

Chapter: Troubleshooting

Topic: Leak Checking your GC

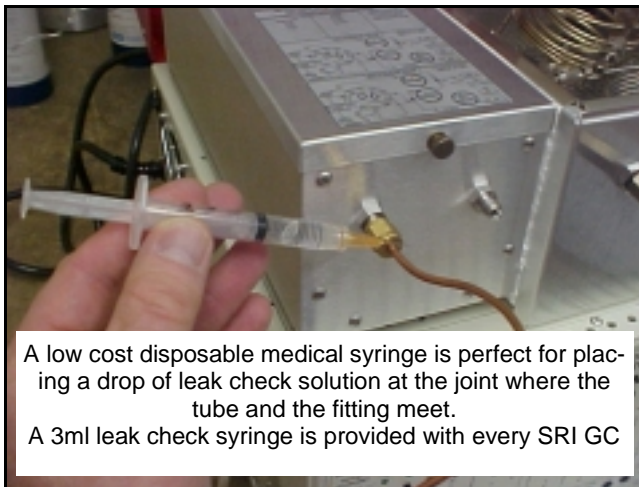
There are 3 ways to check for gas leaks in a GC.

The 1st method of leak checking is called "**looking for bubbles**" or "snooping the fittings". Snoop® is a specific brand of leak check solution, but SRI suggests a mixture of isopropyl alcohol (IPA) and water. The alcohol reduces the surface tension of the water so it flows into the cracks between the tubing and the fitting, otherwise water alone would be fine. Don't use soapy water because if the leak check solution gets inside the GC tubing or fittings, it will contaminate the system.

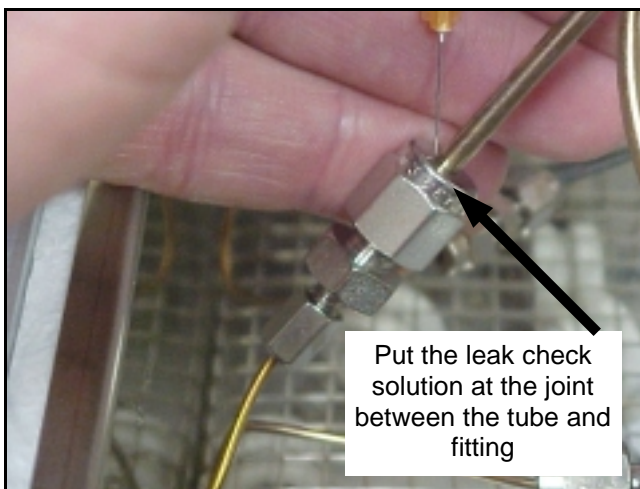
Apply gas pressure to the system then place a droplet or two of leak check solution on the tube connections. If tiny little bubbles are visible then the fitting is leaking.

Using the liquid leak check solution can be difficult however when there are many fittings to test or when some of the fittings are hot, (this will rapidly boil off the leak check solution) making it impossible to tell if there are bubbles from a leak or bubbles from the water boiling away.

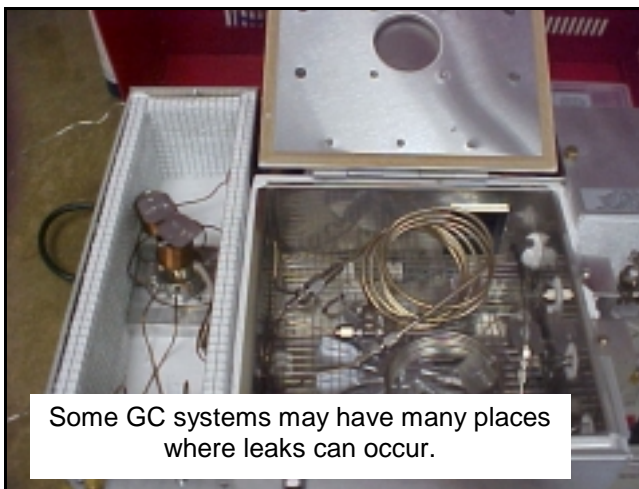
Liquid leak checking is the least effective way to check for gas leaks in a GC system.



A low cost disposable medical syringe is perfect for placing a drop of leak check solution at the joint where the tube and the fitting meet.
A 3ml leak check syringe is provided with every SRI GC



Put the leak check solution at the joint between the tube and fitting



Some GC systems may have many places where leaks can occur.

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The second method of leak checking is to use a **leak detector**. Leak Detectors are made by several different manufacturers, but in most cases they consist of a vacuum pump and a thermistor detector which measures the thermal conductivity of the gas that is sucked up through the hand held probe. When helium or hydrogen flows through the thermistor, the thermal conductivity is a little greater than the thermal conductivity of air, so there is a response on the meter of the Leak Detector.

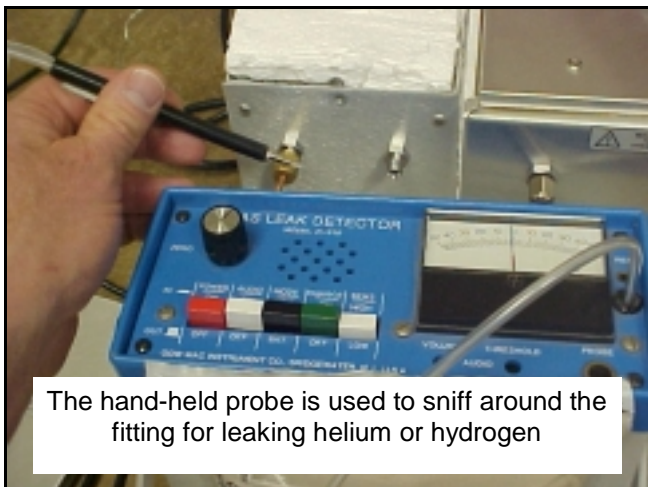
Apply gas pressure to the system then sniff around all the fittings with the Leak Detector. The display on the Leak Detector indicates a leak.

Unlike the liquid leak check solution, the Leak Detector can be used on hot fittings, but is difficult to use if there is any airflow around the fittings (such as in a GC oven with the fan running).

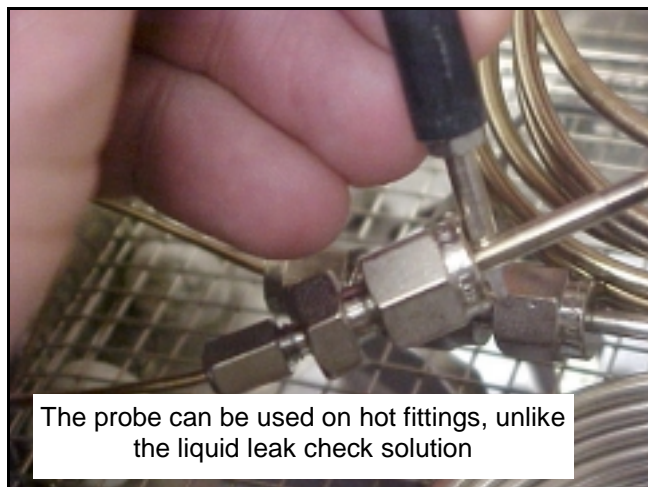
Some leaks may be too small to detect, and some fittings may be in-accessible. Be careful with the probe around live electrical circuits or heaters



Commercial leak detectors are available from several different manufacturers. Prices range from about \$600 to \$2000.



The hand-held probe is used to sniff around the fitting for leaking helium or hydrogen



The probe can be used on hot fittings, unlike the liquid leak check solution

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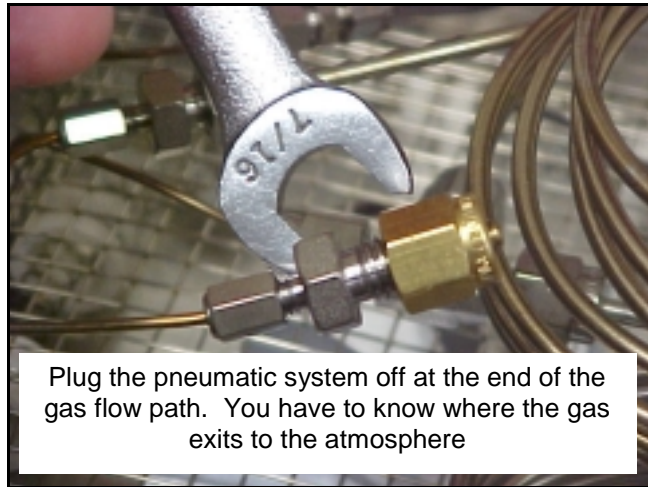
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The third method of leak checking is called the "**pressure drop**" test.

The pneumatic system is plugged at the end of the gas flow path. This may be the outlet of the detector or the end of the column.

Use a swagelok fitting or a swagelok nut with a GC septum to make a gas tight seal. If the plug leaks, the test will not work.

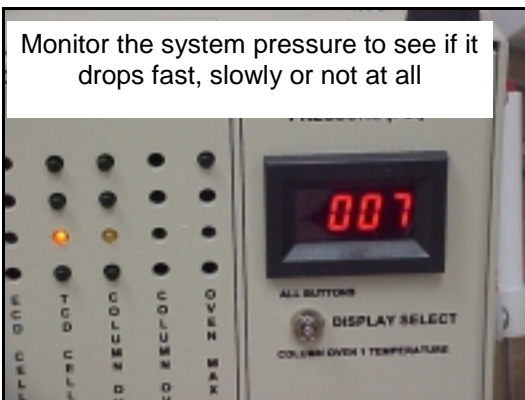
The system is then pressurized using the EPC (electronic pressure regulator) built-in to the SRI GC. The EPC is then turned down (or off). Because the end of the gas flow path is plugged, the gas is trapped (under pressure) in the pneumatic system. If there is a leak, the gas pressure will drop. If the entire system is leak free, the pressure will remain for many minutes before it slowly drops. The rate at which the pressure drops is indicative of the magnitude of the leak



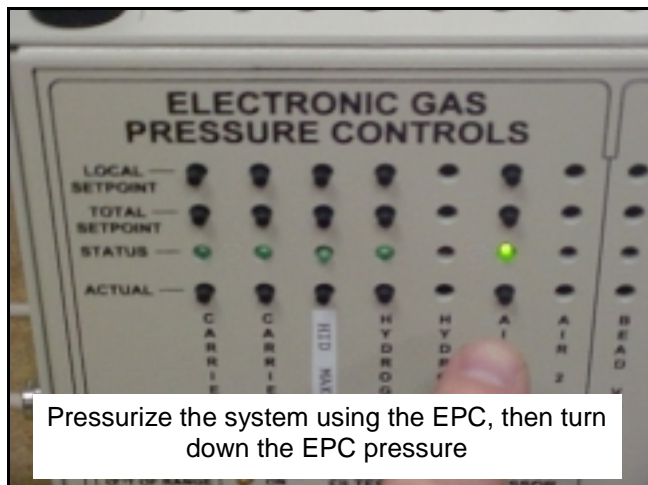
Plug the pneumatic system off at the end of the gas flow path. You have to know where the gas exits to the atmosphere



Use a swagelok cap or plug fitting, or use a GC septum in a swagelok nut to make a leak-tight seal



Monitor the system pressure to see if it drops fast, slowly or not at all



Pressurize the system using the EPC, then turn down the EPC pressure

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If the pressure does not drop at all, or drops very slowly, then the entire system is leak-tight. In some ways, this is the best way to check for leaks, because one test verifies that every connection in the system is holding pressure. With a complex gas system, or one where some of the fittings are in-accessible or hot it may be difficult to use the leak check liquid or meter. Also, the pressure drop test can detect leaks that are too small for the other methods to see.

If the pressure does drop quickly, there is a leak in the system. To locate the source of the leak, move the plug from the end of the pneumatic system to the next fitting upstream and repeat the test. If the system now holds pressure, then the leak must be somewhere between the location of the previous plug and the current plug.

By moving the plug location step by step upstream, eventually it will be obvious where the leak must be.

