

UCD CSN Technical Information #402C

Gas Cylinder Change

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1. PURPOSE AND APPLICABILITY

The subject of this technical information document (TI) is changing gas cylinders for carbon analysis of quartz fiber filters.

2. SUMMARY OF THE METHOD

Carbon content is measured from quartz fiber filters using thermal/optical transmission-reflectance spectrometry. These instruments, referred to as carbon analyzers, are prepared for each day of analysis. Punches from quartz filters are inserted into the carbon analyzers, where they undergo a specified heating protocol. The thermograms generated during analysis provide the means for carbon content quantification.

3. DEFINITIONS

He+Ox: Oxygen premixed with helium gas.

Helium (He): Gas used for carbon analysis.

Hydrogen (H): Gas used for carbon analysis.

4. HEALTH AND SAFETY WARNINGS

4.1 Gas cylinders

It is recommended that the lab technicians use caution when handling all support gas cylinders and regulators, and always have cylinders properly chained to a safety rack.

NOTE: Hydrogen is a flammable gas and extra precautions should be used with the hydrogen gas lines from the supply cylinder to ensure all fittings are connected and must be leak tested each time a new cylinder is installed. The pressure of the hydrogen gas line should be kept under 15 psi at all times.

5. CAUTIONS

Not applicable.

6. INTERFERENCES

Not applicable

7. PERSONNEL QUALIFICATIONS, DUTIES, AND TRAINING

Only trained lab personnel designated by the Laboratory Manager may change gas cylinders.

8. EQUIPMENT AND SUPPLIES

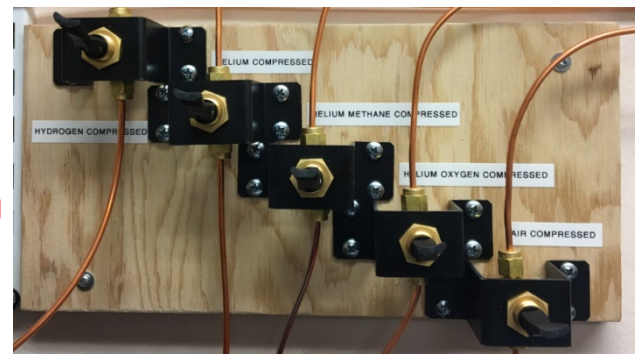
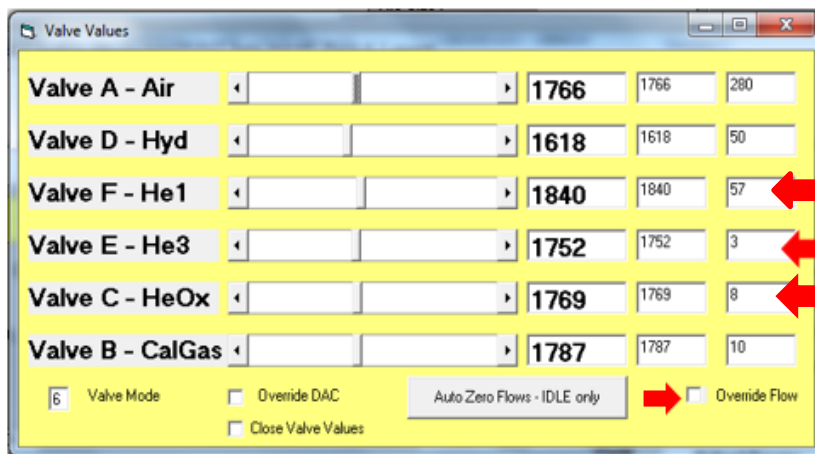
- Helium gas tank, ultra-high purity
- Hydrogen gas tank, ultra-high purity
- Oxygen (10 %) in helium, premixed, purified
- Methane (5 %) in helium, premixed, purified
- Air, ultra zero

9. PROCEDURAL STEPS

Uninstalling the empty cylinder:

1. If the pressure reading on the cylinder pressure gauge is below 100 psi, the cylinder is ready to be changed.
2. Put the carbon analyzers on “Standby” mode.

NOTE: When changing Helium or He+Ox tank, while the instruments are on “Standby” mode, open the Valve Values window. Click on “Override Flow” and set the flows for He1, He3 and HeOx to 0 cc/min (this will prevent the software from closing).



3. Turn the gas line valve to the “Closed” position (pointing down) for the gas to be changed.

Open: switch is 180°, Closed: switch is 90°
Each carbon analyzer has its own set of gas valves

4. Close the main gas cylinder valve on the top of the cylinder being changed by turning it clockwise when viewed from above.

5. To remove the regulator, loosen the regulator fitting that is threaded into the neck of the compressed gas cylinder with a 1-1/8 inch wrench. Turn the wrench in the directions shown for left-hand and right-hand threads respectively.

NOTE: Regulators for different gases have different thread systems. Hydrogen, Air, Helium + Oxygen and Helium + Methane use a **left hand thread** while Helium uses a **right hand thread**.



6. Turn the fitting until the regulator assembly can be removed from the cylinder. Leave the system supply line connected to the regulator assembly.
7. Hang the regulator assembly out of the way and carefully thread a protective cap on the cylinder until the cap is fully seated.
8. Label the empty cylinder and move the empty cylinder to an empty spot outside the cylinder cage. Attach the safety chain on the cage to secure the empty cylinder.

Installing a replacement cylinder:

1. Locate the replacement cylinder inside (or outside) the cage and move it to the designated spot outside the lab. Attach the safety chain.
2. Remove the protective cap from the gas cylinder.
3. Remove the plastic wrap and plug in the cylinder outlet. Wipe the outlet with laboratory wipes to remove any debris.
4. Attach the regulator assembly by carefully threading the regulator coupling into the cylinder outlet. Recall that regulators for air cylinders have left hand thread. Hand tighten the fitting first.
5. Briefly open the cylinder valve on top of the cylinder for a couple seconds to flush the line.

6. Continue tightening the fitting with the wrench until it is snug.
7. Slowly open the cylinder valve on top of the cylinder turning in a counter clockwise direction when viewed from above until full pressure (~2000-3000 psi) is noted on the cylinder pressure gauge.
8. Close the main cylinder valve and open the valve at the end of the gas line. Once the line is depressurized, turn off the valve at the end of the gas line and turn on the main cylinder valve again. Repeat Step 8 two more times to flush the gas line.
9. If the tank change takes place in the middle of the day, skip the leak check. Turn the gas line valves to “Open” position for the gas replaced.

NOTE: If Helium or Helium+Oxygen is replaced, remember to uncheck the “Override Flow” in the Valve Values table before taking the analyzers out of standby.

Leak Check:

1. Perform a leak check when 1) a Hydrogen tank is replaced; and/or 2) at the end of day if any gas tank other than Hydrogen is replaced during the day.
2. Pressurize the gas line and then close the main cylinder valve. Meanwhile keep the gas line valves to the instruments closed.
3. Mark the cylinder pressure on the regulator.
4. Check the pressure reading in the morning of the following day. If the pressure is significantly lower than the original mark, there is probably a leak. Tighten the fittings and repeat the leak check for one hour.

10. QUALITY ASSURANCE AND QUALTY CONTROL

Not Applicable.

11. REFERENCES

Not Applicable.