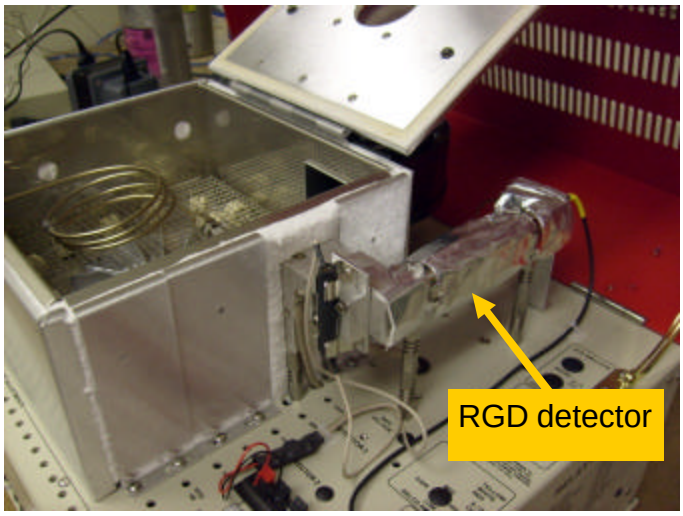
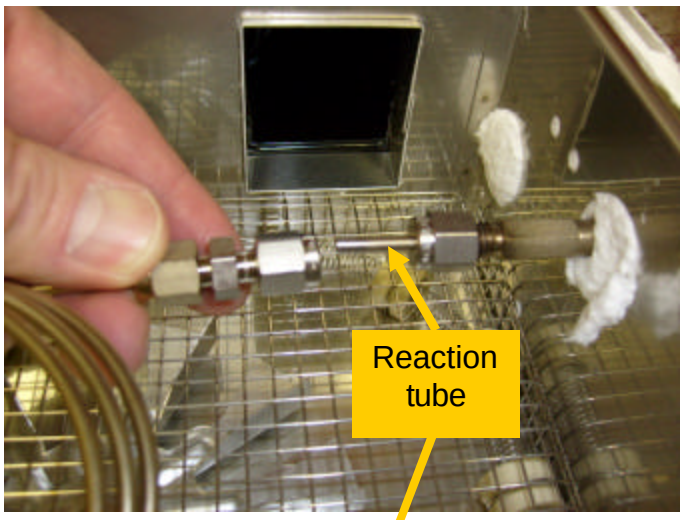
Operating the SRI RGD
(Reduction Gas Detector)

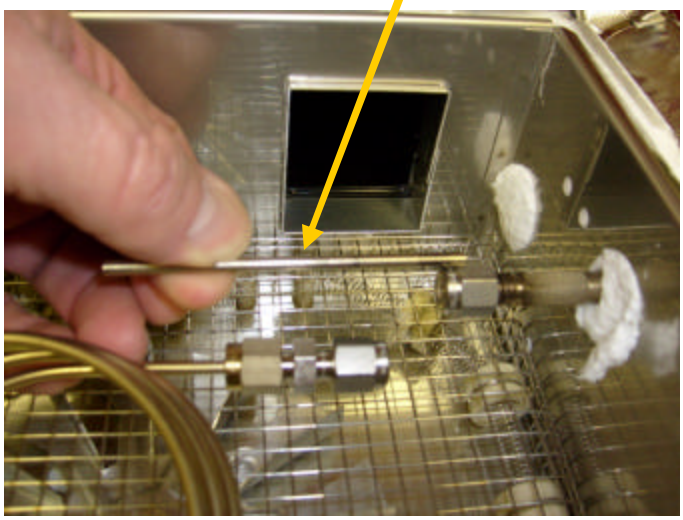
The SRI RGD detector is mounted on the right side of the column oven on a 8610C or 310 gas chromatograph. The RGD detector can also be mounted on a Model 110 stand-alone chassis (not shown).



Remove the column from the reaction tube. The column should be connected with a union and a graphite ferrule so the union can be completely removed from the reaction tube.



Pull the reaction tube out of the RGD inlet. The nut on the RGD inlet should also have a graphite ferrule



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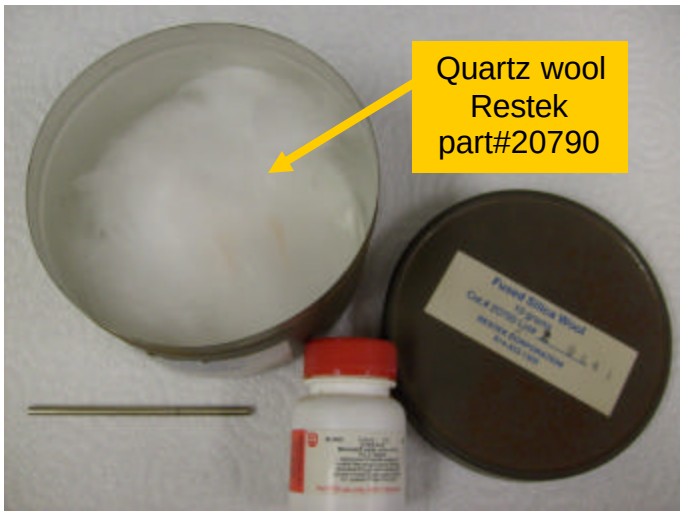
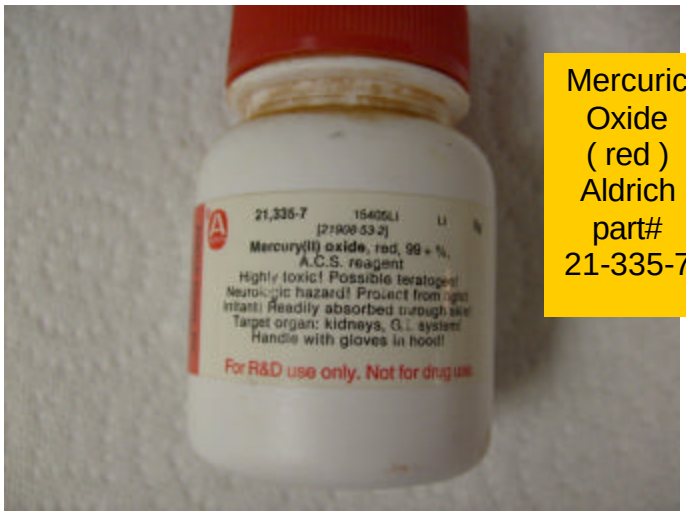
The reaction tube has a 20 micron pore size stainless steel frit on the downstream end. Mercuric Oxide suspended on quartz (fused silica) wool is placed into the open end of the reaction tube.

The mercuric oxide (HgO) is NOT shipped with the RGD detector. Customers must order the HgO directly from Aldrich (Sigma-Aldrich.com) or other supplier.

Make a " worm" of quartz wool by rolling a clump in your fingers. Insert the " worm" into the reaction tube and push it down to the bottom with a piece of 1/16" (1mm) tubing or wire. Push the quartz wool " worm" until it hits the frit.
This "worm" keeps the HgO from clogging up the frit.

Make another quartz wool "worm", but coat this worm with the HgO first. If you drop the "worm" into the bottle of HgO and shake it around, the HgO will adhere to the wool. Some people prefer to use a small spatula to load the tube with a small amount of the HgO instead .
Add a final plug of quartz wool to secure the HgO in the reaction tube towards the frit end (the frit is the hottest part of the tube).





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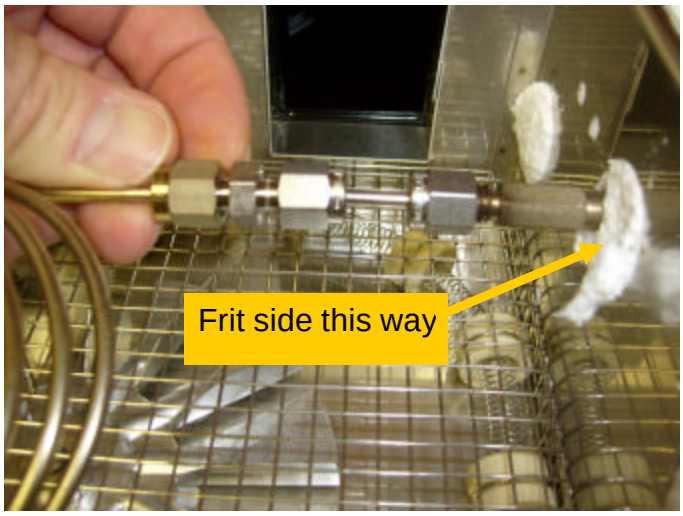
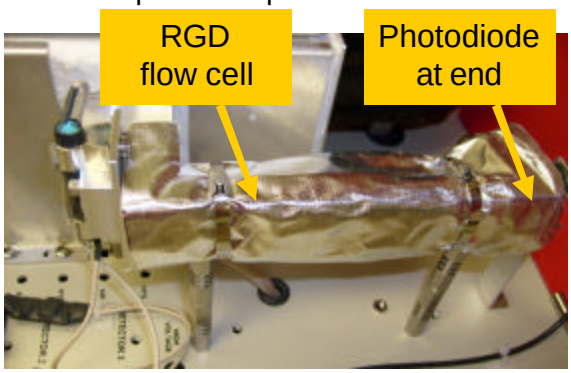
Re-attach the reaction tube to the RGD inlet and the column to the reaction tube.
The frit end of the tube should go towards the detector where the temperature is the hottest.

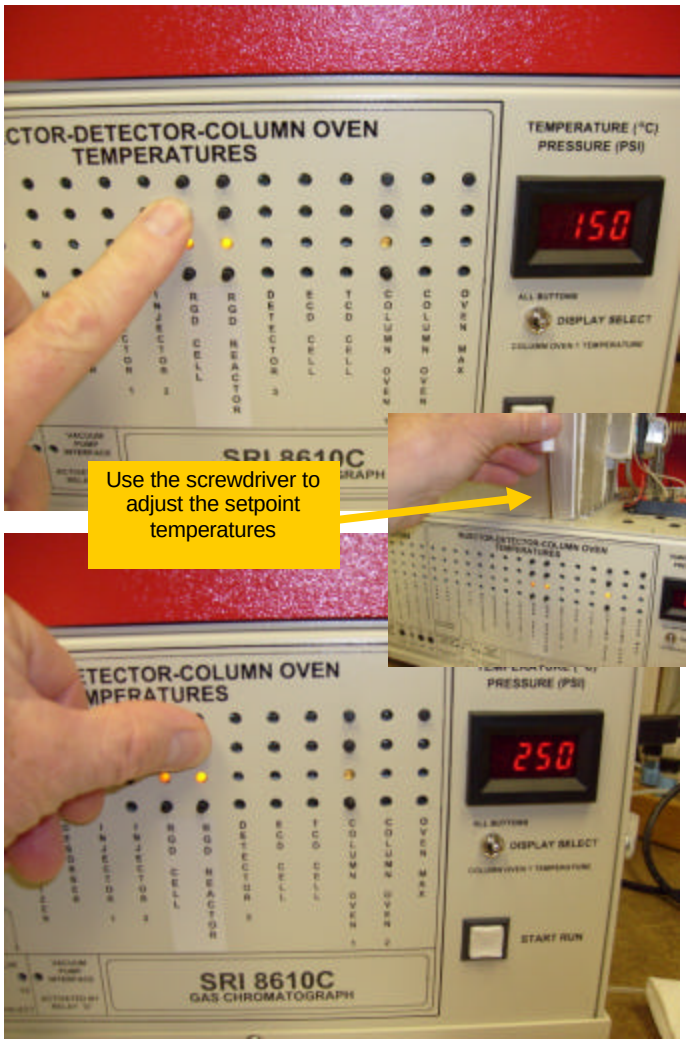


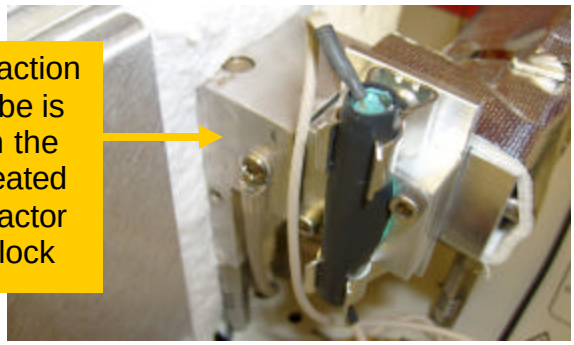
Use the screwdriver to set the RGC flow cell temperature to 180C. The cell temperature is the 6" (15cm) pathlength tube between the UV lamp and the photodiode. The cell is



covered with aluminized silicone foam insulation and must be hot enough to keep the gaseous mercury vapor liberated from the mercuric oxide from condensing.

Set the reaction tube temperature to 250C. The reaction tube is secured in the heated aluminum block just to the left of the UV lamp. The mercuric oxide powder in the reaction tube must be hot for the reaction with reducing compounds to occur.





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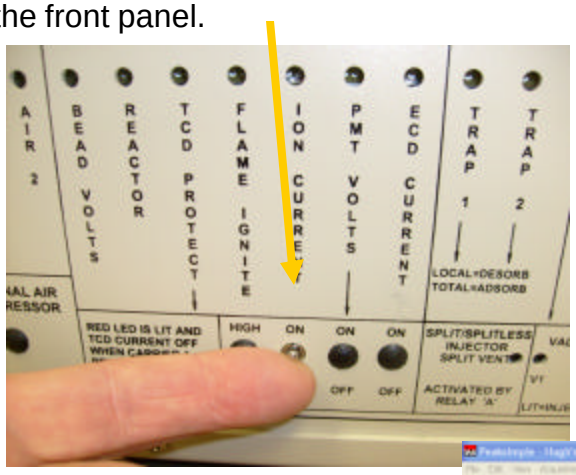
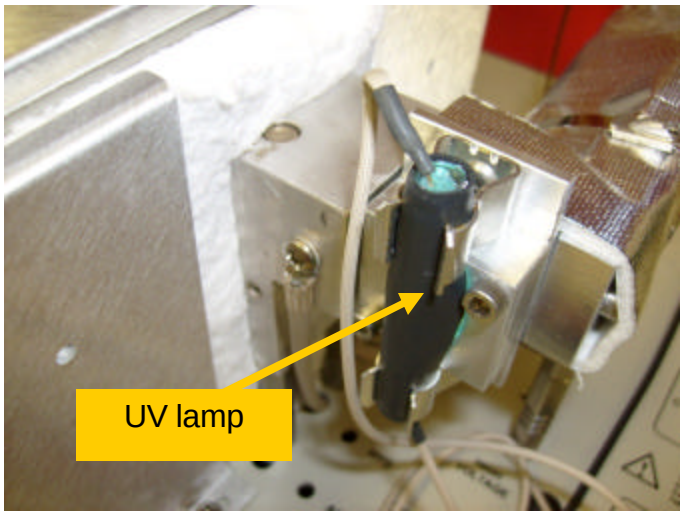
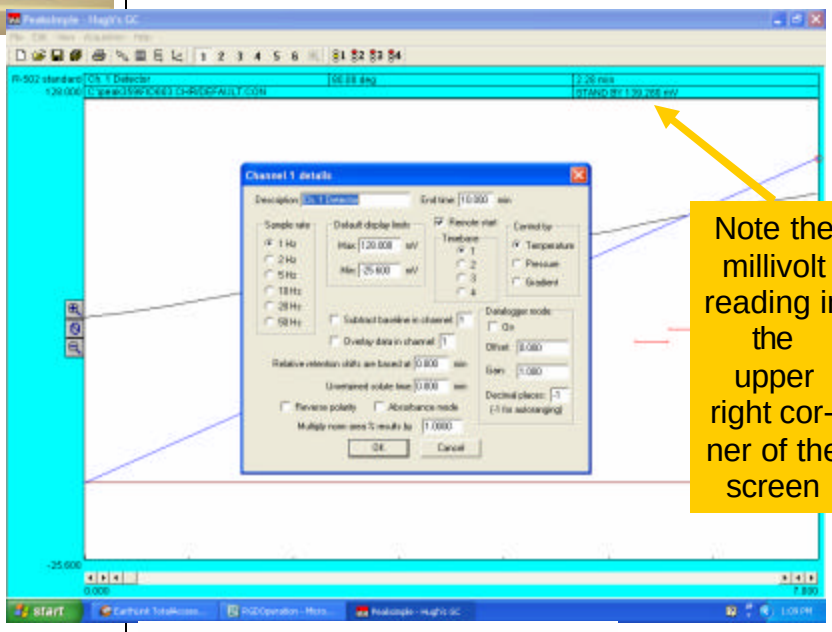
Turn on the UV lamp with the switch on the front panel.

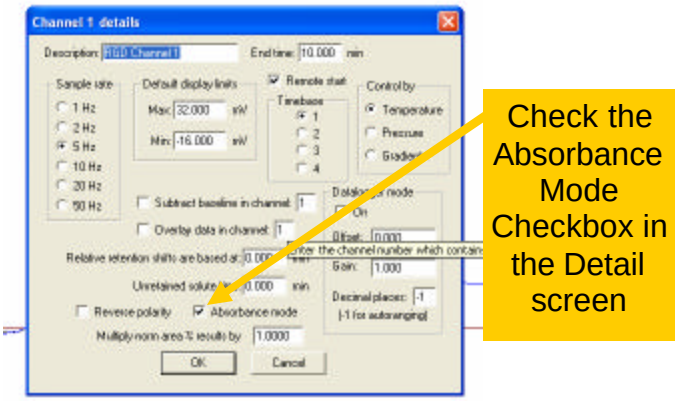




Note that the millivolt reading should increase from a number close to zero (0.00 millivolts) to some larger number when the UV lamp is turned on. This larger number is the **transmittance** (100% T). Ideally this number is greater than 100 millivolts but the actual number will vary as the Mercuric Oxide in the reaction tube becomes conditioned.
The **transmittance** is the amount of UV light which reaches the photodiode at the end of the RGD flow cell.



PeakSimple converts the transmittance to absorbance when the Absorbance mode is selected in the Details box for the channel to which the RGD detector is connected (normally channel 1). When the Absorbance Mode checkbox is checked the signal displayed by PeakSimple is 1000 millivolts per absorbance unit.



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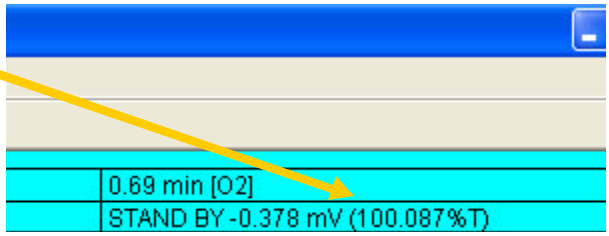
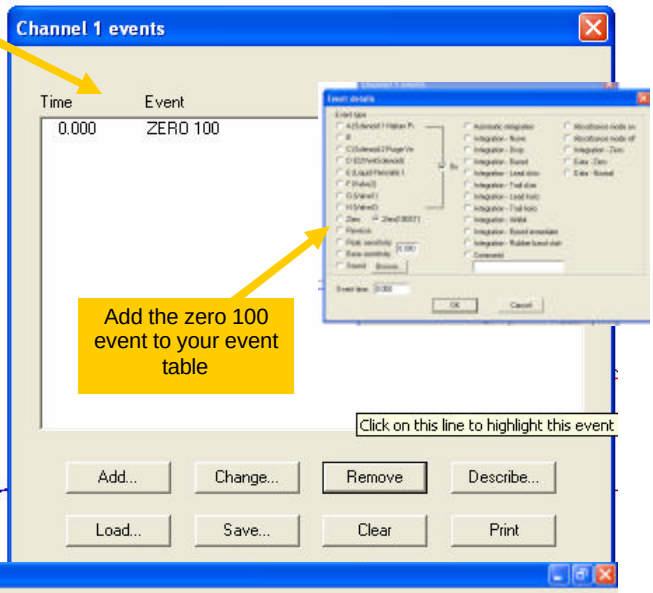
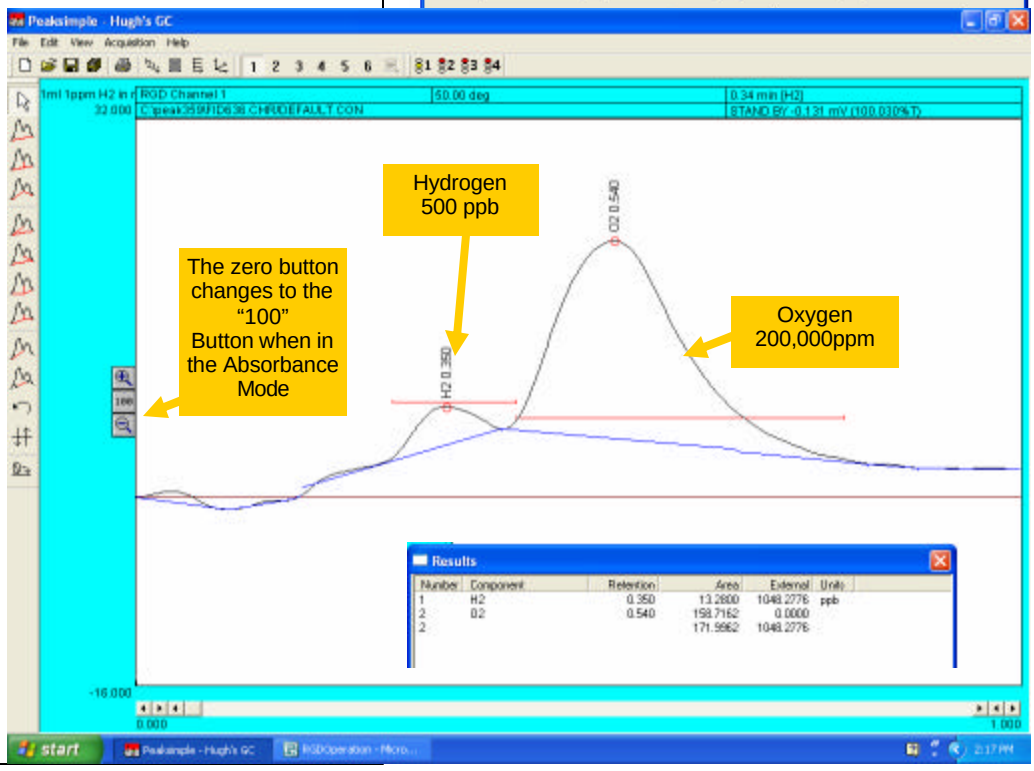
Notice that the millivolt reading changes to include the transmittance value when in the Absorbance Mode.
If for example, the transmittance was 100 millivolts (100% T), then the signal dropped to 10 millivolts, this reduction in the signal is defined as 1 absorbance unit and would result in a 1000millivolt signal on the PeakSimple display (in the absorbance mode).



Be sure to change the regular “autozero” event in the Event table to the “zero 100” event when in the Absorbance Mode. If you accidentally “zero” the transmittance the absorbance reading will be 6000 millivolts (or some similar high value).



The mercuric oxide may need to condition for 24 hours to develop maximum sensitivity. After that, you should be able to inject 1 ml. room air on an appropriate column (typically 2 meter molecular sieve 5A) and see ambient hydrogen at 500ppb similar to the chromatogram shown.



This chromatogram was run with the following conditions:

Column temp=50C
RGD reactor=250C
RGD cell=180C
Helium @ 5psi
MS-5A column
Inject 1 ml room air

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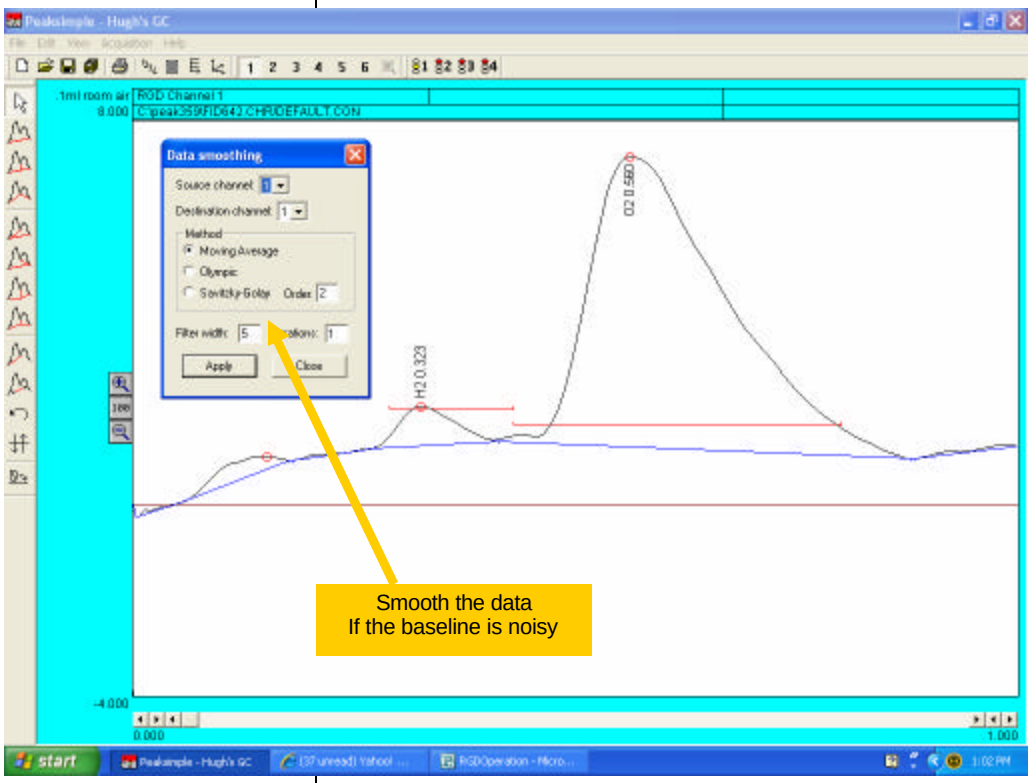
The chromatogram to the right is .1ml room air using the same conditions.

Smoothing was applied to the data



A commonly available 5 micron syringe filter collects the condensed mercury vapor as it exits the heated flow cell. Replace this filter periodically with an equivalent filter, charcoal tube etc. or vent the exit line to a hood to avoid mercury vapors venting into the room.