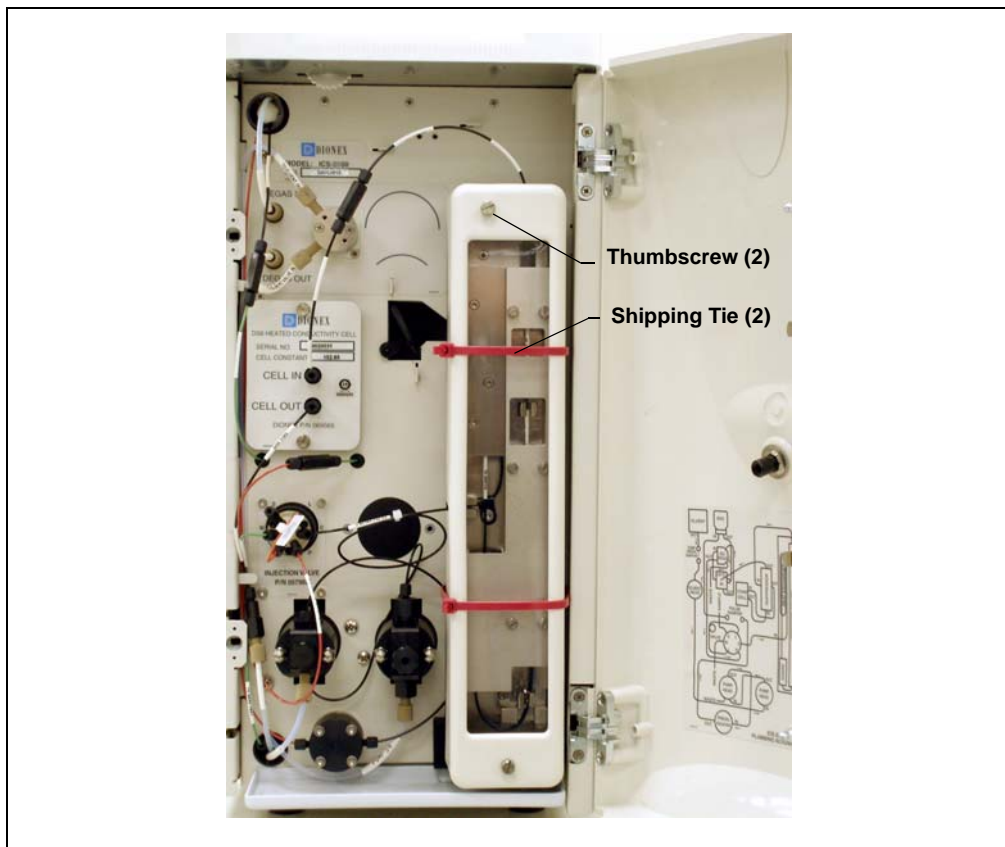
Figure 27. Column Heater with Shipping Ties

2. Loosen the two thumbscrews on the heater cover (they remain attached to the cover).

3. Pull the heater cover straight out to remove it.

4. Unscrew the six thumbscrews on the top metal plate (see Figure 28) and remove the plate.

Thumbscrew (6)

Figure 28.   Column Heater with Cover Removed

13.3   Plumbing the Columns

1. Remove the coupler connecting the lines labeled **GUARD IN** and **GUARD OUT**.

2. Connect the **GUARD IN** line to the guard column inlet. Check the arrow on the guard column label; it should point down (flow away from the injection valve).

3. Connect the **GUARD OUT** line to the guard column outlet.

4. Push the guard column onto the back column clip.

5. Remove the coupler connecting the **COL IN** and **COL OUT** lines.

6. Connect **COL IN** to the separator column inlet. Connect **COL OUT** to the separator column outlet. Check the arrow on the column label. It should point up (flow toward the cell).

7. Push the separator column onto the front column clips.

8. Replace the top metal plate on the column heater.

13.4 Installing the Suppressor

1. Before installing the suppressor, hydrate it as instructed in the suppressor manual. Suppressor manuals are provided on the Dionex Reference Library CD-ROM (P/N 053891).

2. Locate the suppressor mounting tabs on the component panel (see Figure 29). Reach into the opening between the tabs and pull the yellow connector and attached cable slightly out of the opening.

   Connect this cable to the cable from the suppressor (align the pins on the two connectors and push them together).

1	**Suppressor Mounting Tabs**
2	**Suppressor Cable Connector**
3	**Guideline for AES®**
4	**Guideline for SRS®**
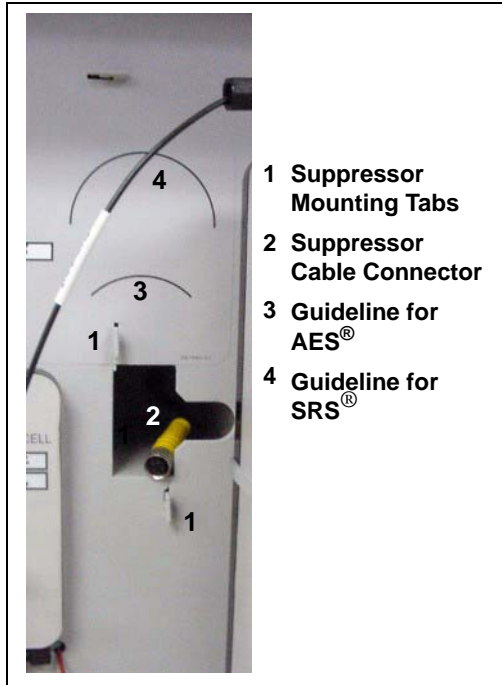
Figure 29. Suppressor Mounting Tabs and Guidelines

3. Orient the suppressor with the **REGEN OUT** fitting on top and the cable to the right.

4. Feed the cable into the opening in the component panel.

5. Align the top of the suppressor with the guideline printed on the component panel (see Figure 29) and align the slots on the rear of the suppressor with the tabs on the panel.

6. Press the suppressor onto the tabs and then slide it down to lock it in place. Pull slightly on the center of the suppressor to verify that it is securely fastened. Figure 30 shows an SRS® suppressor installed on the component panel.

7. Remove the coupler connecting the **ELUENT IN** and **ELUENT OUT** lines and connect these lines to the corresponding ports on the suppressor.
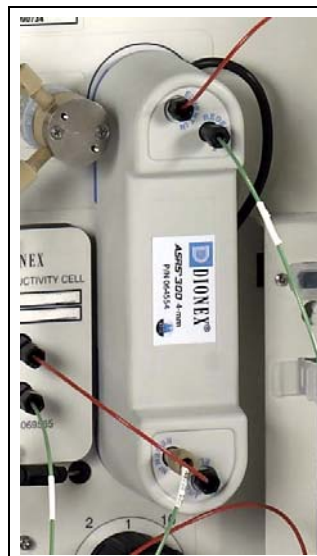
Figure 30. Suppressor Installed (SRS Shown)

8. Remove the fitting plug from the **REGEN IN** line and connect it to the **REGEN IN** port on the suppressor.

9. **Do not connect the REGEN OUT port until after completing the eluent generator setup (Section 18)**.

10. Replace the cover on the column heater, making sure the **GUARD IN** line is aligned with the slot on the side of the heater cover.

14. Connecting the Waste Lines

1. Untape the coiled waste lines from the rear panel. Place the ends of the **PUMP WASTE** and **TO WASTE OUT** lines into a waste container.

2. Direct the **WASTE, GAS SEPARATOR** line from the top of the IC system to the rear panel. Snap the line onto one of the tubing clips on the rear panel. Connect the line to the waste, gas separator tube (see Section 14.1).

> **NOTE** **To prevent waste from siphoning back into the system, check the lines periodically to be sure they are not bent, pinched, or elevated at any point.**

14.1   Installing the Waste, Gas Separator Tube

1. Locate the waste, gas separator tube assembly in the IC system Ship Kit.

2. Connect the **WASTE, GAS SEPARATOR** line from the suppressor to one of the 3-mm (1/8-in) ID white PTFE lines on the waste, gas separator tube assembly (see Figure 31).
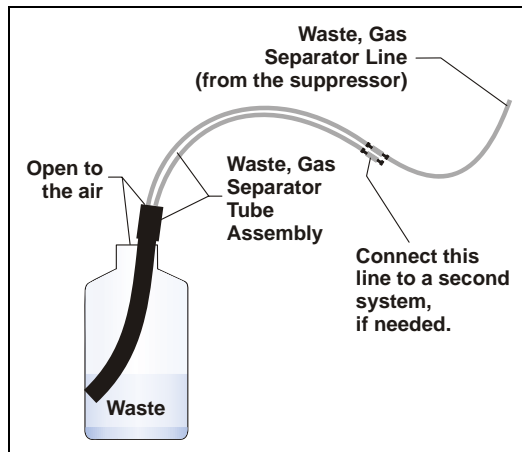
Figure 31. Waste, Gas Separator Tube Installation

3. Place the waste, gas separator tube assesmbly into the waste container. Make sure the tubing junction (where the white PTFE tubing meets the black polyethylene tubing) is above the top of the container and that the waste, gas separator tube and the waste container are open to the atmosphere.

DO NOT CAP THE WASTE CONTAINER: In the ICS-2100, the Atlas® Electrolytic Suppressor and Self-Regenerating Suppressor (SRS) use an electrolytic process that results in the production of small amounts of oxygen or hydrogen gas. To ensure that the gas is not trapped in a closed container and allowed to concentrate, install a 1.3-cm (0.52-in) ID black waste, gas separator tube (P/N 045460) in an uncapped waste container. Connect the Waste, Gas Separator line to the waste tube (see Figure 31).

NE FERMEZ PAS LE CONTENEUR DE GAZ RÉSIDUEL: Le ICS-2100, le Atlas Electrolytic Suppressor, et le Self-Regenerating Suppressor (SRS) travaillent avec un proces d´électrolyse, qui produit des petites quantités de gaz d´oxygène ou d´hydrogène. Afin de garantir que le gaz ne soit pas enfermé dans un conteneur fermé et puisse s´y concentrer, connectez un tube noir à gaz résiduel (diamètre intérieur = 1,3 cm; n° de commande 045460) à un conteneur ouvert (non fermé). Connectez le conteneur résiduel au tube résiduel/gaz séparateur (désigné: « Waste, Gas Separator»).

⚠ **VORSICHT**

VERSCHLIESSEN SIE DEN ABFALLBEHÄLTER NICHT: Der ICS-2100 , Atlas Electrolytic Suppressor und Self-Regenerating Suppressor (SRS) verwenden einen Elektrolyseprozess, wodurch kleine Mengen an Sauerstoff und Wasserstoff entstehen. Führen Sie einen schwarzen Gasabscheiderschlauch (ID = 1,3 cm; Bestell-Nr. 045460) in einen offenen (unverschlossenen) Abfallbehälter, damit sich das Gas nicht in einem geschlossenen Behälter sammelt und aufkonzentriert. Verbinden Sie die mit Waste, Gas Separator bezeichnete Leitung mit dem Abfallschlauch.

15. Setting Up the Eluent Reservoir

1. Rinse the eluent reservoir with ASTM filtered, Type I (18-megohm) deionized water.

2. Fill the reservoir with ASTM filtered, Type I (18-megohm) deionized water.

3. Place the reservoir on top of the IC system.

4. Install the cap and handtighten.

5. Connect the liquid lines from the IC system to the corresponding lines exiting the eluent bottle.

> **NOTE** **The IC system does not require pressurized reservoirs. However, if eluent is manually degassed or is sensitive to contamination, Dionex recommends pressurizing the reservoir with helium or nitrogen. See <u>Section 22</u> for instructions.**

16. Entering the Eluent Level

After filling the reservoir, enter the volume of liquid in the reservoir.

1. On the IC system panel on the Chromeleon panel tabset, click the **Pump Settings** button.

    The **Pump Settings** window appears (see Figure 32).
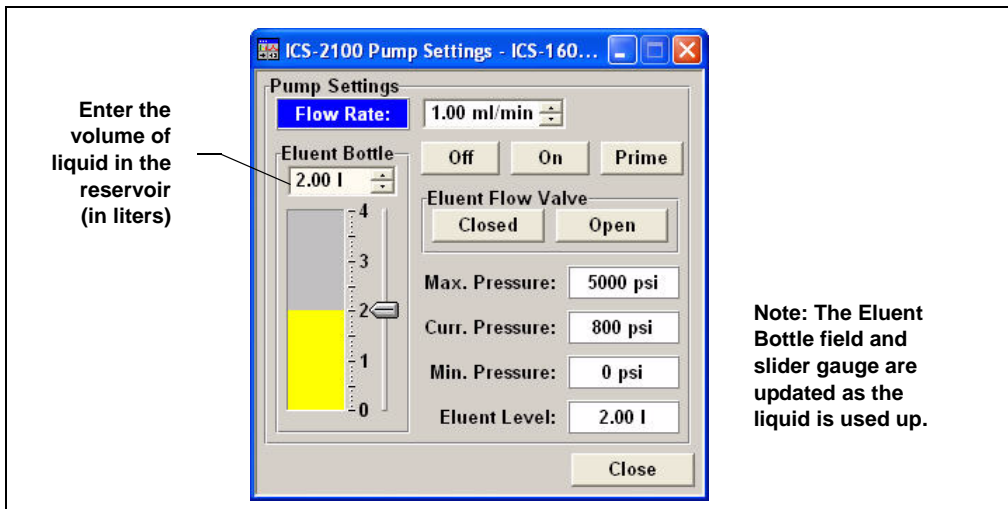
Figure 32. Pump Settings Window: Setting the Eluent Level

2. Use the slider to enter the volume (in liters), or enter the volume directly into the **Eluent Bottle** box.

The IC system determines the eluent usage by monitoring the flow rate and the length of time the pump is on, and updates the **Eluent Bottle** volume as the eluent is used up. A warning appears if the level falls below 200 mL. Warnings are repeated at 100 mL and 0 mL.

> **IMPORTANT**
>
> **In order for the level displayed in the Eluent Bottle box and gauge to be accurate, you must enter the level when the reservoir is filled. The IC system does not automatically detect when the reservoir is filled, nor when it is empty.**

If preferred, you can enter the eluent bottle level on the touch screen **HOME** page, instead of on the Chromeleon Control panel.

17.   Priming the Pump

1. Verify that the eluent reservoir is filled, the reservoir cap is installed and handtightened, and the liquid line from the IC system to the reservoir cap is connected (see Section 15).

2. Verify that the waste lines are directed to a waste container.

3. The priming procedure consists of two parts:

   • Priming the eluent lines with a syringe (see Section 17.1). Perform this procedure at initial installation, after changing eluents, or when eluent lines are empty.

   • Priming the pump heads with the **Prime** button (see Section 17.2). Perform this procedure after the eluent lines are primed.

17.1   Priming the Eluent Lines with a Syringe

> **NOTE** **Prime the eluent lines after initial installation, after changing eluents, or when eluent lines are empty.**

1. Verify that the pump is turned off.

2. Connect a 10 mL syringe (P/N 054578) to the priming valve port on the primary pump head (see Figure 33).
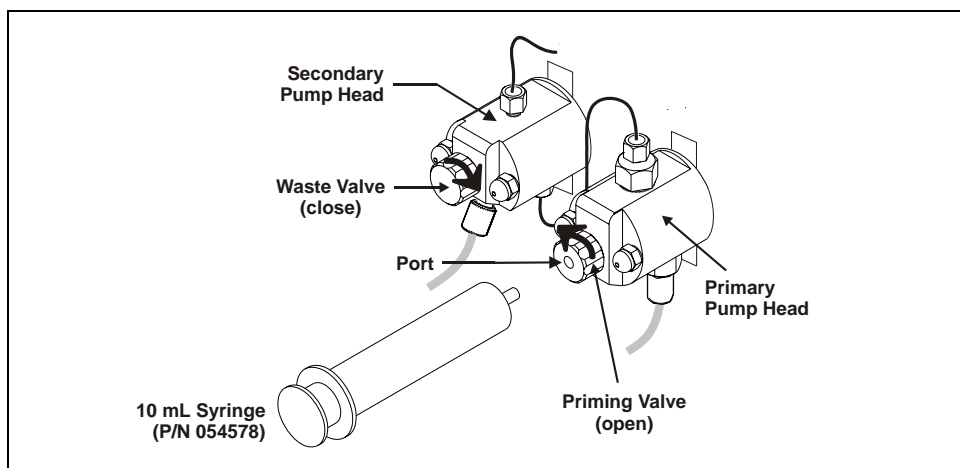
Figure 33. Pump Head Valve Settings for Priming the Eluent Lines

3. Open the priming valve by turning it one-quarter to one-half turn counterclockwise.

4. On the IC system panel on the Chromeleon panel tabset, click the **Pump Settings** button.

   The **Pump Settings** window appears (see Figure 34).
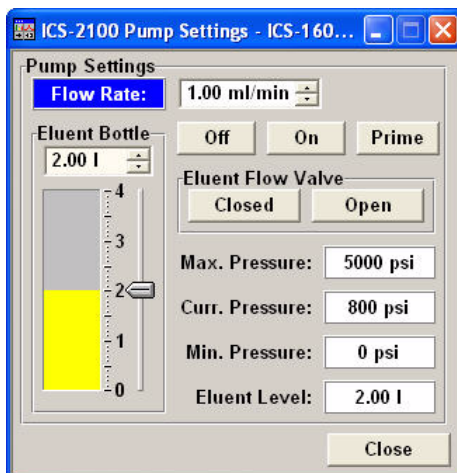
Figure 34. Pump Settings Window

5. Under **Eluent Flow Valve**, click **Open**.

6. Draw the syringe back to begin pulling eluent through the flow path. It may take several syringe draws to remove all air or previous eluent from the tubing. Draw out a minimum of 20 mL of eluent to ensure that the vacuum degas assembly (if installed) is primed.

7. After priming the lines thoroughly, close the priming valve. **Do not overtighten the priming valve.**

8. Under **Eluent Flow Valve**, click **Closed**.

17.2   Priming the Pump Heads with the Prime Button

> **NOTE Perform this procedure after priming the eluent lines (see Section 17.1).**

1. Close the priming valve on the primary pump head (see Figure 35).
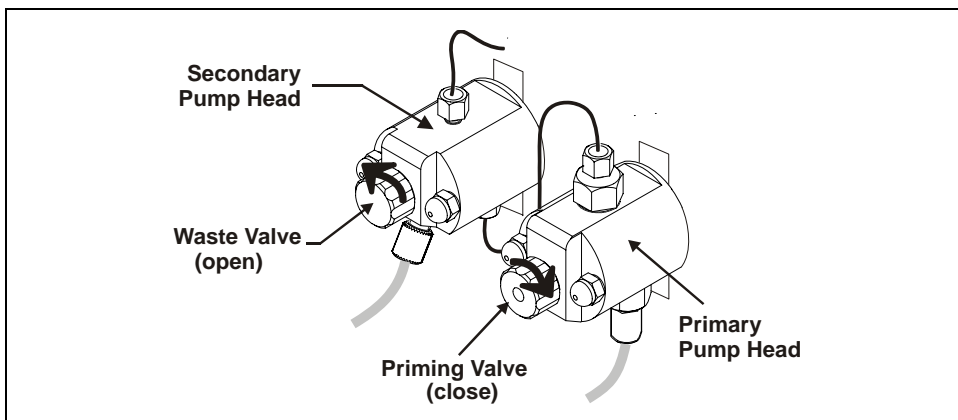
Figure 35. Pump Head Valve Settings for Priming the Pump Heads

2. Open the waste valve on the secondary pump head by turning the knob one-quarter to one-half turn counterclockwise (see Figure 35). Opening the valve directs the eluent flow path to waste and eliminates backpressure.

3. On the **Pump Settings** window, click the **Prime** button. Confirm that the waste valve is open by clicking **OK** when the reminder message appears. The pump will begin pumping at approximately 3 mL/min.

4. Continue priming the IC system until no air bubbles are exiting the pump waste line.

5. On the **Pump Settings** window, click **Pump Off**.

6. Close the waste valve. **Do not overtighten.** The pump is now ready for operation.

> **NOTE If the two standard priming procedures described above are unsuccessful, prime the pump with isopropyl alcohol. See Chapter 5 in the IC system operator's manual for instructions.**

18. Setting Up the Eluent Generator

Before Beginning

Remove the EluGen® cartridge (EGC) and the other items to be installed from their shipping containers. Depending on the type of eluent to be generated, the other items may include a Continuously Regenerated Trap Column (CR-TC), an EPM Electrolytic pH Modifier, and/or an EGC CO_3 Mixer.

> **NOTE** The EGC degas assembly is installed inside the EGC holder at the factory.

The EluGen cartridge contains one of the following: a corrosive base (KOH, LiOH, or NaOH), a corrosive acid (MSA), or a concentrated K_2CO_3 solution. Wear protective eyewear and gloves when handling the cartridge.

⚠ CAUTION

La cartouche d'EluGen contient un de ce qui suit: une base corrosive (KOH, LiOH, ou NaOH), un acide corrosif (MSA), ou une solution concentrée de K_2CO_3. Porter des lunettes et des gants protectives en manipulant la cartouche.

⚠ MISE EN GARDE

Die EluGen-Kartusche enthält eine korrosive Base (KOH, LiOH oder NaOH), oder eine korrosive Säure (MSA). Tragen Sie daher beim Umgang mit der Kartusche eine Schutzbrille und Handschuhe.

⚠ VORSICHT

Refer to the EluGen cartridge, CR-TC, and EPM manuals for the optimal operating conditions for your application. The manuals are provided on the Dionex Reference Library CD-ROM (P/N 053891).

18.1 Eluent Generator Setup for KOH, LiOH, MSA, and NaOH Eluents

Follow the instructions in this section if you are installing a KOH, LiOH, MSA, or NaOH EluGen cartridge and a CR-TC.

- If you are installing a K_2CO_3 cartridge, an EPM, and an EGC CO_3 Mixer (for generating carbonate/bicarbonate eluent), go to .

- If you are installing a K_2CO_3 cartridge and an EGC CO_3 Mixer (for generating carbonate eluent), go to .

Overview

The eluent generator setup procedure for KOH, LiOH, MSA, or NaOH eluents consists of the following main steps:

- Installing the CR-TC.

- Installing the EluGen cartridge.

- Connecting the EluGen cartridge vent line.

- Recording the EluGen cartridge serial number in Chromeleon.

- Conditioning the EluGen cartridge.

- Hydrating the CR-TC.

- Completing the eluent generator setup.

Items Required to Complete the Setup Procedure

In addition to the EluGen cartridge and the CR-TC, you will need the following items to complete the eluent generator setup.

Item	P/N	Use To
Yellow 0.5 mL/min, 7 MPa (1000 psi) backpressure coil (supplied in the ICS-2100 Ship Kit (P/N 064375))	053765	Provide backpressure during setup procedures.
EluGen Cartridge Vent Line Tubing Kit (supplied with the cartridge)	063092	Vent the cartridge during operation.
10-32 to 1/4-28 coupler (supplied in the ICS-2100 Ship Kit)	042806	Provide a temporary connection during setup procedures.
Temporary waste container (beaker, bottle, etc.) (not supplied)	n/a	Collect waste during setup procedures.
10-32 fittings 10-32 ferrules	043275 043276	Complete the connections.
1/8-in fittings 1/8-in ferrules	052267 048949	Complete the connections.

Figure 36 illustrates the ICS-2100 after the EluGen cartridge is installed.
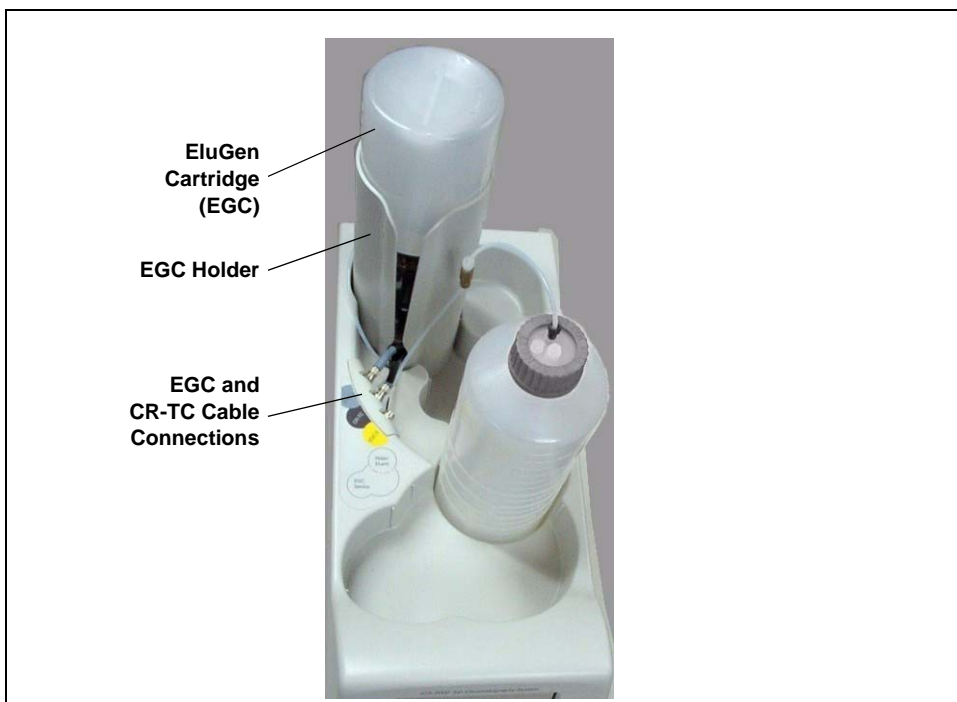
Figure 36. ICS-2100 with an EluGen Cartridge Installed (Top View)

Figure 37 illustrates the liquid flow path through the eluent generator components after all setup steps are complete and the eluent generator is ready for operation.
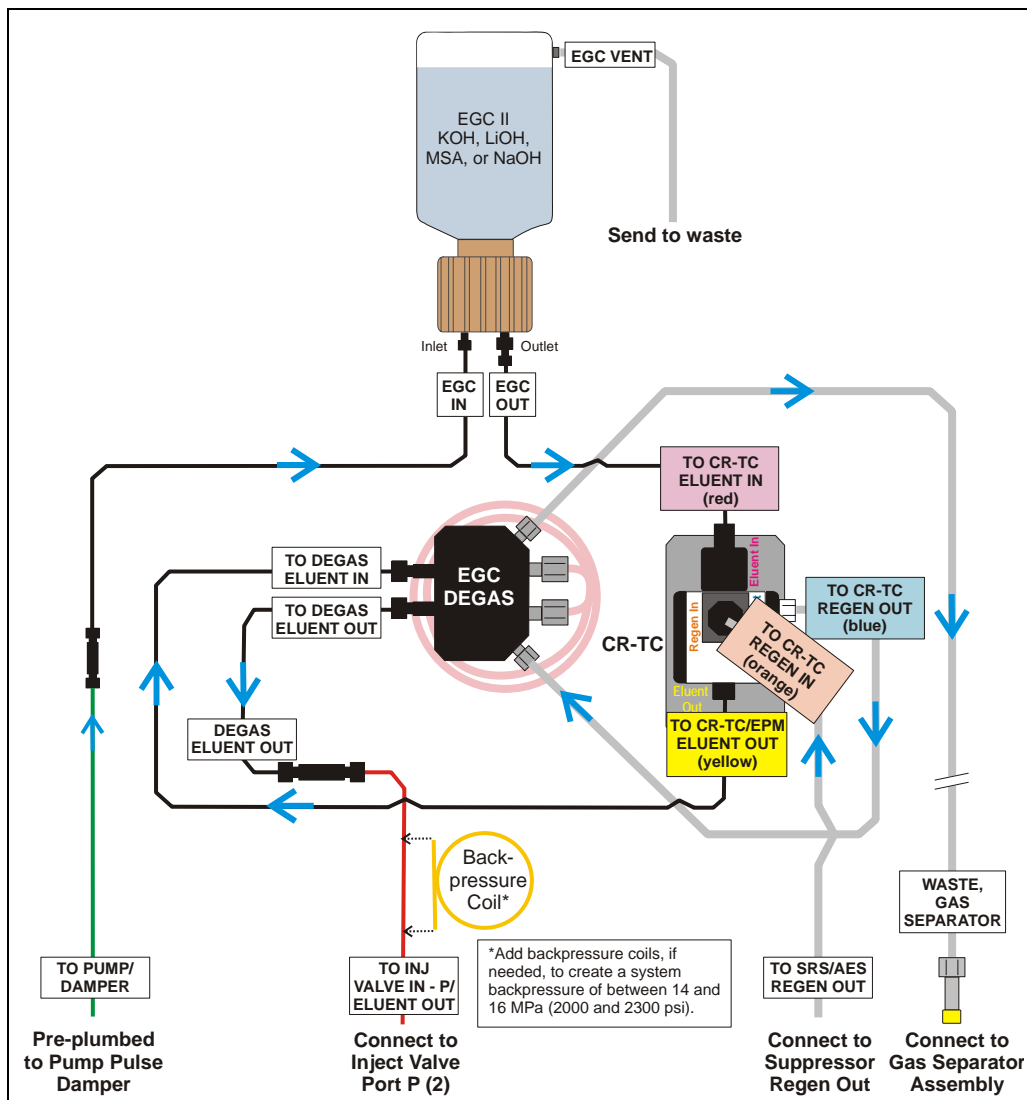
*Figure 37. Eluent Generator Flow Schematic with CR-TC:
Use for Generating KOH, LiOH, MSA, or NaOH Eluent*

Installing the CR-TC

1. Tilt the cartridge holder to view the bottom of the holder and brace the holder against the back corner of the ICS-2100 (see Figure 38).

Figure 38. Cartridge Holder (Tilted to View the Bottom)

2. Before installing the CR-TC, note the metal ball stud inside the bottom of the cartridge holder (see Figure 38) and the bracket on the CR-TC mounting plate (see Figure 39). These are used to mount the CR-TC inside the holder after it is plumbed.
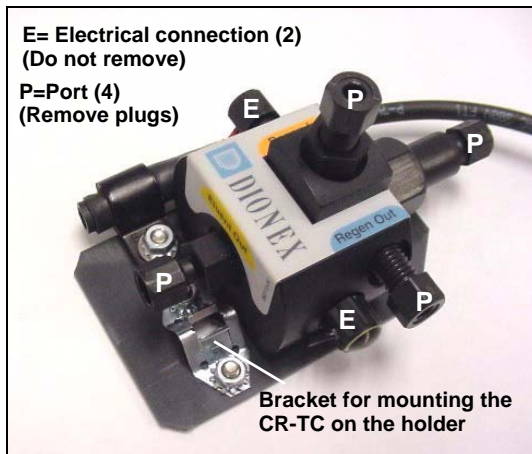
Figure 39. CR-TC

3. Remove the plugs from the four ports, labeled "P" in Figure 39. **Do not remove the two electrical connections, labeled "E" in the figure**.

4. With the CR-TC oriented as shown in , connect each line to the corresponding port on the CR-TC.

   NOTE **To help retain the fittings and ferrules on the lines, remove the coupler from each line just before connecting the line to a port.**
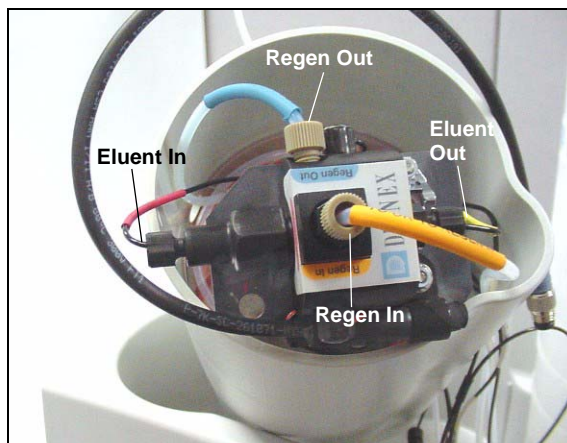
Figure 40. Plumbed CR-TC

5. Check that none of the lines are caught under the CR-TC and then push the CR-TC onto the metal stud inside the EGC holder (see). Push down until the CR-TC snaps into place.
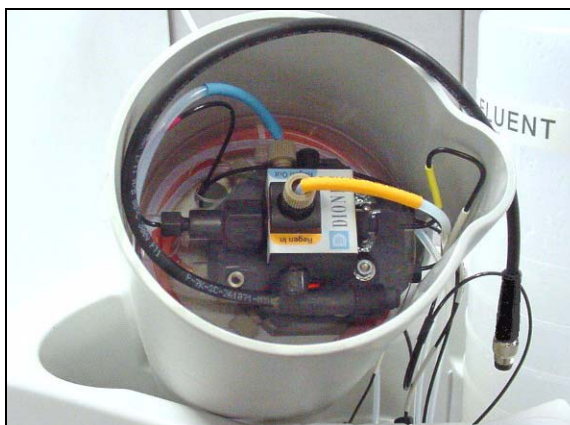
Figure 41. CR-TC Installed in Holder

6. Feed the CR-TC cable through the slot on the side of the EGC holder (see Figure 42).
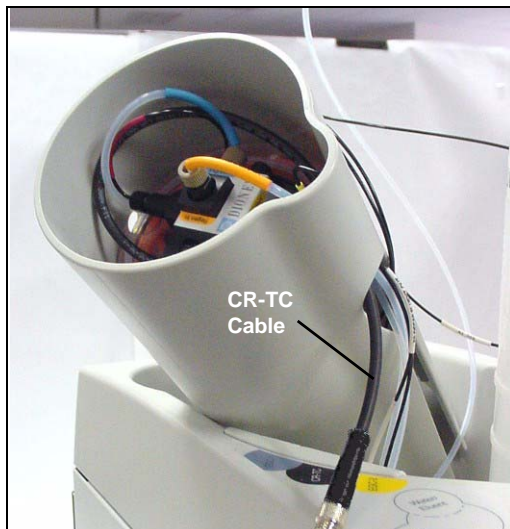
Figure 42. Installing the CR-TC

7. Turn the EGC holder right-side up and set it back into position.

Installing the EluGen Cartridge

1. Orient the EluGen cartridge with the fittings facing up and remove the plugs from the EluGen cartridge **INLET** and **OUTLET** ports (see Figure 43).
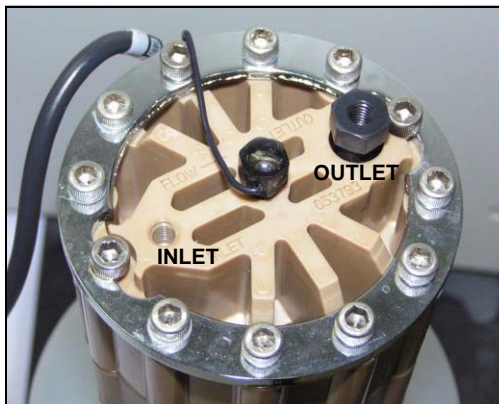
Figure 43. EluGen Cartridge Inlet and Outlet Ports

2. Set the EluGen cartridge in the service area on top of the ICS-2100 and orient it with the cable toward the EGC holder (see Figure 44).

Figure 44. EluGen Cartridge in Service Area

3. Pull the coiled black **EGC IN** and **EGC OUT** lines out slightly from the cartridge holder.

4. Disconnect the **EGC IN** line from the union that connects it to the **EGC OUT** line.

5. Connect **EGC IN** to the EGC **INLET** port (see Figure 45).
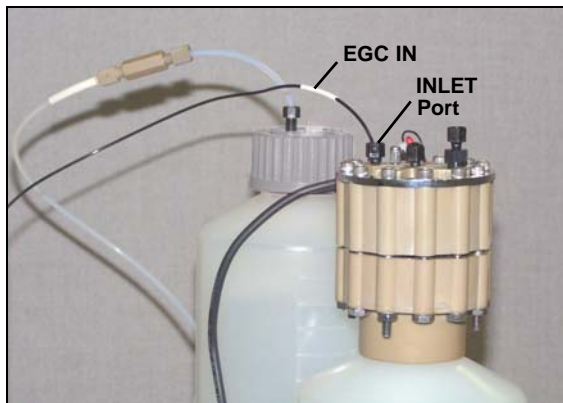
Figure 45. EGC Inlet Port Connections

6. Locate the yellow 0.5 mL/min, 7 MPa (1000 psi) backpressure coil (P/N 053765) in the ICS-2100 Ship Kit (P/N 064375).

7. Connect one end of this coil to the EGC **OUTLET** port (see Figure 46). Leave the other end of the coil unconnected.

Backpressure Coil

OUTLET Port
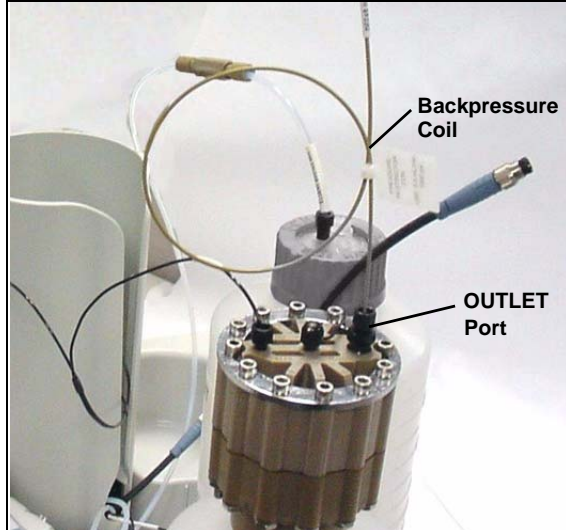
Figure 46. EGC Outlet Connection for Conditioning the EGC

NOTE **The backpressure coil connection is temporary; it is required only during the EluGen cartridge conditioning procedure described in "Conditioning the EluGen Cartridge" on page 50.**

8. Turn the EluGen cartridge over (with the fittings facing down). **Shake the EluGen cartridge vigorously, and tap it with the palm of your hand 10 to 15 times. Check that all bubbles trapped in the eluent generation chamber are dislodged.**

⚠ **CAUTION**

The EluGen cartridge contains one of the following: a corrosive base (KOH, LiOH, or NaOH), a corrosive acid (MSA), or a concentrated K_2CO_3 solution. Wear protective eyewear and gloves when handling the cartridge.

⚠ **MISE EN GARDE**

La cartouche d'EluGen contient un de ce qui suit: une base corrosive (KOH, LiOH, ou NaOH), un acide corrosif (MSA), ou une solution concentrée de K_2CO_3. Porter des lunettes et des gants protectives en manipulant la cartouche.

⚠ **VORSICHT**

Die EluGen-Kassette enthält eine korrodierende Base (KOH, LiOH oder NaOH), eine korrodierende Säure (MSA) oder eine konzentrierte K_2CO_3-Lösung. Tragen Sie daher beim Umgang mit Kassette eine Schutzbrille und Handschuhe.

9. Slide the EluGen cartridge down into the holder until it stops. Make sure the cable and backpressure coil remain out of the holder (see Figure 47).

> **NOTE** **To avoid crimping the lines inside the holder, do not twist the cartridge when you slide it into the holder. The lines are designed to coil inside the holder.**

Figure 47. Installing the EluGen Cartridge in the Holder

10. Remove the plug from the **EGC-1** connector on top of the ICS-2100.

11. Orient the cartridge's blue 4-pin electrical cable connector as shown in Figure 48. Push it onto the **EGC-1** connector on the ICS-2100. Twist the ring on the cable connector fingertight to secure it.

Figure 48. Connecting the EluGen Cartridge Cable

Connecting the Vent Line

1. Locate the vent line tubing kit (P/N 063092) supplied with the EluGen cartridge. Slide the label onto one end of the tubing and then push the barbed luer lock onto the tubing.

2. Unscrew and remove the plug from the vent opening on the side of the EluGen cartridge (see Figure 49).

Vent Plug (remove)

Figure 49. EluGen Cartridge Vent Plug

3. Screw the luer adapter onto the vent opening. Remove the cap on the luer adapter by twisting. **Save the cap.**

4. Twist the luer lock and EluGen cartridge vent line into the luer adapter (see Figure 50).

Luer Adapter **Luer Lock**
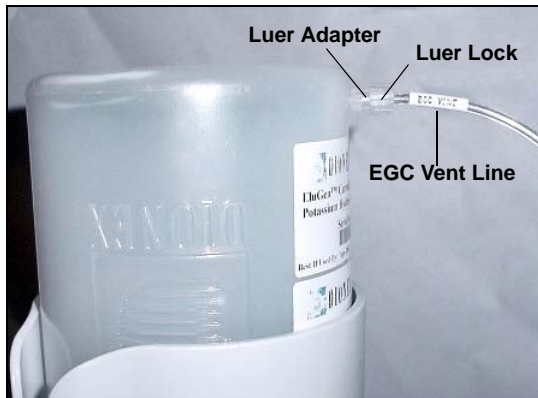
EGC Vent Line

Figure 50. Installing the EluGen Cartridge Vent Line

> **NOTE**   **To prevent leaks from the EluGen cartridge, always replace the luer adapter cap before moving the EluGen cartridge.**

5. Direct the EluGen cartridge vent line to the rear of the ICS-2100 and snap it onto one of the tubing clips on the rear panel.

6. Direct the vent line to the waste container and insert it down into the waste, gas separator tube about 10 to 15 cm (4 to 6 in).

Recording the EluGen Cartridge Serial Number in Chromeleon

The serial number is printed on the EluGen cartridge label.

1. Open the Chromeleon Server Configuration program (select **Start > Programs > Chromeleon > Server Configuration**).

2. Double-click the ICS-2100 system icon. The properties dialog box for the ICS-2100 appears.

3. Click the **Eluent Generator** tab (see Figure 51).

4. Select the **EGC-1** check box and enter the EluGen cartridge serial number.

5. Click **OK.**
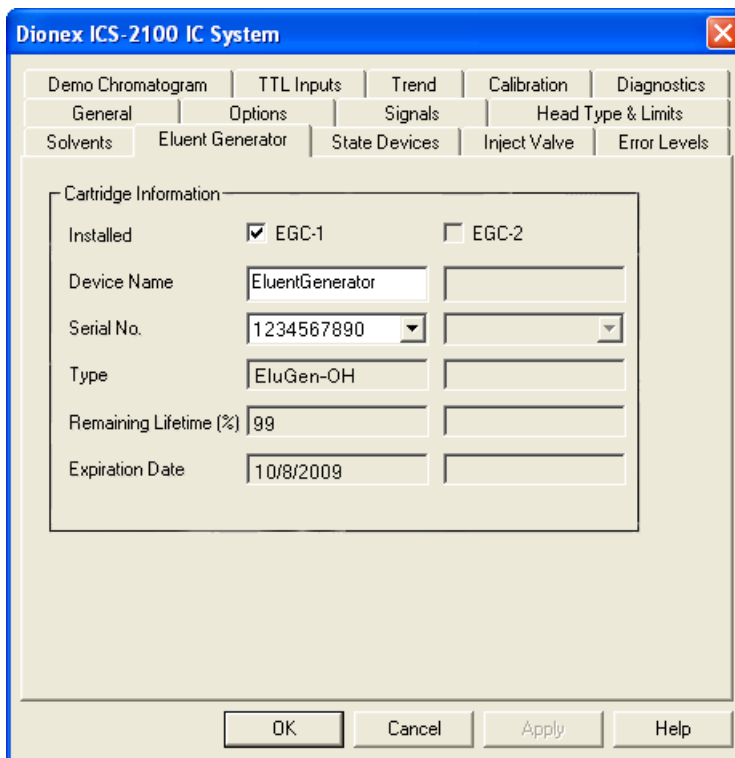
Figure 51. Eluent Generator Configuration Properties: OH Example

Conditioning the EluGen Cartridge

After completing the installation steps described in the previous sections, condition the EluGen cartridge for 30 minutes.

1. Set a temporary waste container, such as a beaker, on top of the ICS-2100 and direct the yellow backpressure coil from the EluGen cartridge **OUTLET** port to the container.

2. On the ICS-2100 touch screen **HOME** page, set the pump flow rate to **1.00 mL/min**.

3. Touch the **EGC** button on the **HOME** page to open the **ELUENT GENERATOR** page. Set the EGC concentration to **50 mM**.

4. Verify that the suppressor and CR-TC are off.

IMPORTANT	**To avoid damaging the suppressor and CR-TC, always turn off the suppressor and CR-TC before conditioning the EluGen cartridge. The pump flow is on during conditioning, however, no flow reaches the suppressor or CR-TC.**

5. Verify that the **Automatically turn on with pump** options are not selected on the ICS-2100 touch screen **SUPPRESSOR** page and **ELUENT GENERATOR** page. Disabling these options lets you turn on the pump, without automatically turning on the suppressor and CR-TC.

6. Verify that the eluent reservoir is filled with ASTM filtered, Type 1 (18 megohm-cm) deionized water (see Section 15).

7. Turn on the pump.

8. Turn on the EluGen cartridge.

9. Run at the selected settings (1.00 mL/min at 50 mM) for 30 minutes.

10. Turn off the EluGen cartridge.

11. Turn off the pump.

12. Disconnect the EluGen cartridge cable.

13. Remove the backpressure tubing from the waste container and remove the waste container.

14. Lift the EluGen cartridge out of the holder, turn it over, and set it in the service area.

15. Disconnect the backpressure coil from the EluGen cartridge **OUTLET** port.

16. Connect the **EGC OUT** line to the **OUTLET** port (see).

Figure 52. EGC Inlet and Outlet Connections

17. Turn over the EluGen cartridge. Check for bubbles; if necessary, shake and tap the EluGen cartridge to remove bubbles.

18. Reinstall the EluGen cartridge in the holder.

19. Do not reconnect the EluGen cartridge cable until after hydrating the CR-TC.

Hydrating the CR-TC

Always hydrate the CR-TC before initial operation. This requires running ASTM filtered, Type 1 (18 megohm-cm) deionized water through the CR-TC for 10 minutes, while bypassing the columns and suppressor.

Figure 53 illustrates the liquid flow path through the CR-TC during the hydration procedure.
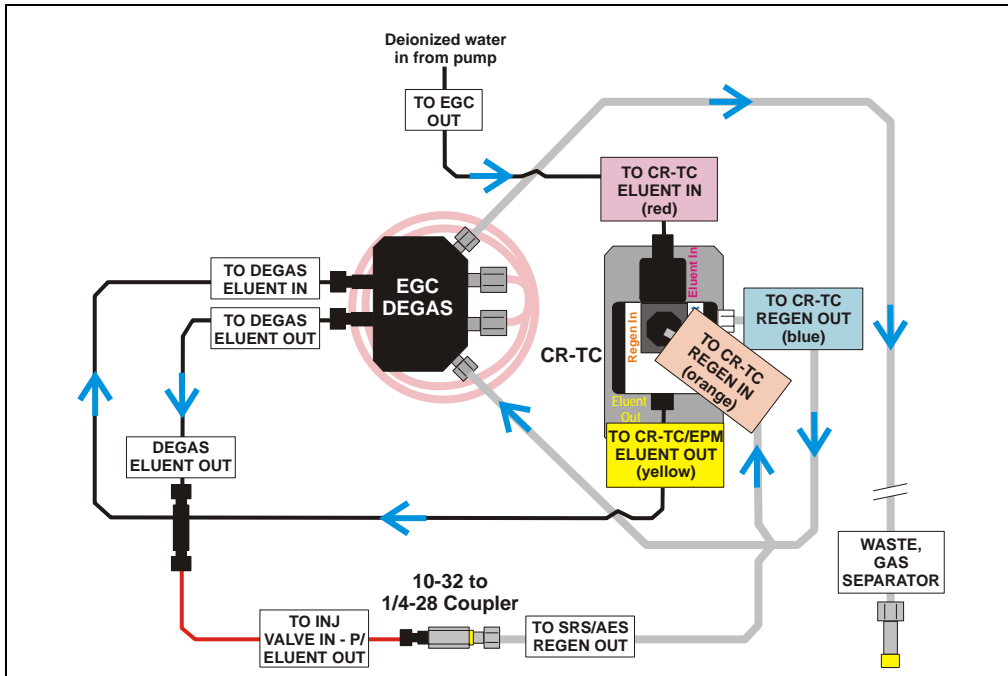
Figure 53. CR-TC Plumbing for Hydration

1. Disconnect the **TO INJ VALVE IN - P/ELUENT OUT** line from port **P** (**2**) on the injection valve.

2. Disconnect the **TO SRS/AES REGEN OUT** line from the suppressor.

3. Use a 10-32 to 1/4-28 coupler (P/N 042806) to connect the **TO INJ VALVE IN - P/ELUENT OUT** line to the **SRS/AES REGEN OUT** line.

4. Verify that the suppressor is off.

IMPORTANT

To avoid damaging the suppressor, always turn off the suppressor before hydrating the CR-TC. The pump flow is on during conditioning, however, no flow reaches the suppressor.

5. Verify that the **Automatically turn on with pump** option is not selected on the ICS-2100 touch screen **SUPPRESSOR** page. Disabling

this option lets you turn on the pump, without automatically turning on the suppressor.

6. Turn on the pump and set the flow to the rate recommended for your application.

7. Pump deionized water through the CR-TC for at least 10 minutes.

8. Turn off the pump and remove the coupler.

Completing the Eluent Generator Setup

1. Reconnect the **TO SRS/AES REGEN OUT** line to the **REGEN OUT** port on the suppressor.

2. Reconnect the **TO INJ VALVE IN - P/ELUENT OUT** line to port **P** (**2**) on the injection valve.

3. Reconnect the EluGen cartridge cable.

4. Remove the plug from the **CR-TC** connector on top of the ICS-2100

5. Orient the CR-TC's black 3-pin electrical cable connector as shown in Figure 48. Push it onto the **CR-TC** connector on the ICS-2100. Twist the ring on the cable connector and fingertighten to secure it.

Figure 54. Connecting the CR-TC Cable

NOTE **Backpressure tubing may be required between the injection valve and the EGC degas eluent outlet. The EluGen cartridge requires 14 to 16 MPa (2000 to 2300 psi) of system backpressure for removal of electrolysis gas from the eluent produced by the cartridge. See Section 19.1 for details.**

6. Go on to Section 19, "Equilibrating the System."

18.2 Eluent Generator Setup for Carbonate/Bicarbonate Eluent

Follow the instructions in this section if you are installing a K_2CO_3 cartridge, an EPM, and an EGC CO_3 Mixer (for generating carbonate/bicarbonate eluent).

- If you are installing a K_2CO_3 cartridge and an EGC CO_3 Mixer (for generating carbonate eluent), go to Section 18.3.

- If you are installing a KOH, LiOH, MSA, or NaOH EluGen cartridge and a CR-TC, go to Section 18.1.

Overview

The eluent generator setup procedure for carbonate/bicarbonate eluent consists of the following main steps:

- Installing the EluGen cartridge.

- Connecting the EluGen cartridge vent line.

- Installing the EPM.

- Plumbing the EPM for conditioning.

- Recording the EluGen cartridge and the EPM serial numbers in Chromeleon.

- Conditioning the EluGen cartridge and the EPM.

- Installing the EGC CO_3 Mixer.

- Temporarily filling the EGC CO_3 Mixer with deionized water.

- Filling the EGC CO_3 Mixer with eluent of the required concentration.

- Completing the eluent generator setup.

Items Required to Complete the Setup Procedure

The following items are required to setup the EluGen cartridge, EPM, and EGC CO_3 Mixer. Except as noted, all items are supplied in the ICS-2100 Ship Kit (P/N 064375).

Item	P/N	Used To
EPM mounting bracket	063624	Mount the EPM on the EGC holder.
35 cm (14 in) of black 0.25-mm (0.010-in) ID PEEK tubing	064340	Lengthen the line between the EGC degas eluent inlet and the EPM **ELUENT OUT** port.
30 cm (12 in) of black 0.25-mm (0.010-in) ID PEEK tubing	064334	Lengthen the line between the EluGen cartridge outlet and the EPM **ELUENT IN** port.
28 cm (11 in) of clear 1.58-mm (0.062-in) ID PTFE tubing	064337	Lengthen the line between the EGC degas regenerant inlet and the EPM **REGEN OUT** port.
EluGen Cartridge Vent Line Tubing Kit (supplied with the cartridge)	063092	Vent the cartridge during operation.
Yellow 0.5 mL/min, 7 MPa (1000 psi) backpressure coil	053765	Provide backpressure during setup procedures.
EGC CO_3 Mixer mounting clips	063642	Install the mixer.
Phillips head screwdriver (not supplied)	n/a	Install the EGC CO_3 Mixer mounting clips.
35 cm (14 in) of black 0.25-mm (0.010-in) ID PEEK tubing	064346	Connect the EGC degas eluent outlet and the EGC CO_3 Mixer inlet.
60 cm (24 in) of black 0.25-mm (0.010-in) ID PEEK tubing	064343	Connect the EGC CO_3 Mixer outlet to port **P** (**2**) on the injection valve.
Temporary waste container (beaker, bottle, etc.) (not supplied)	n/a	Collect waste during setup procedures.
10-32 to 10-32 coupler 10-32 to 1/4-28 coupler	042627 042806	Complete the connections.
10-32 fittings 10-32 ferrules	043275 043276	Complete the connections.
1/8-in fittings 1/8-in ferrules	052267 048949	Complete the connections.

Figure 55 illustrates the EluGen cartridge and EPM after installation.
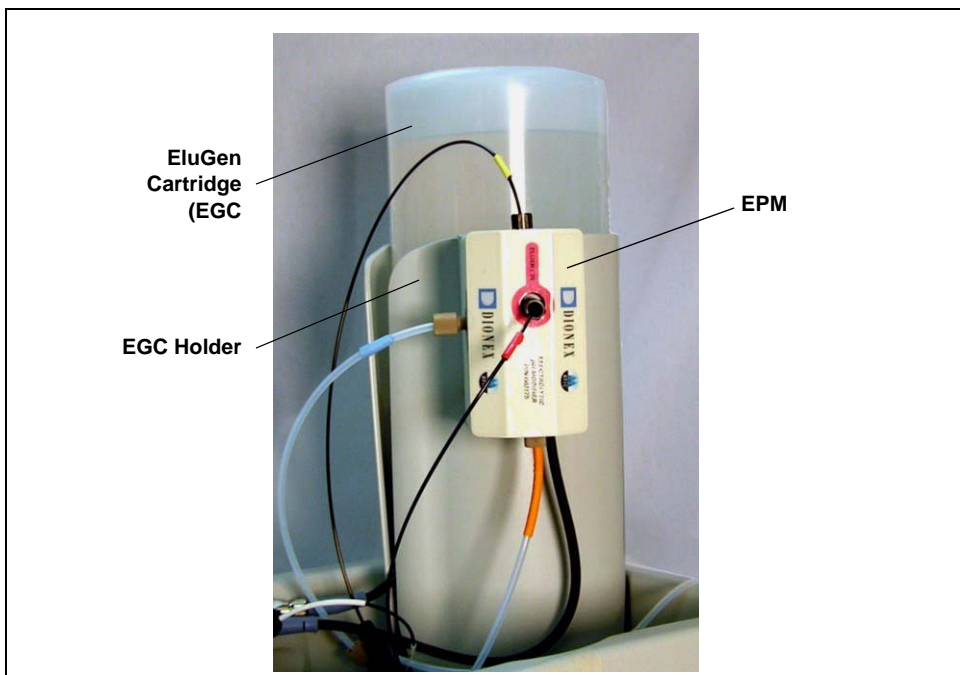
Figure 55. ICS-2100 with an EluGen Cartridge and EPM Installed

Figure 56 illustrates the liquid flow path through the eluent generator components after all setup steps are complete and the eluent generator is ready for operation.
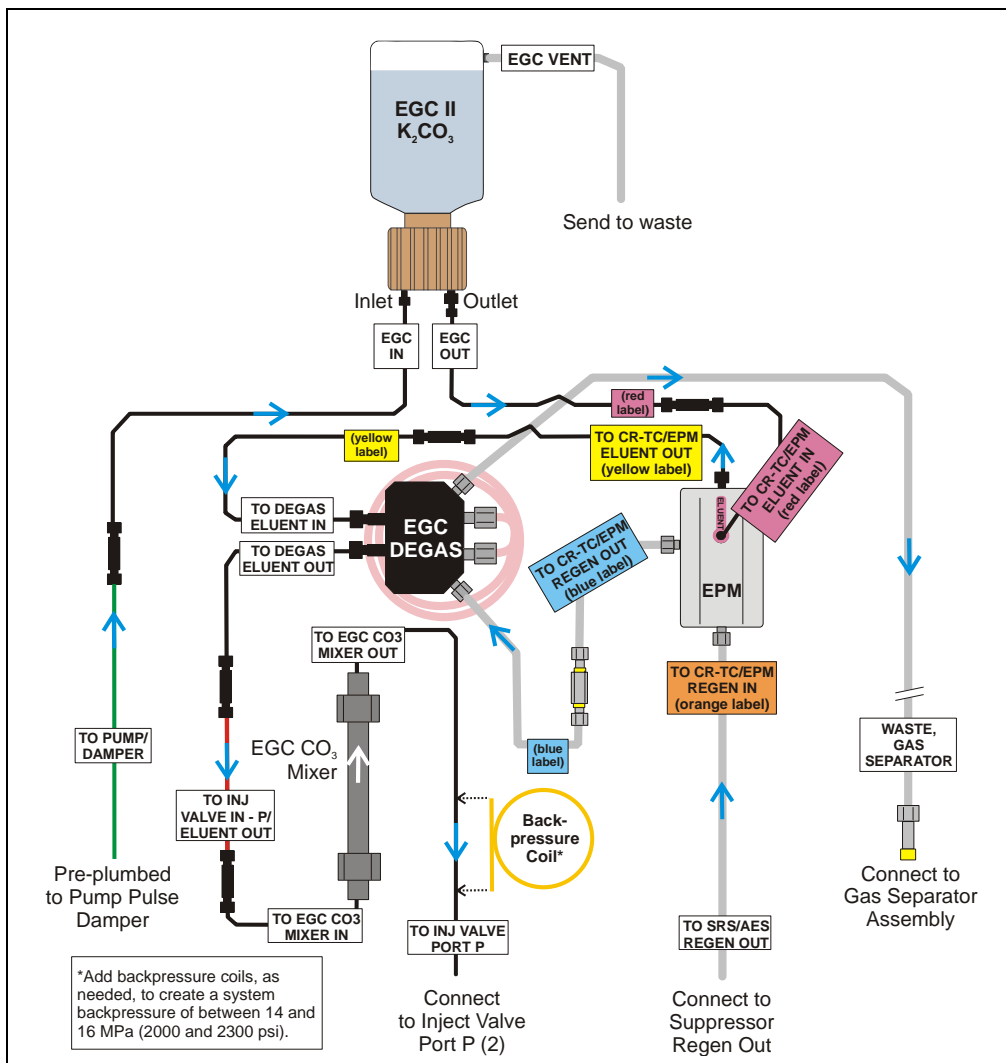
Figure 56. Eluent Generator Flow Schematic with an EPM and EGC CO$_3$ Mixer: Use for Generating Carbonate/Bicarbonate Eluent

Installing the EluGen Cartridge

1. Tilt the cartridge holder to view the bottom and brace the holder against the back corner of the ICS-2100 (see Figure 57).

Figure 57. Cartridge Holder (Tilted to View the Bottom)

2. Use the precut tubing assemblies included in the ICS-2100 Ship Kit to extend the length of three lines as described below:

   a. Disconnect the **TO CR-TC ELUENT IN** line (red label) from the coupler that connects it to the **TO CR-TC ELUENT OUT** line (yellow label). Connect a 32 to 10-32 coupler to the end of the **TO CR-TC ELUENT IN** line and connect the 30 cm (12 in) length of black PEEK tubing (red labels) (P/N 064334) to the coupler (see Figure 58).

   b. Connect the 35 cm (14 in) length of black PEEK tubing (yellow labels) (P/N 064340) to the coupler on the **TO CR-TC ELUENT OUT** line (yellow label).

   c. Disconnect the **TO CR-TC REGEN IN** line (orange label) from the coupler that connects it to the **TO CR-TC REGEN OUT** line (blue label). Connect the 28 cm (11 in) length of clear PTFE tubing (blue labels) (P/N 064337) to the coupler on the **TO CR-TC REGEN OUT** line (blue label).
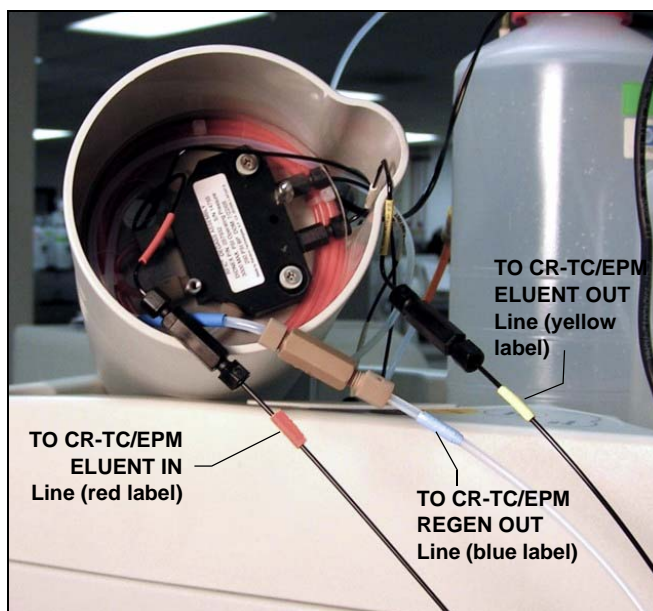
Figure 58. EPM Eluent and Regen Line Extensions

3. Pull the **TO CR-TC REGEN IN** line (orange label) out of the opening on the side of the holder.

4. Thread the three extended lines (red, yellow, and blue labels) through the opening on the side of the holder (see Figure 59).
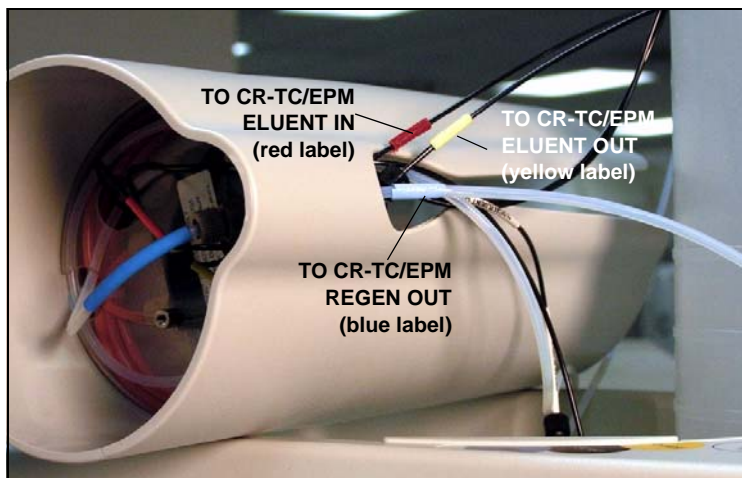
Figure 59. TO CR-TC/EPM Lines Outside of Holder

5. Turn the EGC holder right-side up and set it back into position.

6. Orient the EluGen cartridge with the fittings facing up and remove the plugs from the cartridge **INLET** and **OUTLET** fittings (see Figure 60).
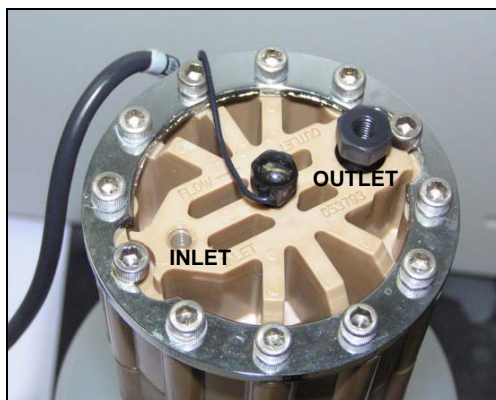
Figure 60. EluGen Cartridge Fitting Plugs

7. Set the EluGen cartridge in the service area on top of the ICS-2100 and orient it with the cable toward the EGC holder (see Figure 61).

Figure 61. EluGen Cartridge in Service Area

8. Pull the coiled black **EGC IN** and **EGC OUT** lines out from inside the EGC holder. Disconnect the **EGC IN** line from the coupler that connects it to the **EGC OUT** line.

9. Connect the **EGC IN** line to the EluGen cartridge **INLET** port (see Figure 62).

10. Remove the coupler and connect the **EGC OUT** line to the EluGen cartridge **OUTLET** port.

Figure 62. EluGen Cartridge Inlet and Outlet Port Connections

11. Turn the EluGen cartridge over (with the fittings facing down). **Shake the EluGen cartridge vigorously, and tap it with the palm of your**

hand 10 to 15 times. Check that all bubbles trapped in the eluent generation chamber are dislodged.

⚠ **CAUTION**

The EluGen cartridge contains one of the following: a corrosive base (KOH, LiOH, or NaOH), a corrosive acid (MSA), or a concentrated K_2CO_3 solution. Wear protective eyewear and gloves when handling the cartridge.

⚠ **MISE EN GARDE**

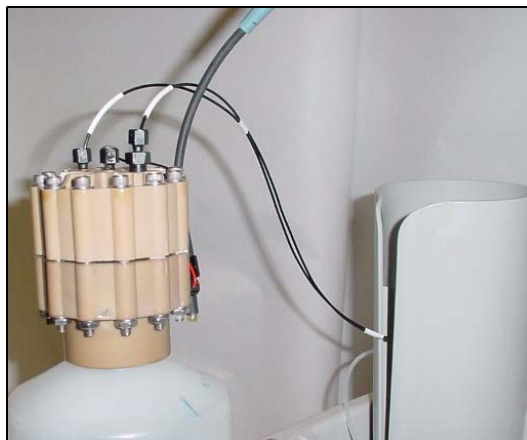**La cartouche d'EluGen contient un de ce qui suit: une base corrosive (KOH, LiOH, ou NaOH), un acide corrosif (MSA), ou une solution concentrée de K_2CO_3. Porter des lunettes et des gants protectives en manipulant la cartouche.**

⚠ **VORSICHT**

Die EluGen-Kassette enthält eine korrodierende Base (KOH, LiOH oder NaOH), eine korrodierende Säure (MSA) oder eine konzentrierte K_2CO_3-Lösung. Tragen Sie daher beim Umgang mit Kassette eine Schutzbrille und Handschuhe.

12. Slide the EluGen cartridge down into the holder until it stops (see Figure 63). Make sure the cable remains out of the holder.

    NOTE **To avoid crimping the lines, do not twist the cartridge when you slide it into the holder. The lines are designed to coil inside the holder.**

Figure 63. EluGen Cartridge Installed in the Holder

13. Remove the plug from the **EGC-1** connector on top of the ICS-2100.

14. Orient the cartridge's blue 4-pin electrical cable connector as shown in Figure 64. Push it onto the **EGC-1** connector on the ICS-2100. Twist the ring on the cable connector fingertight to secure it.

Figure 64. Connecting the EluGen Cartridge Cable

Connecting the EluGen Cartridge Vent Line

1. Locate the EluGen Cartridge Vent Line Tubing Kit supplied with the EluGen cartridge.

2. Slide the label onto one end of the tubing and then push the barbed luer lock onto the tubing.

3. Unscrew and remove the plug from the vent opening on the side of the EluGen cartridge (see Figure 65).

Figure 65. EluGen Cartridge Vent Plug

4. Screw the luer adapter onto the vent opening. Remove the cap on the luer adapter by twisting. **Save the cap.**

5. Twist the luer lock and EluGen cartridge vent line into the luer adapter (see Figure 66).
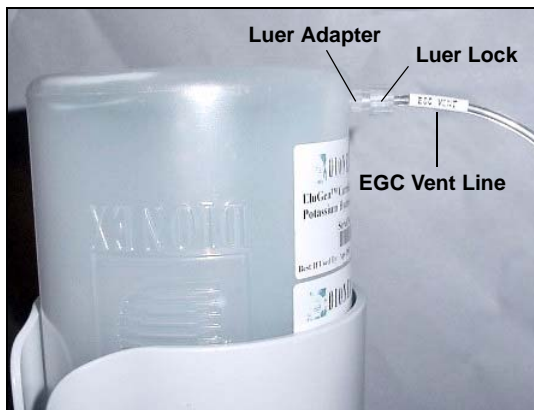
Figure 66. Installing the EluGen Cartridge Vent Line

NOTE **To prevent leaks from the EluGen cartridge, always replace the luer adapter cap before moving the EluGen cartridge.**

6. Direct the vent line to the waste container and insert it down into the waste, gas separator tube about 10 to 15 cm (4 to 6 in).

Installing the EPM

1. Remove the plugs from the EPM eluent and regen liquid ports.

2. Push the EPM onto the ball studs on the mounting bracket (see Figure 67).
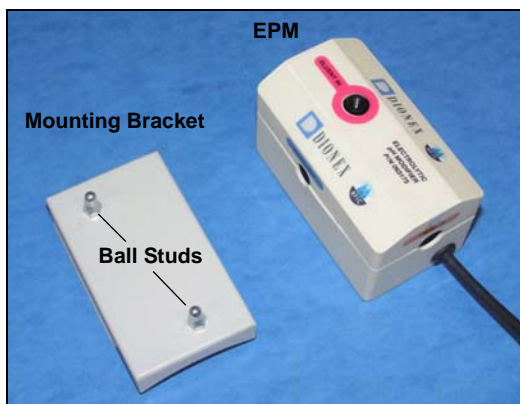
Figure 67. EPM and Mounting Bracket

3. Lift the EluGen cartridge up slightly from the EGC holder and slide the EPM bracket onto the side of the holder (see Figure 68).

Figure 68. EPM and Mounting Bracket Installed on EGC Holder

4. Connect the following lines to the EPM:

   - Connect the **TO CR-TC/EPM ELUENT OUT** line (yellow label) to the **ELUENT OUT** port on the EPM (see Figure 69).

   - Connect the **TO CR-TC/EPM ELUENT IN** line (red label) to the **ELUENT IN** port on the EPM.

   - Connect the **TO CR-TC/EPM REGEN IN** line (orange label) to the **REGEN IN** port on the EPM.

   - Connect the **TO CR-TC/EPM REGEN OUT** line (blue label) to the **REGEN OUT** port on the EPM.
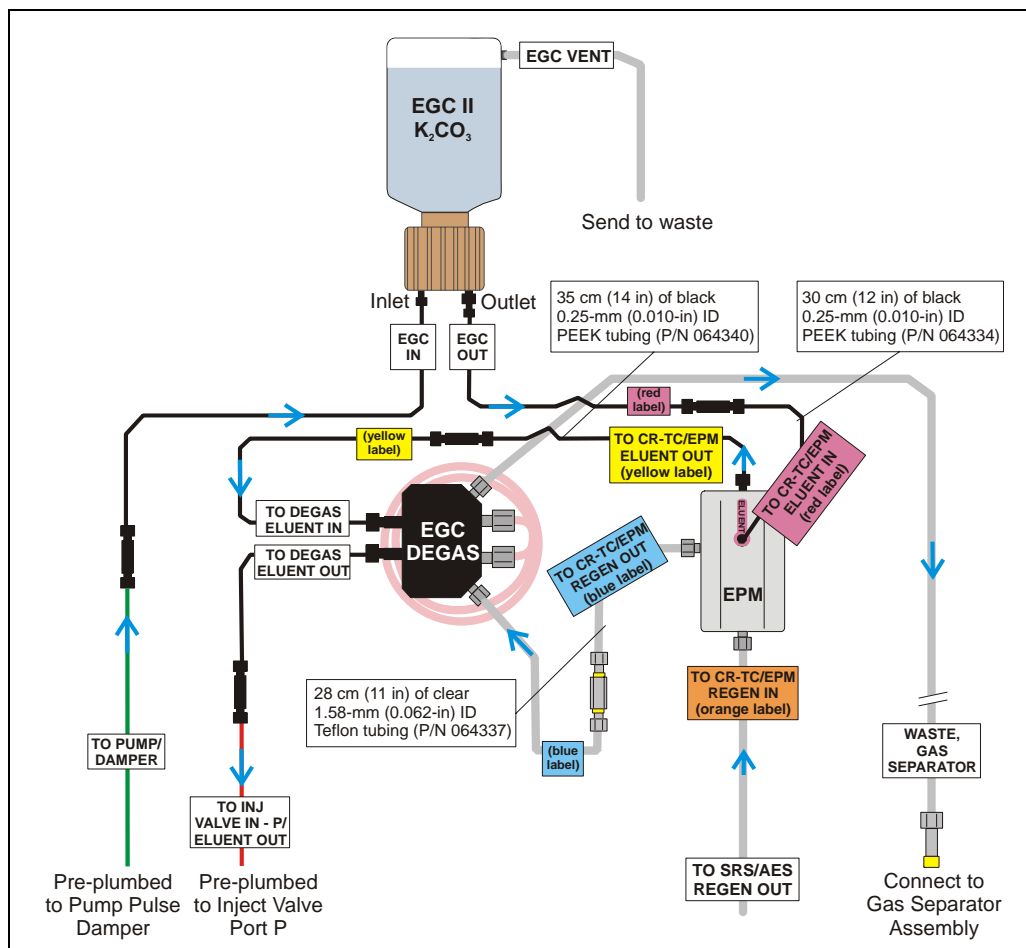
Figure 69. EluGen Cartridge and EPM Plumbing with Tubing Extensions

5. Remove the plug from the **EGC-2** connector on top of the ICS-2100.

6. Connect the EPM electrical cable to the **EGC-2** connector.

Recording the EluGen Cartridge and EPM Serial Numbers in Chromeleon

The serial numbers are printed on labels on the EluGen cartridge and EPM.

1. Open the Server Configuration program (select **Start > Programs > Chromeleon > Server Configuration**).

2. Double-click the ICS-2100 system icon. The properties dialog box for the ICS-2100 appears.

3. Click the **Eluent Generator** tab (see Figure 70).

4. Select the **EGC-1** check box and enter the EluGen cartridge serial number.

5. Select the **EGC-2** check box and enter the serial number of the EPM.

6. Click **OK**.

Figure 70. Eluent Generator Configuration Properties: CO$_3$ / EPM Example

Plumbing the EluGen Cartridge and EPM for Conditioning

Figure 71 illustrates the liquid flow path through the EluGen cartridge and EPM during the conditioning procedure.
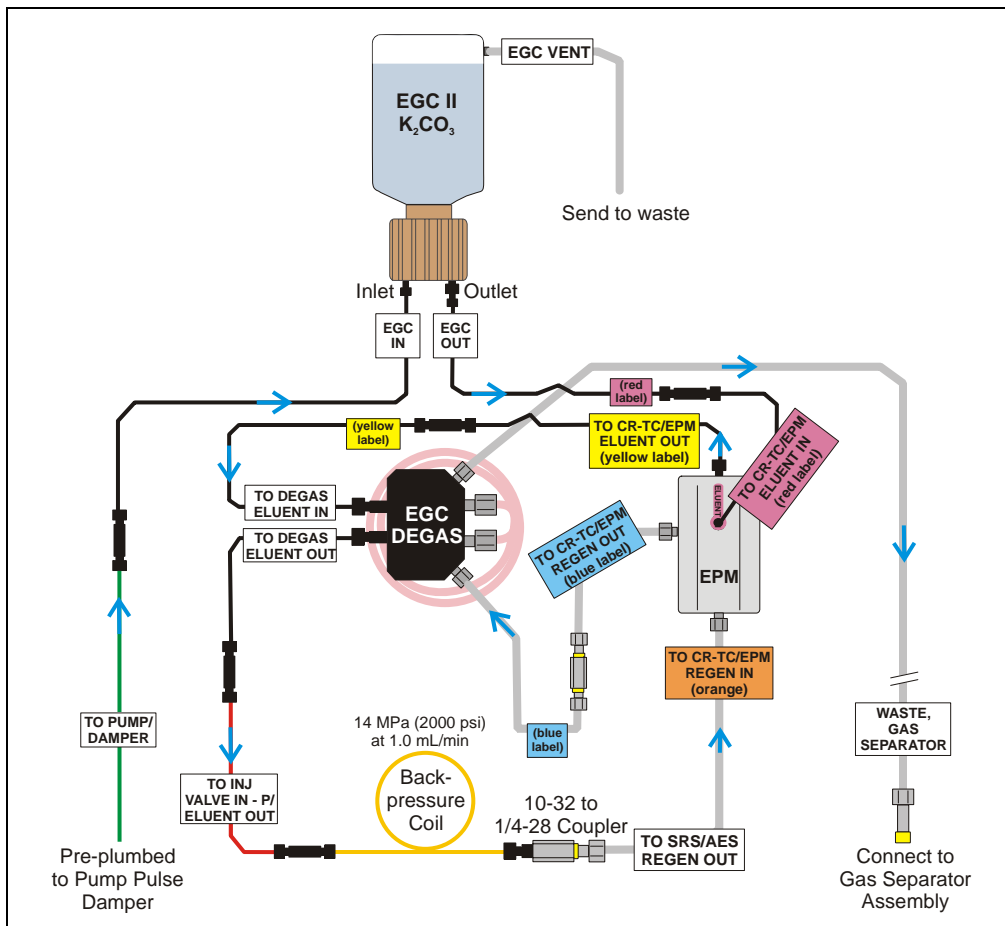
Figure 71. EluGen Cartridge and EPM Plumbing for Conditioning with Carbonate/Bicarbonate Eluent

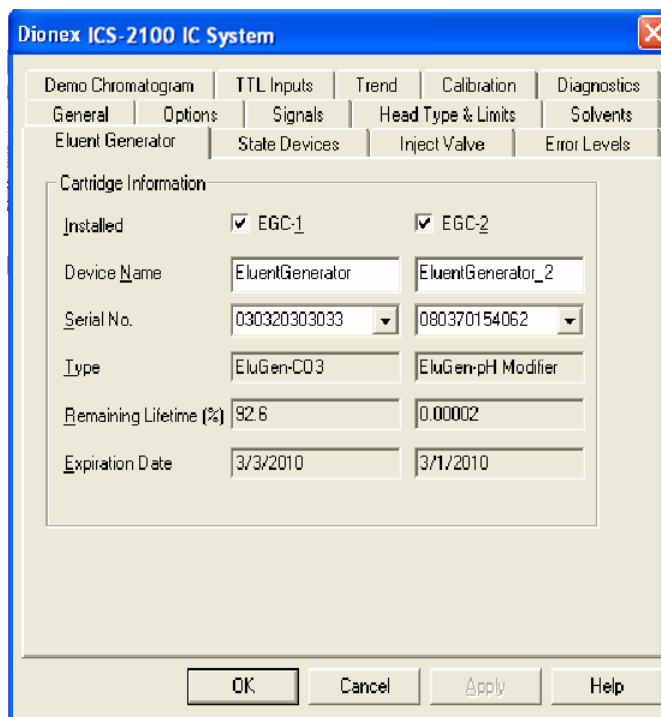1. Disconnect the **TO INJ VALVE IN - P/ELUENT OUT** line from port **P** (**2**) on the injection valve.

2. Use a 10-32 to 10-32 coupler (P/N 042627) to connect the yellow 0.5 mL/min, 7 MPa (1000 psi) backpressure coil (P/N 053765) to the **TO INJ VALVE IN - P/ELUENT OUT** line.

3. Connect a 10-32 to 1/4-28 coupler (P/N 042806) to the free end of the backpressure coil.

4. Disconnect the **TO SRS/AES REGEN OUT** line from the suppressor **REGEN OUT** port.

5. Connect the **TO SRS/AES REGEN OUT** line to the 10-32 to 1/4-28 coupler (see Figure 72).

   NOTE **The backpressure coil connection in Figure 72 is temporary; it is required only during the EPM and EluGen cartridge conditioning procedure described in the next section.**

Figure 72. Backpressure Coil Connections for Conditioning the EluGen Cartridge and EPM with Carbonate/Bicarbonate Eluent

Conditioning the EPM and EluGen Cartridge

After completing the plumbing connections described in the previous sections, follow the steps below to hydrate the EPM for 5 minutes and then condition the EPM and EluGen cartridge for 30 minutes.

1. Make sure the eluent reservoir is filled with ASTM filtered, Type I (18-megohm) deionized water.
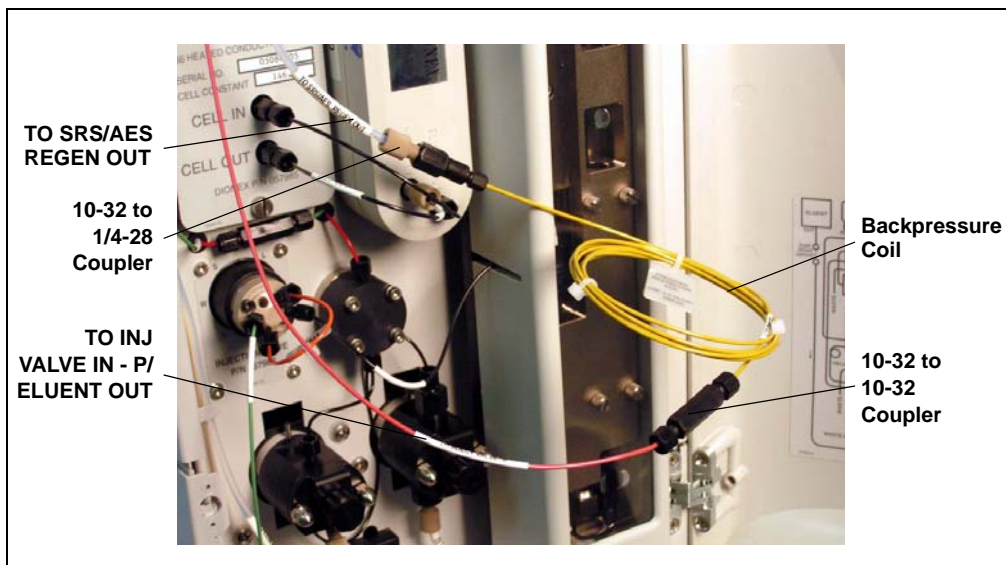
2. Verify that the suppressor is off.

<div style="border:1px solid">IMPORTANT</div> **To avoid damaging the suppressor, always turn off the suppressor before conditioning the EPM and EluGen cartridge. The pump flow is on during conditioning, however, no flow reaches the suppressor.**

3. Verify that the **Automatically turn on with pump** option is not selected on the ICS-2100 touch screen **SUPPRESSOR** page. Disabling this option lets you turn on the pump, without automatically turning on the suppressor.

4. On the ICS-2100 touch screen **HOME** page, set the pump flow rate to **1.00 mL/min**.

5. Turn on the pump.

6. Run the pump for 5 minutes to hydrate the EPM.

7. Touch the **EGC** button on the **HOME** page to open the **ELUENT GENERATOR** page.

8. Verify that the cartridge type for **EGC-1** is **Carb** and the type for **EGC-2** is **pH Mod**.

   If the cartridge types are wrong, make sure the cartridge serial numbers were entered correctly in the Chromeleon Server Configuration program (see <u>"Recording the EluGen Cartridge and EPM Serial Numbers in Chromeleon" on page 67</u>).

9. Select the following settings:

   • Set the **EGC-1** concentration to **9 mM**.

   • Set the **EGC-2** concentration to **1 mM**.

10. Turn on the EGC-1 and EGC-2 currents.

11. Run the EluGen cartridge and EPM at these settings for 30 minutes.

12. Turn off the EGC-1 and EGC-2 current.

13. Turn off the pump.

Installing the EGC CO₃ Mixer

[Figure 73](#) illustrates the EGC CO₃ Mixer after installation.
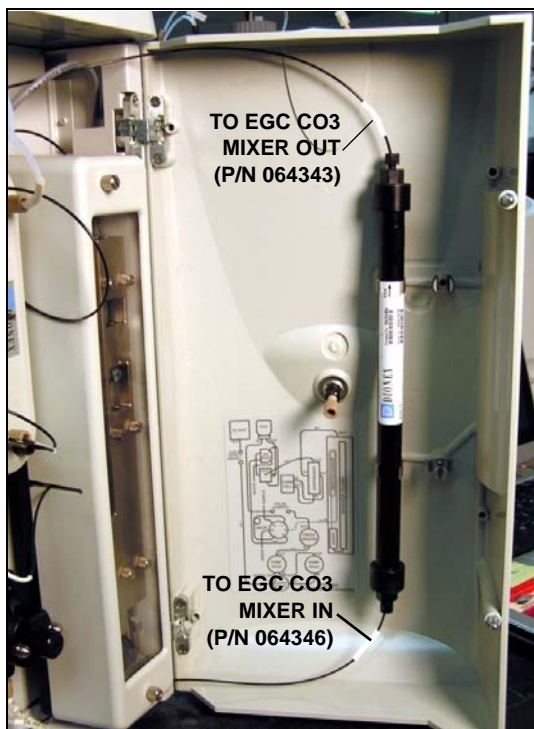
Figure 73. ICS-2100 with an EGC CO₃ Mixer Installed

1. Use a Phillips head screwdriver to remove the existing small diameter mounting clips from the inside of the ICS-2100 door.

2. Install the larger diameter clips (P/N 063642) (see Figure 74).
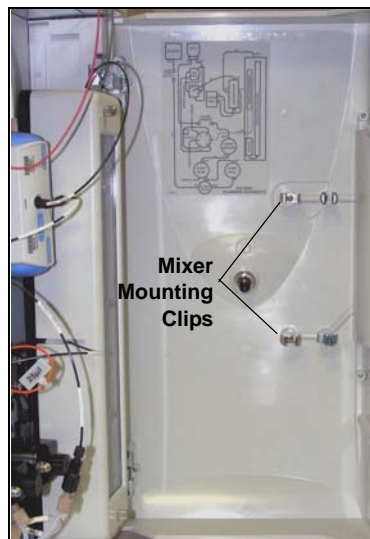
Figure 74. Location of Mounting Clips for the EGC CO3 Mixer

3. Orient the mixer with the outlet pointing upward and push it onto the clips (see Figure 75). The mixer outlet must point upward to ensure thorough mixing of the eluent.

4. Locate the 35 cm (14 in) length of black PEEK tubing (white labels) (P/N 064346). Connect the end labeled **TO EGC CO3 MIXER IN** to the mixer inlet.

5. Locate the 60 cm (24 in) length of black PEEK tubing (white labels) (P/N 064343). Connect the end labeled **TO EGC CO3 MIXER OUT** to the mixer outlet.

Figure 75. EGC CO$_3$ Mixer Installed on the ICS-2100 Door

Filling the EGC CO$_3$ Mixer with Deionized Water

1. Verify that the EGC-1 and EGC-2 currents are off.

2. Disconnect the EluGen cartridge inlet line (labeled **TO PUMP/DAMPER**) from the coupler that connects it to the green pump outlet line (see Figure 76).
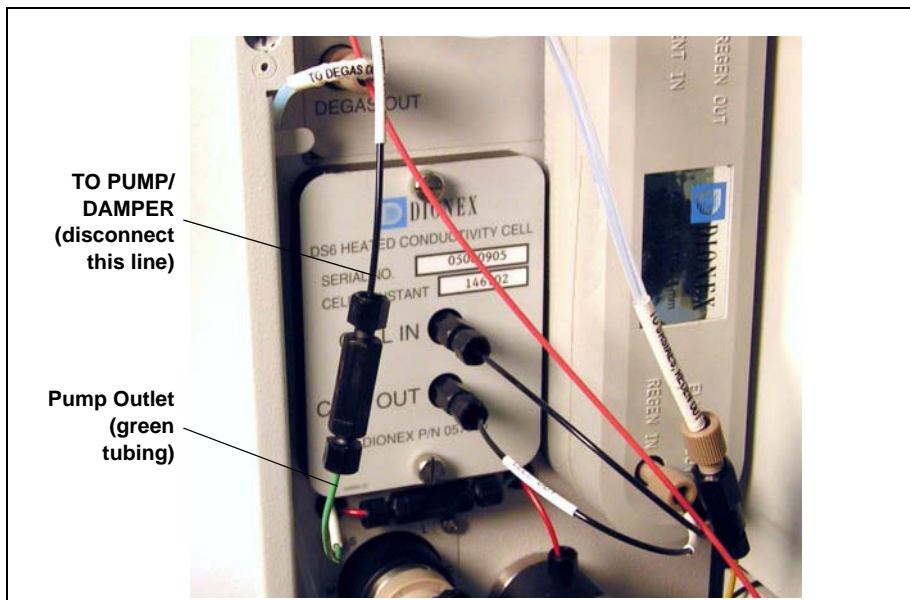
Figure 76. EluGen Cartridge Inlet and Pump Outlet

3. Connect the pump outlet to the mixer inlet (see Figure 77).
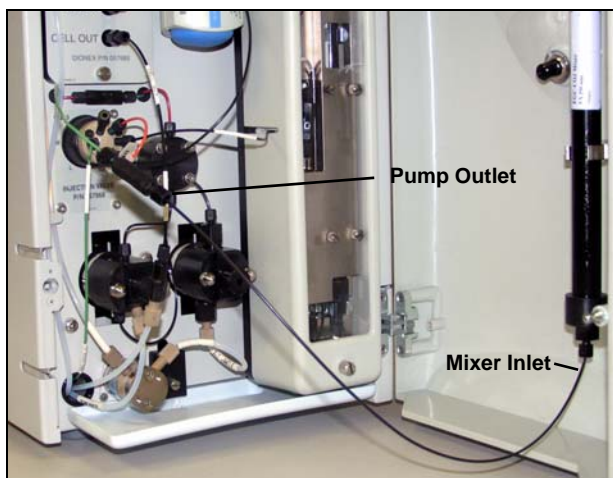
Figure 77. Pump Outlet Connected to Mixer Inlet for Mixer Hydration

4. Direct the mixer outlet line to a temporary waste container, such as a beaker.

5. Verify that the suppressor is off.

IMPORTANT **To avoid damaging the suppressor, always turn off the suppressor before filling the mixer. The pump flow is on during filling, however, no flow reaches the suppressor.**

6. Verify that the **Automatically turn on with pump** option is not selected on the ICS-2100 touch screen **SUPPRESSOR** page. Disabling this option lets you turn on the pump, without automatically turning on the suppressor.

7. Set the pump flow rate to **5.00 mL/min.**

8. Turn on the pump.

9. Run the pump until the mixer is filled and there is a consistent flow of water exiting the mixer outlet.

   It takes about 5 minutes to fill a 4-mm mixer and about 2 minutes to fill a 2-mm mixer.

10. Turn off the pump.

Filling the EGC CO$_3$ Mixer with the Carbonate/Bicarbonate Eluent

Before initial use, follow the steps in this section to fill the EGC CO$_3$ Mixer with the carbonate/bicarbonate eluent concentration required for the application to be run.

Figure 78 illustrates the liquid flow path through the eluent generator components during initial filling of the EGC CO$_3$ Mixer with carbonate/bicarbonate eluent.
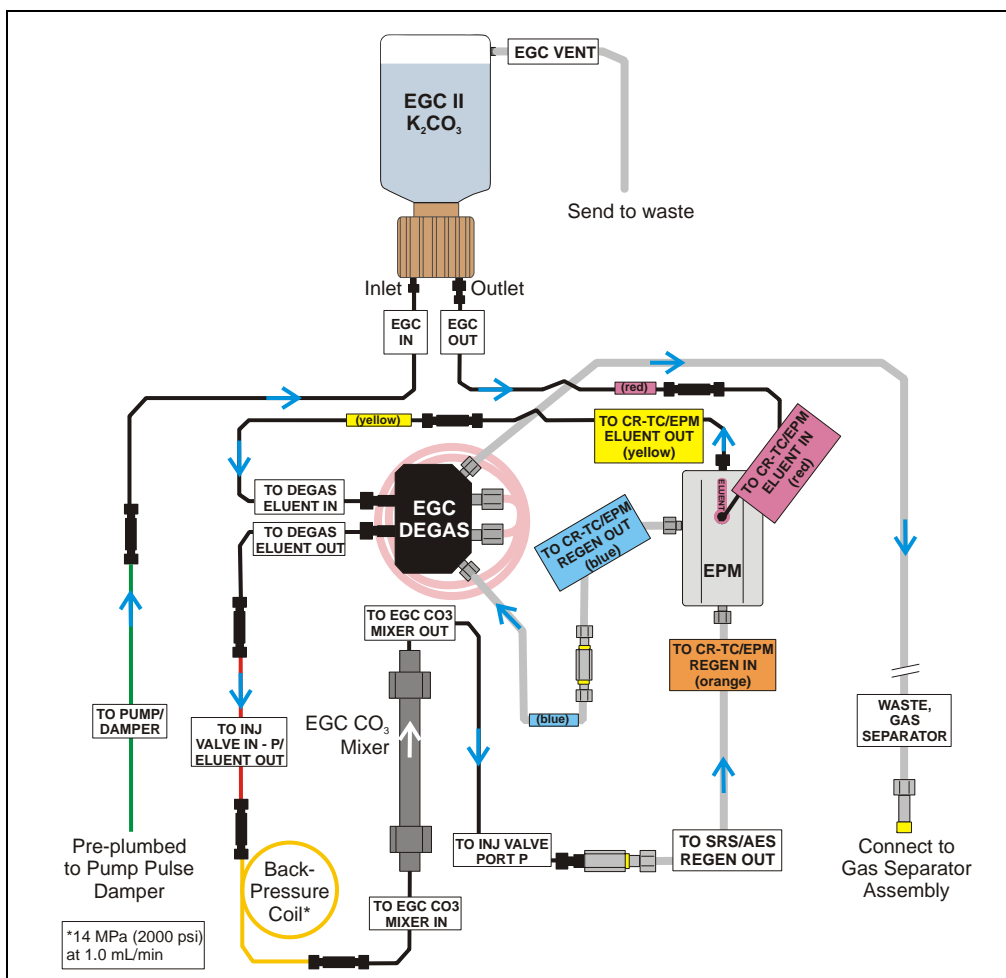
Figure 78. EluGen Cartridge and EPM Plumbing for Initial Filling of the EGC CO$_3$ Mixer with Carbonate/Bicarbonate Eluent

1. Disconnect the pump outlet from the mixer inlet.

2. Reconnect the pump outlet and the EluGen cartridge inlet.

3. Connect a 10-32 to 10-32 coupler to the mixer inlet.

4. Disconnect the outlet of the yellow PEEK backpressure coil from the **TO SRS/AES REGEN OUT** line and then connect the backpressure coil to the mixer inlet (see).

5. Connect the mixer outlet to the **TO SRS/AES REGEN OUT** line.

> **NOTE** **The backpressure coil connection is temporary; it is required only during initial filling of the mixer.**
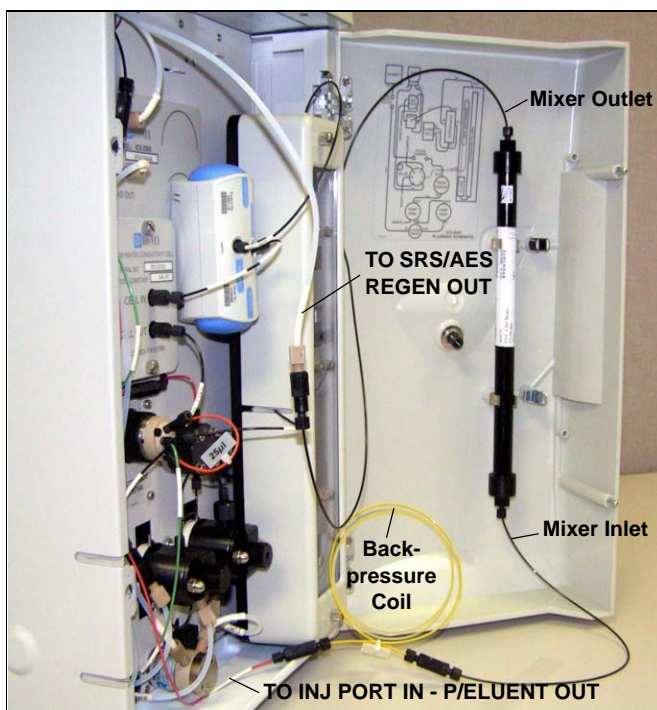
Figure 79. Mixer Connected Directly to Eluent Generator Outlet for Initial Filling

6. Verify that the suppressor is off.

To avoid damaging the suppressor, always turn off the suppressor before filling the mixer. The pump flow is on during filling, however, no flow reaches the suppressor.

7. Verify that the **Automatically turn on with pump** option is not selected on the ICS-2100 touch screen **SUPPRESSOR** page. Disabling this option lets you turn on the pump, without automatically turning on the suppressor.

8. Set the pump flow rate to the rate required for the application.

9. Turn on the pump.

10. Verify that the system backpressure is between 14 and 16 MPa (2000 and 2300 psi). If necessary, adjust the pressure by adding or removing backpressure tubing.

11. Set the **EGC-1** and **EGC-2** concentrations to the values required for your application. For example, for a 3.5 mM K_2CO_3/1.0 mM $KHCO_3$ mixture, set the **EGC-1** concentration to 3.5 mM and the **EGC-2** concentration to 1.0 mM.

12. Turn on the **EGC-1** and **EGC-2** currents.

13. Run at the selected settings until the mixer is filled with the eluent mixture. At a flow rate of 1 mL/min it will take about 45 minutes to fill the 4-mm mixer and about 15 minutes to fill the 2-mm mixer.

> **NOTE The void volume of the 4-mm mixer is about 16 mL. The void volume of the 2-mm mixer is about 5 mL.**

14. Turn off the **EGC-1** and **EGC-2** currents.

15. Turn off the pump.

16. Remove the yellow PEEK backpressure coil from the **TO INJ VALVE IN - P/ELUENT OUT** line and the mixer inlet.

17. Disconnect the mixer outlet from the **TO SRS/AES REGEN OUT** line and remove the 10-32 to 1/4-28 coupler.

18. Reconnect the **TO SRS/AES REGEN OUT** line to the suppressor **REGEN OUT** port.

Completing the Eluent Generator Setup for Carbonate/Bicarbonate Eluent

Figure 80 illustrates the liquid flow path through the ICS-2100 after all setup steps are complete and the eluent generator is ready for operation.
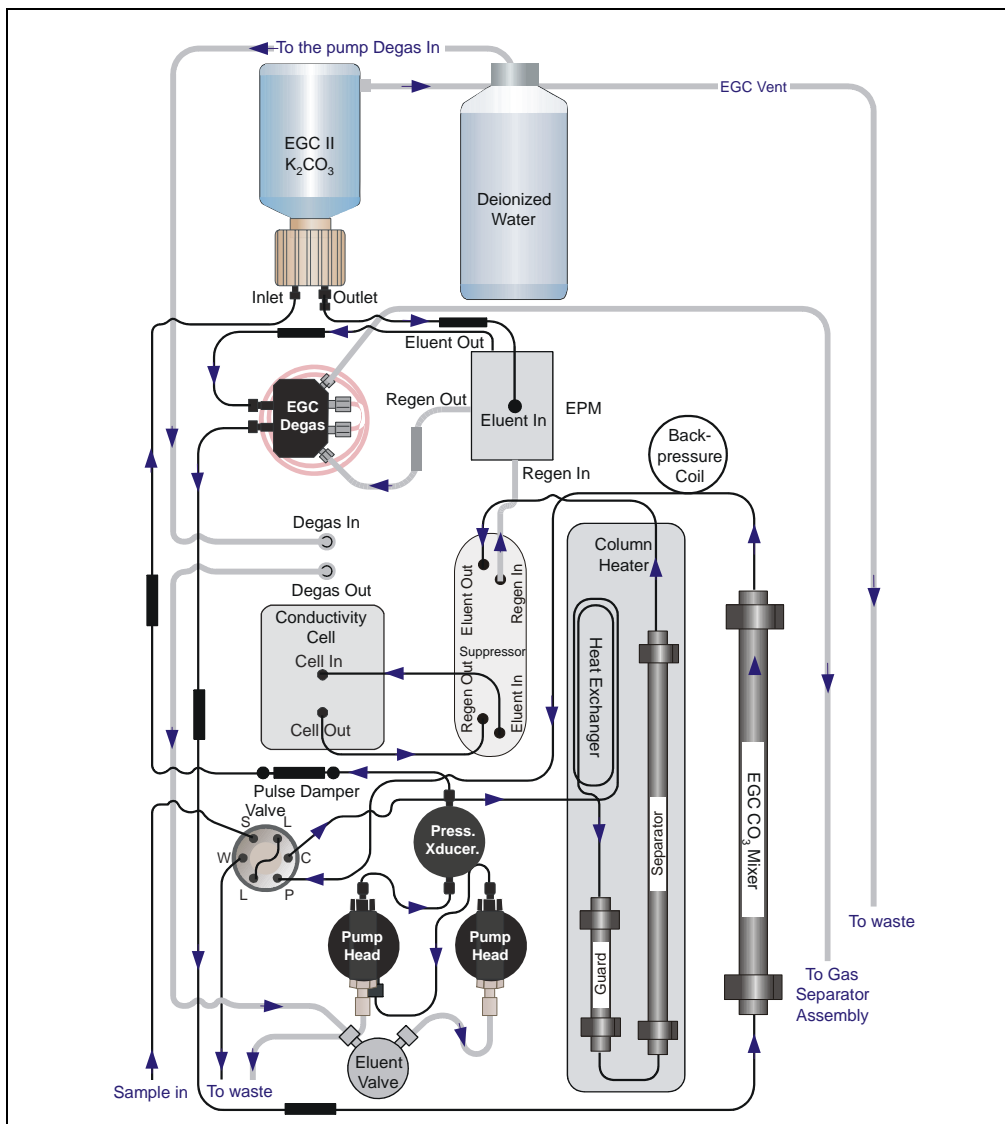
Figure 80. ICS-2100 Flow Schematic: Carbonate/Bicarbonate Eluent Generation

1. Connect the **TO INJ VALVE IN - P/ELUENT OUT** line to the coupler attached to the mixer inlet line. Route this line along the back of the drip tray to prevent it from being pinched when the ICS-2100 door is opened and closed

2. Route the mixer outlet line to the back of the component panel (see Figure 81).

3. Connect the mixer outlet line to port **P** (**2**) on the injection valve.

Figure 81. Mixer Outlet Routed to the Back of the Component Panel

> **NOTE** **Backpressure tubing may be required between the injection valve and the EGC CO$_3$ Mixer outlet. The EluGen cartridge requires 14 to 16 MPa (2000 to 2300 psi) of system backpressure for removal of electrolysis gas from the eluent produced by the cartridge. See Section 19.1 for details.**

4. Go on to Section 19, "Equilibrating the System."

18.3 Eluent Generator Setup for Carbonate Eluent

Follow the instructions in this section if you are installing a K_2CO_3 cartridge and an EGC CO_3 Mixer (for generating carbonate eluent).

- If you are installing a KOH, LiOH, MSA, or NaOH EluGen cartridge and a CR-TC, go to .

- If you are installing a K_2CO_3 cartridge, an EPM, and an EGC CO_3 Mixer (for generating carbonate/bicarbonate eluent), go to .

Overview

The eluent generator setup procedure for carbonate eluent consists of the following main steps:

- Installing the EluGen cartridge and preparing for conditioning.

- Conditioning the EluGen cartridge.

- Installing the EGC CO_3 Mixer.

- Filling the EGC CO_3 Mixer with the eluent concentration required for the application.

- Completing the eluent generator setup.

Items Required to Complete the Setup Procedure

In addition to the EluGen cartridge and the EGC CO_3 Mixer, you will need the following items to complete the eluent generator setup. Except as noted, all items are supplied in the ICS-2100 Ship Kit (P/N 064375).

Item	P/N	Use To
Yellow 0.5 mL/min, 7 MPa (1000 psi) backpressure coil	053765	Provide backpressure during setup procedures.
EluGen Cartridge Vent Line Tubing Kit (supplied with the cartridge)	063092	Vent the cartridge during operation.
EGC CO_3 Mixer mounting clips	063642	Install the mixer.
Phillips head screwdriver (not supplied)	n/a	Install the EGC CO_3 Mixer mounting clips.
35 cm (14 in) of black 0.25-mm (0.010-in) ID PEEK tubing	064346	Connect the EGC degas eluent outlet and the EGC CO_3 Mixer inlet.
60 cm (24 in) of black 0.25-mm (0.010-in) ID PEEK tubing	064343	Connect the EGC CO_3 Mixer outlet to port **P** (**2**) on the injection valve.
Temporary waste container (beaker, bottle, etc.) (not supplied)	n/a	Collect waste during setup procedures.
10-32 fittings 10-32 ferrules	043275 043276	Complete the plumbing connections.
1/8-in fittings 1/8-in ferrules	052267 048949	Complete the plumbing connections.
10-32 to 10-32 couplers	042627	Complete the plumbing connections.

[Figure 82](#) illustrates the liquid flow path through the eluent generator components after all setup steps are complete and the eluent generator is ready for operation.
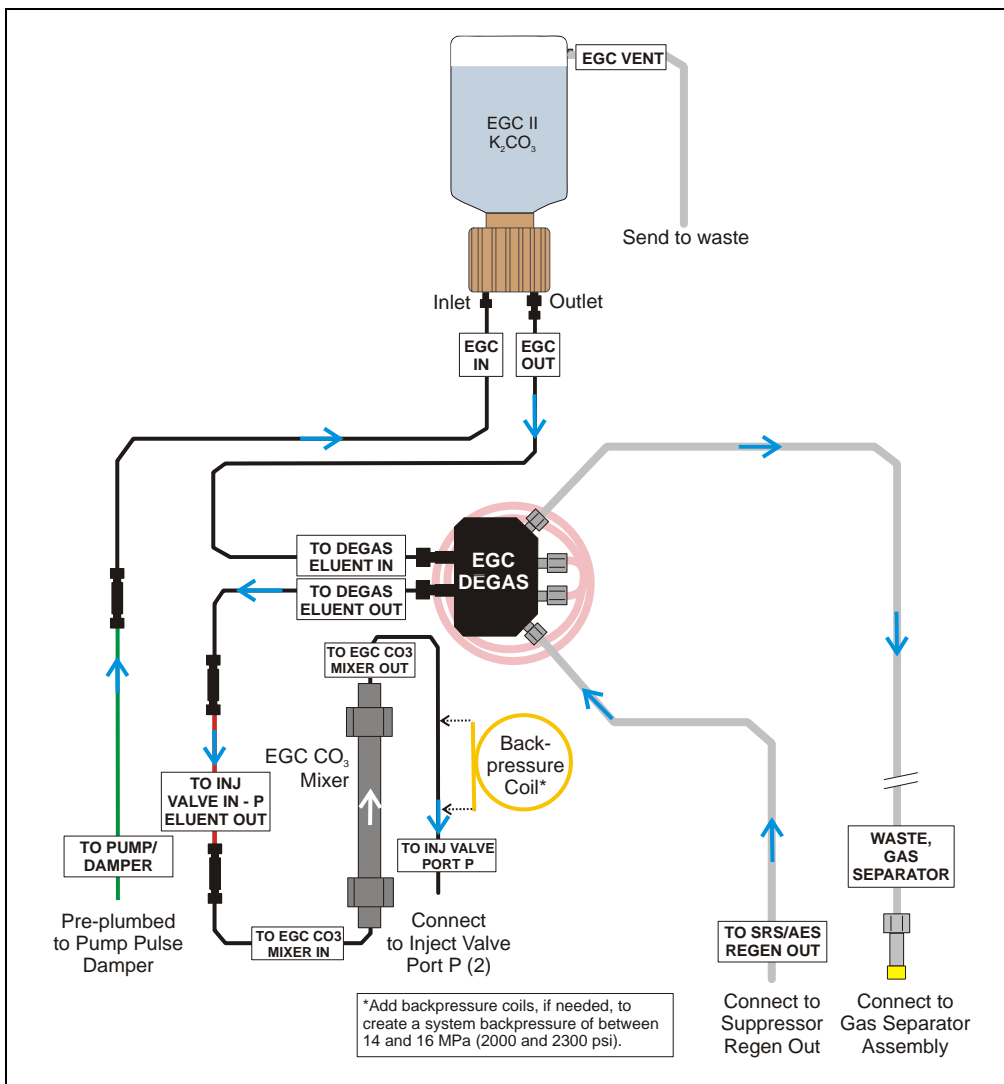
Figure 82. Eluent Generator Flow Schematic with an EGC CO$_3$ Mixer: Use for Generating Carbonate Eluent

Installing the EluGen Cartridge and Preparing for Conditioning

Follow the steps in this section to install the EluGen cartridge and prepare it for conditioning before initial use.

Figure 83 illustrates the liquid flow path during the conditioning procedure.
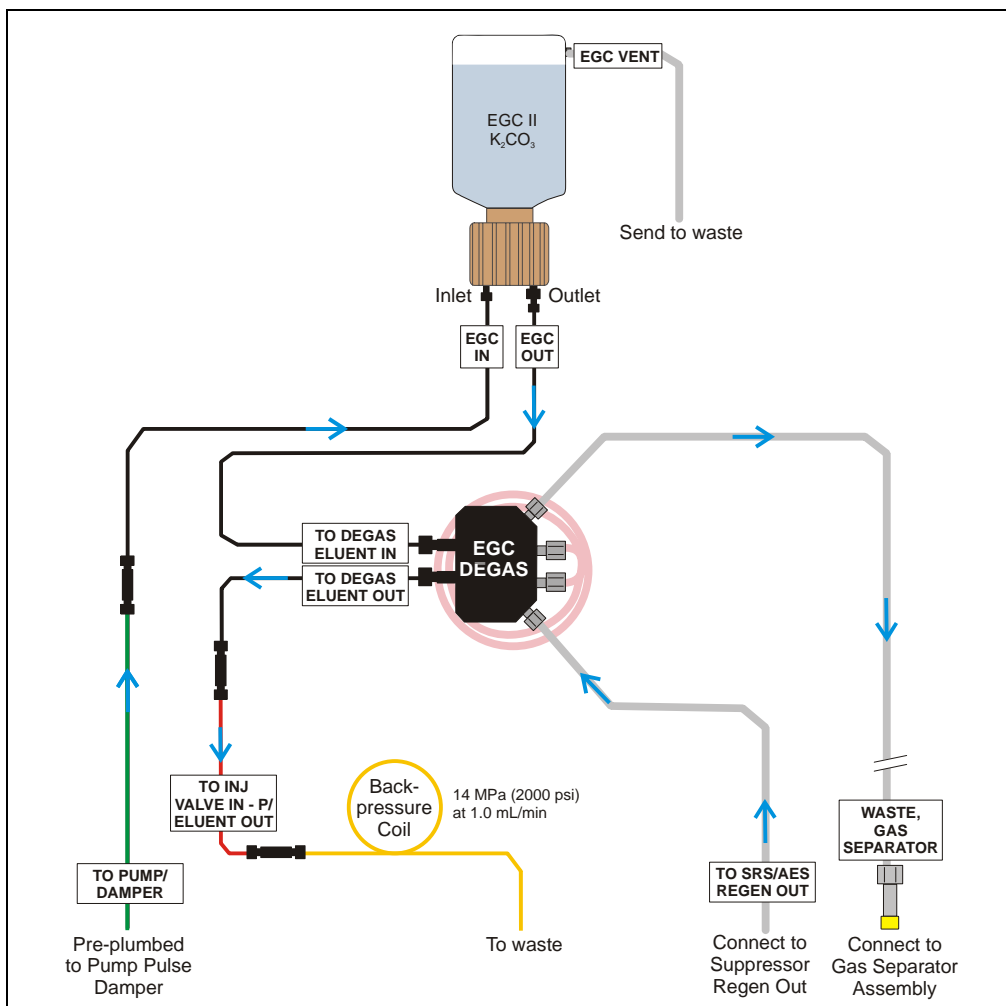
Figure 83. EluGen Cartridge Plumbing for Conditioning with Carbonate Eluent

1. Orient the EluGen cartridge with the fittings facing up and remove the plugs from the cartridge **INLET** and **OUTLET** fittings (see Figure 84).

Figure 84. EluGen Cartridge Fitting Plugs

2. Set the EluGen cartridge in the service area on top of the ICS-2100 and orient it with the cable toward the EGC holder (see Figure 85).

Figure 85. EluGen Cartridge in Service Area

3. Pull the coiled black **EGC IN** and **EGC OUT** lines out from inside the EGC holder. Disconnect the **EGC IN** line from the coupler that connects it to the **EGC OUT** line.

4. Connect the **EGC IN** line to the EluGen cartridge **INLET** port (see Figure 86).

5. Remove the coupler and connect the **EGC OUT** line to the EluGen cartridge **OUTLET** port.
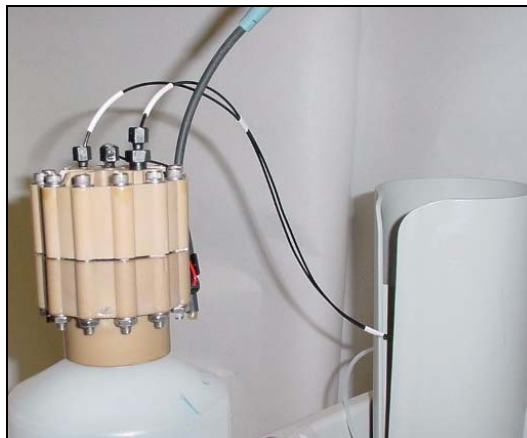
Figure 86. EluGen Cartridge Port Connections

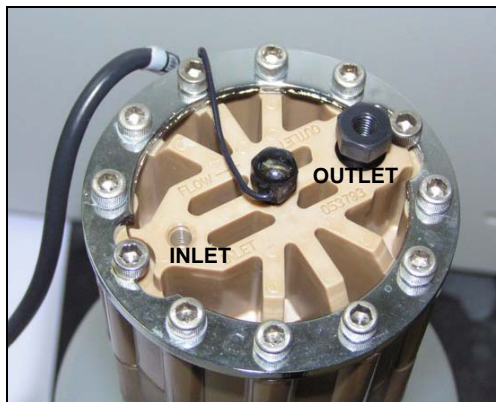6. Turn the EluGen cartridge over (with the fittings facing down). **Shake the EluGen cartridge vigorously, and tap it with the palm of your hand 10 to 15 times. Check that all bubbles trapped in the eluent generation chamber are dislodged.**

CAUTION

The EluGen cartridge contains one of the following: a corrosive base (KOH, LiOH, or NaOH), a corrosive acid (MSA), or a concentrated K_2CO_3 solution. Wear protective eyewear and gloves when handling the cartridge.

MISE EN GARDE

La cartouche d'EluGen contient un de ce qui suit: une base corrosive (KOH, LiOH, ou NaOH), un acide corrosif (MSA), ou une solution concentrée de K_2CO_3. Porter des lunettes et des gants protectives en manipulant la cartouche.

VORSICHT

Die EluGen-Kassette enthält eine korrodierende Base (KOH, LiOH oder NaOH), eine korrodierende Säure (MSA) oder eine konzentrierte K_2CO_3-Lösung. Tragen Sie daher beim Umgang mit Kassette eine Schutzbrille und Handschuhe.

7. Slide the EluGen cartridge down into the holder until it stops (see Figure 87). Make sure the cable remains out of the holder.

    NOTE To avoid crimping the lines, do not twist the cartridge when you slide it into the holder. The lines are designed to coil inside the holder.

Figure 87. EluGen Cartridge Installed in the Holder

8. Remove the plug from the **EGC-1** connector on top of the ICS-2100.

9. Orient the cartridge's blue 4-pin electrical cable connector as shown in Figure 88. Push it onto the **EGC-1** connector on the ICS-2100. Twist the ring on the cable connector fingertight to secure it.

Figure 88. Connecting the EluGen Cartridge Cable

10. Disconnect the **TO INJ VALVE IN - P/ELUENT OUT** line from port **P** (**2**) on the injection valve.

11. Use a 10-32 to 10-32 coupler (P/N 042627) to connect the **TO INJ VALVE IN - P/ELUENT OUT** line to one end of the yellow 0.5 mL/min, 7 MPa (1000 psi) backpressure coil (P/N 053765) (see Figure 89).

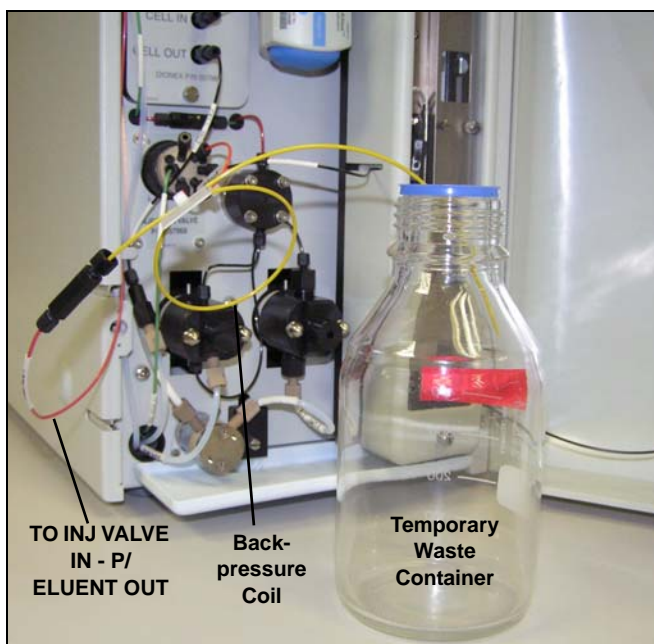12. Direct the free end of the backpressure coil to a temporary waste container.

Figure 89. Plumbing Connections for Conditioning the EluGen Cartridge with Carbonate Eluent

Installing the EluGen Cartridge Vent Line

1. Locate the EluGen Cartridge Vent Line Tubing Kit (P/N 063092) supplied with the EluGen cartridge.

2. Slide the label onto one end of the tubing and then push the barbed luer lock onto the tubing.

3. Unscrew and remove
   the plug from the vent
   opening on the side of
   the EluGen cartridge
   (see Figure 90).

Figure 90. EluGen Cartridge Vent Plug

4. Screw the luer adapter
   onto the vent opening.
   Remove the cap on
   the luer adapter by
   twisting. **Save the
   cap.**

5. Twist the luer lock
   and EluGen cartridge
   vent line into the luer
   adapter (see
   Figure 91).
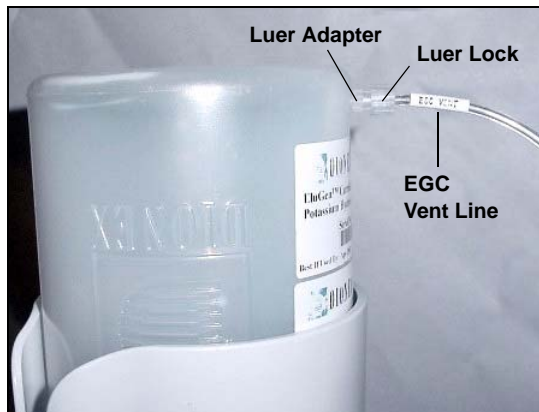
Figure 91. Installing the EluGen Cartridge Vent Line

NOTE   **To prevent leaks from the EluGen cartridge, always
replace the luer adapter cap before moving the
EluGen cartridge.**

6. Direct the EluGen cartridge vent line to the rear of the ICS-2100 and
   snap it onto one of the tubing clips on the rear panel.

7. Direct the vent line to the waste container and insert it down into the
   waste, gas separator tube about 10 to 15 cm (4 to 6 in).

Recording the EluGen Cartridge Serial Number in Chromeleon

The serial number is printed on the EluGen cartridge label.

1. Open the Chromeleon Server Configuration program (click **Start** on the Windows taskbar and select **All Programs > Chromeleon > >Server Configuration**).

2. Double-click the ICS-2100 system icon. The properties dialog box for the ICS-2100 appears.

3. Click the **Eluent Generator** tab (see Figure 92).

4. Select the **EGC-1** check box.

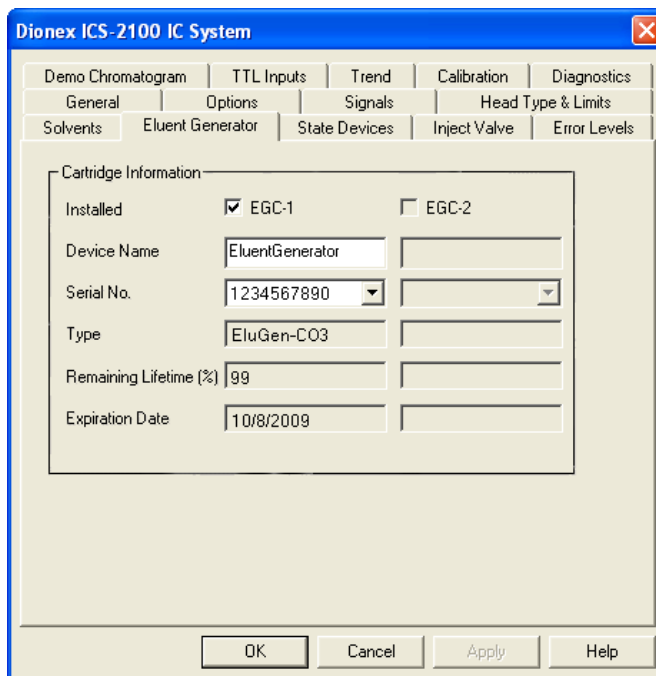5. Enter the EluGen cartridge serial number and click **OK**.

Figure 92. Eluent Generator Configuration Properties: CO$_3$ Example

Conditioning the EluGen Cartridge

After completing the installation steps described in the previous sections, condition the EluGen cartridge for 30 minutes before initial use.

1. Make sure the eluent reservoir is filled with ASTM filtered, Type I (18-megohm) deionized water.

2. Verify that the suppressor is off.

IMPORTANT **To avoid damaging the suppressor, always turn off the suppressor before conditioning the EluGen cartridge. The pump flow is on during conditioning, however, no flow reaches the suppressor.**

3. Verify that the **Automatically turn on with pump** option is not selected on the ICS-2100 touch screen **SUPPRESSOR** page. Disabling this option lets you turn on the pump, without automatically turning on the suppressor.

4. On the ICS-2100 touch screen **HOME** page, set the pump flow rate to **1.00 mL/min**.

5. Turn on the pump.

6. On the touch screen **HOME** page, touch the **EGC** button to open the **ELUENT GENERATOR** page. Verify that the cartridge type is **Carb**.

   If the cartridge type is wrong, verify that the cartridge serial number was entered correctly in the Chromeleon Server Configuration program (see).

7. Set the **EGC-1** concentration to **9 mM**.

8. Turn on the EGC-1 current.

9. Run the EluGen cartridge at these settings for 30 minutes.

10. Turn off the EGC-1 current.

11. Turn off the pump.

Installing the EGC CO$_3$ Mixer

illustrates the EGC CO$_3$ Mixer after installation.
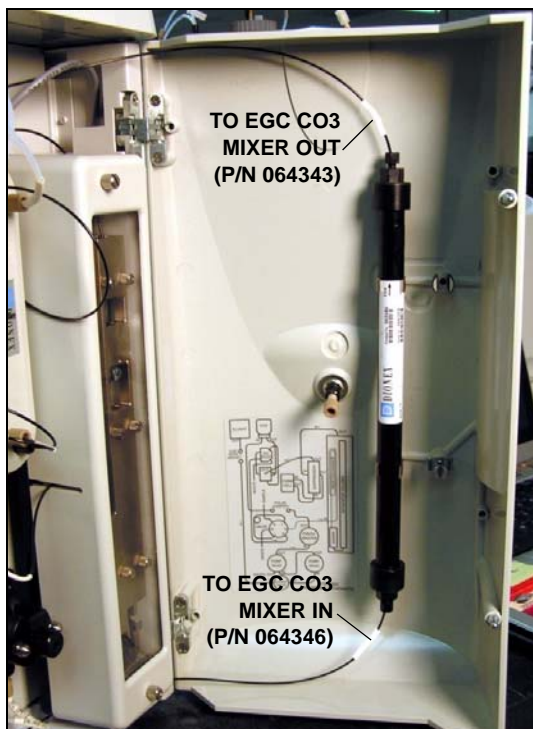
Figure 93. ICS-2100 with an EGC CO$_3$ Mixer Installed

1. Use a Phillips head screwdriver to remove the existing small diameter mounting clips from the inside of the ICS-2100 door.

2. Install the larger diameter mounting clips (P/N 063642) (see Figure 94).
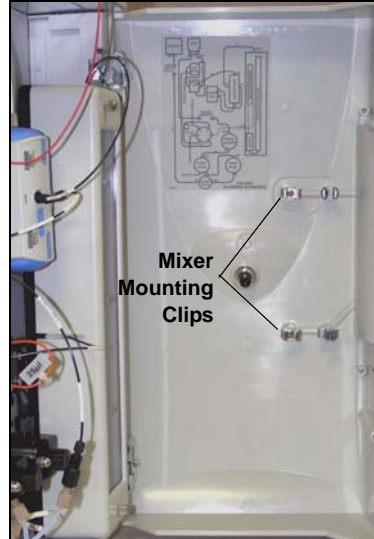
Figure 94. Location of Mounting Clips for the EGC CO3 Mixer

3. Orient the mixer with the outlet pointing upward and push it onto the clips (see Figure 95). The mixer outlet must point upward to ensure thorough mixing of the eluent.

4. Locate the 35 cm (14 in) length of black PEEK tubing (white labels) (P/N 064346). Connect the end labeled **TO EGC CO3 MIXER IN** to the mixer inlet.

5. Locate the 60 cm (24 in) length of black PEEK tubing (white labels) (P/N 064343). Connect the end labeled **TO EGC CO3 MIXER OUT** to the mixer outlet.

Figure 95. EGC CO$_3$ Mixer Installed on the ICS-2100 Door

Filling the EGC CO$_3$ Mixer with the Carbonate Eluent

Before initial use, follow the steps in this section to fill the EGC CO$_3$ Mixer with the carbonate eluent required for the application to be run. Figure 96 illustrates the liquid flow path through the eluent generator components during initial filling of the EGC CO$_3$ Mixer with carbonate eluent.

Figure 96. Plumbing for Filling the EGC CO$_3$ Mixer with Carbonate Eluent

1. Connect a 10-32 to 10-32 coupler to the mixer inlet and connect the outlet of the yellow PEEK backpressure coil to the coupler.
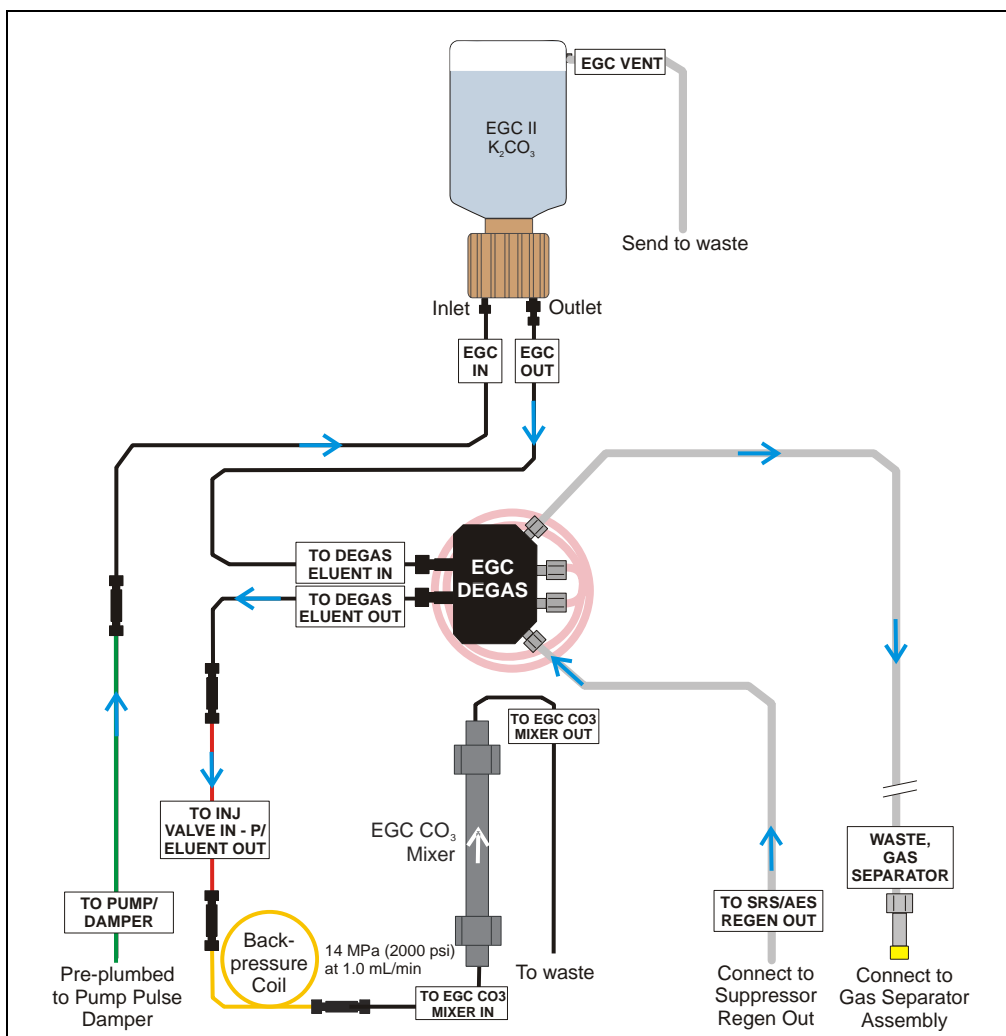
2. Direct the mixer outlet to the temporary waste container.

3. Verify that the suppressor is off.

| IMPORTANT | **To avoid damaging the suppressor and CR-TC, always turn off the suppressor before conditioning the EluGen cartridge. The pump flow is on during conditioning, however, no flow reaches the suppressor.** |

4. Verify that the **Automatically turn on with pump** option is not selected on the ICS-2100 touch screen **SUPPRESSOR** page. Disabling this option lets you turn on the pump, without automatically turning on the suppressor.

5. Set the pump flow rate to the rate required for the application.

6. Turn on the pump.

7. Verify that the system backpressure is between 14 and 16 MPa (2000 and 2300 psi). If necessary, adjust the pressure by adding or removing backpressure tubing.

8. Set the **EGC-1** concentration to the value required for your application.

9. Turn on the **EGC-1** current.

10. Run at these settings until a consistent flow of eluent is exiting the mixer outlet. At a flow rate of 1 mL/min it will take about 16 minutes to fill a 4-mm mixer and about 5 minutes to fill a 2-mm mixer.

> **NOTE** The void volume of the 4-mm mixer is about 16 mL. The void volume of the 2-mm mixer is about 5 mL.

11. Turn off the **EGC-1** current.

12. Turn off the pump.

13. Remove the yellow PEEK backpressure coil from the **TO INJ VALVE IN - P/ELUENT OUT** line and the mixer inlet.

14. Retain the coupler on the mixer inlet.

Completing the Eluent Generator Setup for Carbonate Eluent

Figure 97 illustrates the liquid flow path through the ICS-2100 after all setup steps are complete and the eluent generator is ready for operation.
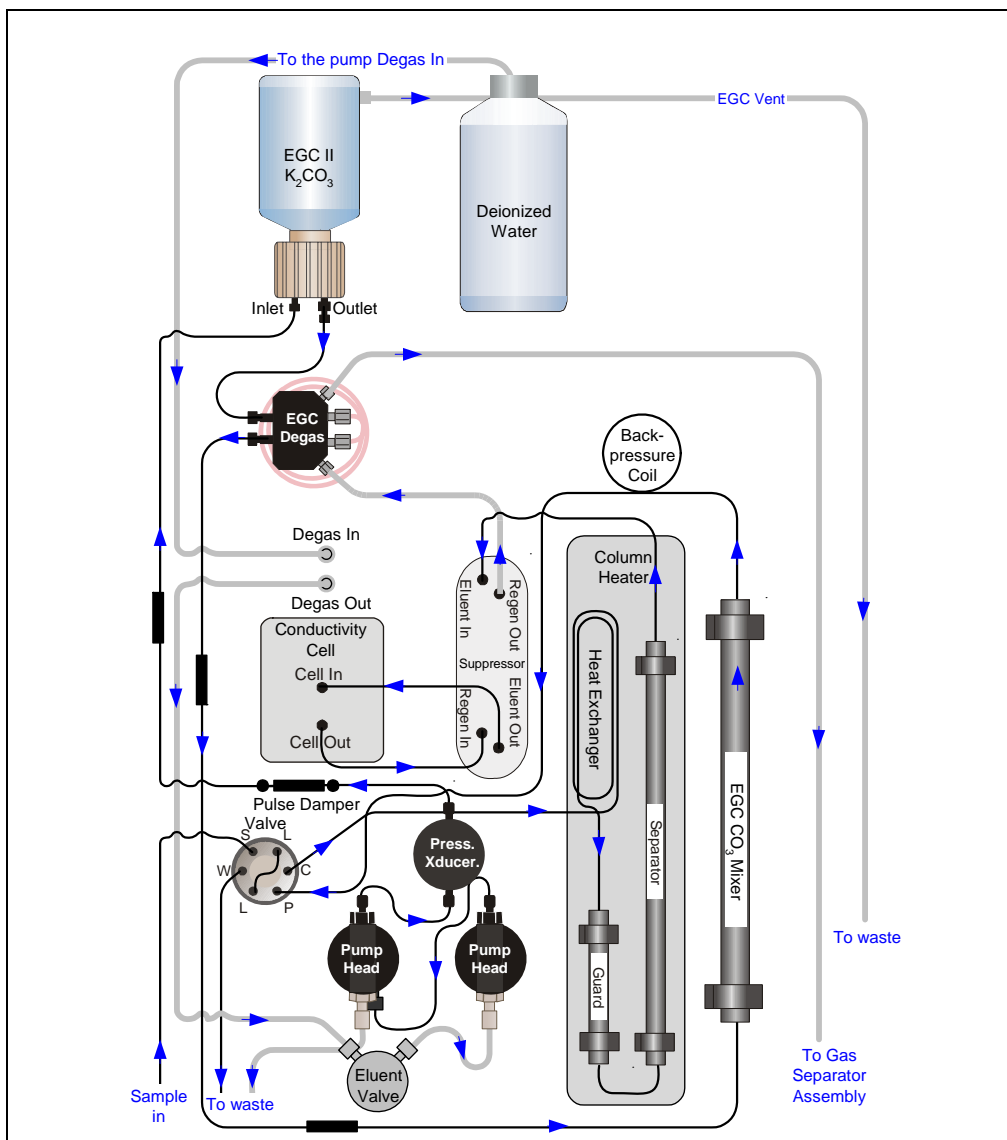
Figure 97. ICS-2100 Flow Schematic: Carbonate Eluent Generation

1. Connect the **TO INJ VALVE IN - P/ELUENT OUT** line to the coupler attached to the mixer inlet line. Route this line along the back of the drip tray to prevent it from being pinched when the ICS-2100 door is opened and closed.

2. Route the mixer outlet line to the back of the component panel (see Figure 98).

3. Connect the mixer outlet line to port **P** (**2**) on the injection valve.

Figure 98. Mixer Outlet Routed to the Back of the Component Panel

> **NOTE** **Backpressure tubing may be required between the injection valve and the EGC CO$_3$ Mixer outlet. The EluGen cartridge requires 14 to 16 MPa (2000 to 2300 psi) of system backpressure for removal of electrolysis gas from the eluent produced by the cartridge. See Section 19.1 for details.**

4. Go on to Section 19, "Equilibrating the System."

19.   Equilibrating the System

1. Turn on the pump and set the flow to the operating rate.

2. Flush the system for about 5 minutes to equilibrate.

3. Monitor the system pressure reading from the Chromeleon Control panel.

    The EluGen cartridge requires at least 14 MPa (2000 psi) of system backpressure for removal of electrolysis gas from the eluent produced by the cartridge. A system backpressure of 16 MPa (2300 psi) is ideal. If the pressure is too low, install a backpressure coil (see Section 19.1).

IMPORTANT	**The recommended maximum operating pressure for the eluent generator is 21 MPA (3000 psi). Excessive backpressure may rupture the tubing in the EGC degas tubing assembly.**

4. Check that liquid is flowing out of the suppressor **REGEN OUT** waste line and that the pressure is stable.

5. Monitor the baseline conductivity. In general, it should be <30 μS for a system set up for anion analyses and <2 μS for a system set up for cation analyses. Equilibration time varies and it can take some time to reach these expected values.

19.1   EluGen Cartridge Backpressure Requirements

The EluGen cartridge requires at least 14 MPa (2000 psi) of backpressure for optimal removal of electrolysis gas from the eluent produced by the cartridge. During system equilibration (see Section 19), monitor the system pressure and verify that it is between 14 and 20 MPa (2000 and 3000 psi). A system backpressure of 16 MPa (2300 psi) is ideal.

If the pressure is too low, install a backpressure coil between the injection valve and the eluent outlet. The backpressure coils listed in the table below are included in the ICS-2100 Ship Kit (P/N 064375).

Connect one end of the backpressure coil to port **P** (**2**) on the injection valve; connect the other end to the **TO INJ VALVE IN - P/ELUENT OUT** line or to the mixer outlet, if an EGC CO3 Mixer is installed.

Part Number	Description	Flow Rate	Approximate Back-pressure Added
053763	4-mm Backpressure Coil	2.00 mL/min	7 MPa (1000 psi)
	(red)	1.00 mL/min	3.5 MPa (500 psi)
053762	4-mm Backpressure Coil	2.00 mL/min	3.5 MPa (500 psi)
	(red)	1.00 mL/min	1.75 MPa (250 psi)
053765	2-mm Backpressure Coil	0.50 mL/min	7 MPa (1000 psi)
	(yellow)	0.25 mL/min	3.5 MPa (500 psi)
053764	2-mm Backpressure Coil	0.50 mL/min	3.5 MPa (500 psi)
	(yellow)	0.25 mL/min	1.75 MPa (250 psi)

20. Verifying Operational Status

After the system has equilibrated, verify the actual pump pressure and stability by monitoring the pump pressure reading on the IC system panel on the Chromeleon panel tabset (or the touch screen **HOME** page). Write down the short-term pressure fluctuations; they should be less than 0.13 MPa (20 psi).

You can acquire the pressure readings as a separate signal and plot the readings on the IC system panel.

1. Verify that the pump pressure signal is enabled in the Server Configuration program:

   a. Right-click the IC system device in the timebase and click **Properties**.

   b. Click the **Signals** tab.

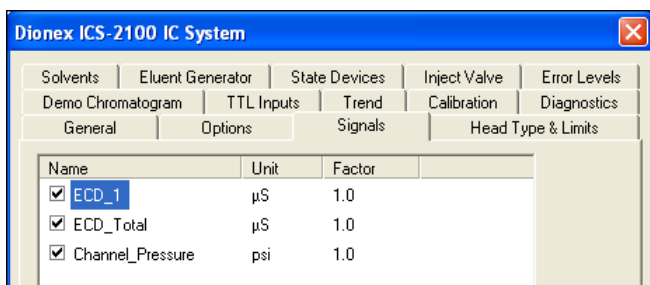c. Verify that the **Channel_Pressure** check box is selected (see Figure 99).

Figure 99. Pump Pressure Channel Enabled

2. Display the pressure channel plot on the Chromeleon panel:

a. Right-click anywhere on the plot section of the panel.

b. Click **Signals**.

c. Under **Available Signals,** select **Channel_Pressure** and click **Add >>** to move the signal to the **Displayed Signals** list (see Figure 100). Click **OK**.
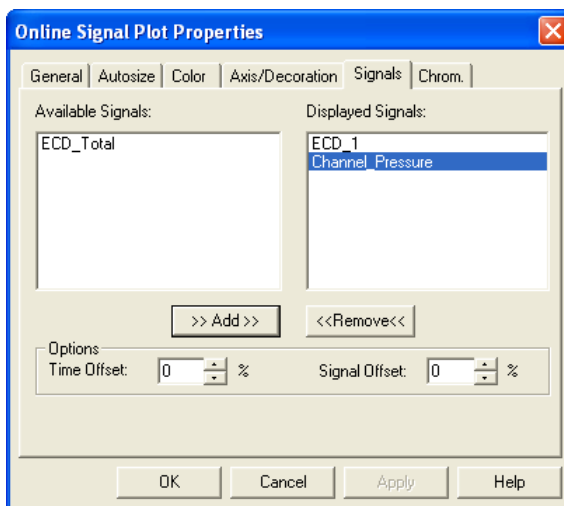

Figure 100. Online Signal Plot Properties

Pump pressure readings will now be plotted during data acquisition (along with the detector signals).

21.   Connecting the Analog Output (Optional)

The analog output connector on the IC system rear panel outputs an analog voltage signal proportional to the conductivity measured by the cell. The selected data rise time filters the output. The analog output can be connected to an analog-to-digital converter such as an integrator or other recording device. Refer to the documentation for the device for connection instructions.

Analog output is 0 to 1V, scaled to the selected range.

For instructions on how to set up the IC system for stand-alone operation with an AS autosampler, refer to the TTL appendix in the system operator's manual.

22.   Pressurizing the Eluent Reservoir (Optional)

The IC system does not require pressurized reservoirs. However, if eluent is manually degassed or is sensitive to contamination, Dionex recommends pressurizing the reservoir with helium or nitrogen. The air regulator accessory bracket and other items needed for pressurizing the eluent reservoir must be ordered separately (P/N 060054).

The following required parts must be ordered separately:

- Barbed fitting (P/N 030071)

- Pipe thread reducer (P/N 030087)

- 3-mm (1/8-in) ID tubing (P/N 040793)

- Air regulator accessory (P/N 060054)

22.1 Connecting the Gas Source

Figure 101 illustrates the eluent reservoir after all gas connections are complete.
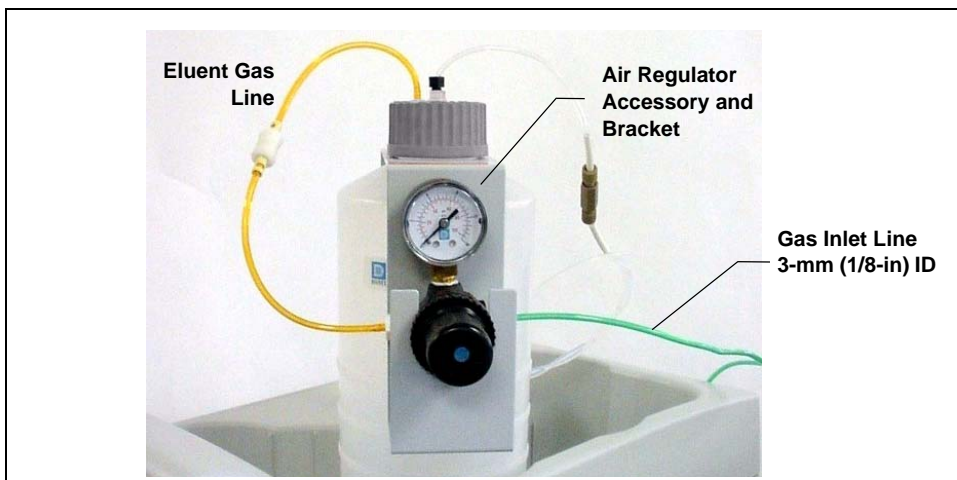

Figure 101. IC System Pressurized Eluent Reservoir Connections (Optional)

1. Use the barbed fitting and pipe thread reducer to connect the 3-mm (1/8-in) ID tubing to a clean gas source regulated to between 0.55 and 0.83 MPa (80 and 120 psi).

2. Push the other end of the tubing onto the inlet of the air regulator.

3. Remove the eluent reservoir cap.

4. Connect the gas line from the eluent reservoir cap to the gas line on the air regulator outlet.

5. Slip the air regulator accessory bracket over the neck of the eluent reservoir (see Figure 101).

22.2   Applying the Pressure

1. Before pressurizing, make sure the reservoir is filled and connected to the system (see <ins>Section 15</ins>).

2. Pull out the air regulator knob and turn it fully counterclockwise to ensure there is no pressure to the reservoir when the gas source is turned on.

3. Turn on the gas source.

4. Pull out the air regulator knob and turn it clockwise to pressurize the eluent reservoir.

5. Adjust the pressure to between 0.03 and 0.04 MPa (5 and 6 psi). Push the regulator knob back in.

⚠ **CAUTION**   **Do not pressurize the eluent reservoir above 0.07 MPa (10 psi).**

⚠ **MISE EN GARDE**   **Ne mettez jamais les réservoirs d'éluants sous une pression supérieure à 0,07 MPa (10 lb/po²).**

⚠ **VORSICHT**   **Setzen Sie den Eluentbehälter auf keinen Fall einem Druck über 0,07 MPa aus.**

23. Connecting the Pump Continuous Seal Wash (Optional)

The pump includes a seal wash assembly that can be set up to continuously rinse the back of the piston seals to remove salt crystals and prolong the life of the seals. Follow the steps below to set up this feature.

Figure 102 shows the seal wash plumbing after all connections are complete.
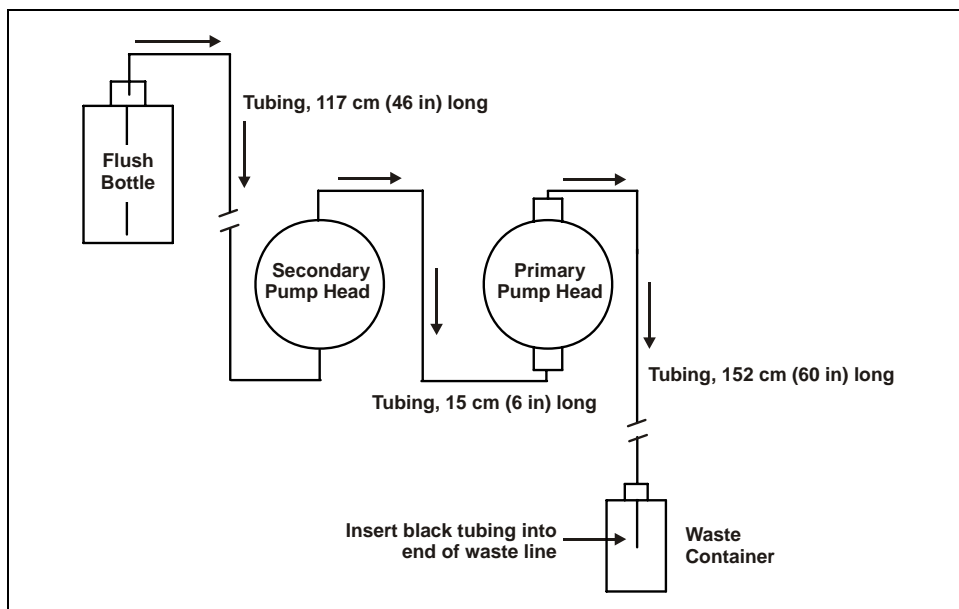

Figure 102. Piston Seal Wash Flow Schematic

1. Fill a flush bottle with either deionized water or a combination of deionized water and 10% or 20% isopropyl alcohol. (Isopropyl alcohol will inhibit bacterial growth in the water.)

2. Place the flush bottle on top of the IC system. During operation, gravity maintains flow through the pump heads.

3. The flush solution is carried to the piston seal wash assembly and out to waste via 1.5-mm (0.06-in) ID tubing (P/N 055847). Locate this tubing in the IC system Ship Kit and cut the tubing into three unequal pieces in the following lengths:

   - 117 cm (46 in)
   - 152 cm (60 in)
   - 15 cm (6 in)

4. Install the tubing as follows (see Figure 103):

   a. Push the 117-cm (46-in) piece of clear tubing onto the drain tube on the bottom of the *secondary* pump head. Place the free end of this tubing in the flush bottle. Make sure the end of the tubing is near the bottom of the bottle.
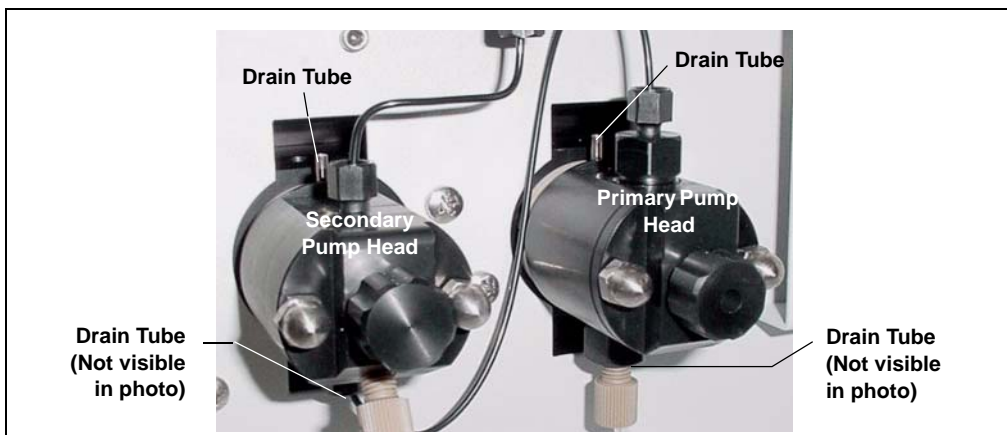

Figure 103. Primary and Secondary Pump Heads with Drain Tubes

   b. Push the 152-cm (60-in) piece of clear tubing onto the drain tube on the top of the *primary* pump head. This is the waste line. Route this waste line through the lower tubing chase and out the back of the IC system.

   c. Push the 15-cm (6-in) piece of clear tubing over the drain tube on the top of the *secondary* pump head. Push the other end of the tubing over the drain tube on the bottom of the *primary* pump head.

   d. Place a 10 mL syringe (P/N 054578) at the end of the waste line, press the syringe against the line to form a seal, and draw out all of the air.

e. Push approximately 5 cm (2 in) of black 0.25-mm (0.01-in) ID tubing
(P/N 057057) into the end of the waste line.

> **NOTE** **The black tubing creates a flow restriction.
> Assuming a height difference of about 76 cm (30 in)
> between the flush bottle and the waste container,
> this setup provides a flow of one drop of flush
> solution every 5 to 30 seconds.**

f. Place the end of the waste line in a waste container.

g. This completes the piston seal wash installation. Periodically refill the
flush bottle and empty the waste container as required.

This completes the IC system installation procedure. For operating instructions,
refer to your IC system operator's manual. The manual is on the Dionex
Reference Library CD-ROM (P/N 053891).

If you will be installing the RFIC-ER Startup Kit, complete the installation of the
kit now. refer to

For a brief description of the steps required to begin processing samples using
Chromeleon, refer to Section 24. For details about using Chromeleon, refer to the
Chromeleon Help.

24. Sample Processing Overview

You can use Chromeleon to create a sequence of sample injections to be processed
automatically.

• For each injection, the sequence includes a program with commands and
parameters for controlling the IC system and autosampler (if installed) and for
acquiring sample data. To create a program, click **Create Program** on the
Sequence Control panel on the panel tabset.

• The sequence also includes a quantification method for peak identification
and area determination. To create a quantification method, select **File > New**
and select **Method File** from the list.

• To create the sequence, click **Create Sequence** on the **Sequence Control**
panel on the panel tabset. In the sequence, specify samples to process, the
names of the program and quantification method that you created, and other

sample processing parameters (the sample name, sample type, injection volume, etc.).

• After creating the sequence, you can start sample processing. On the **Sequence Control** panel, click **Load Sequence** and then click **Start Batch**.

25. Troubleshooting the USB Configuration Error

Problem: When the IC system power is turned on for the first time, a Windows message box appears asking for a USB configuration file (cmwdmusb.inf).

Possible Cause: The USB cable was connected and the power turned on before Chromeleon was installed.

Solution:

Follow these steps to resolve the problem:

1. Click **Cancel** in the Windows message box.

2. Turn off the power to the USB device and unplug the USB cable from the computer.

3. Install Chromeleon (see Section 6).

4. Reconnect the USB cable to the computer and turn on the power to the device. Windows will now automatically recognize the USB device.