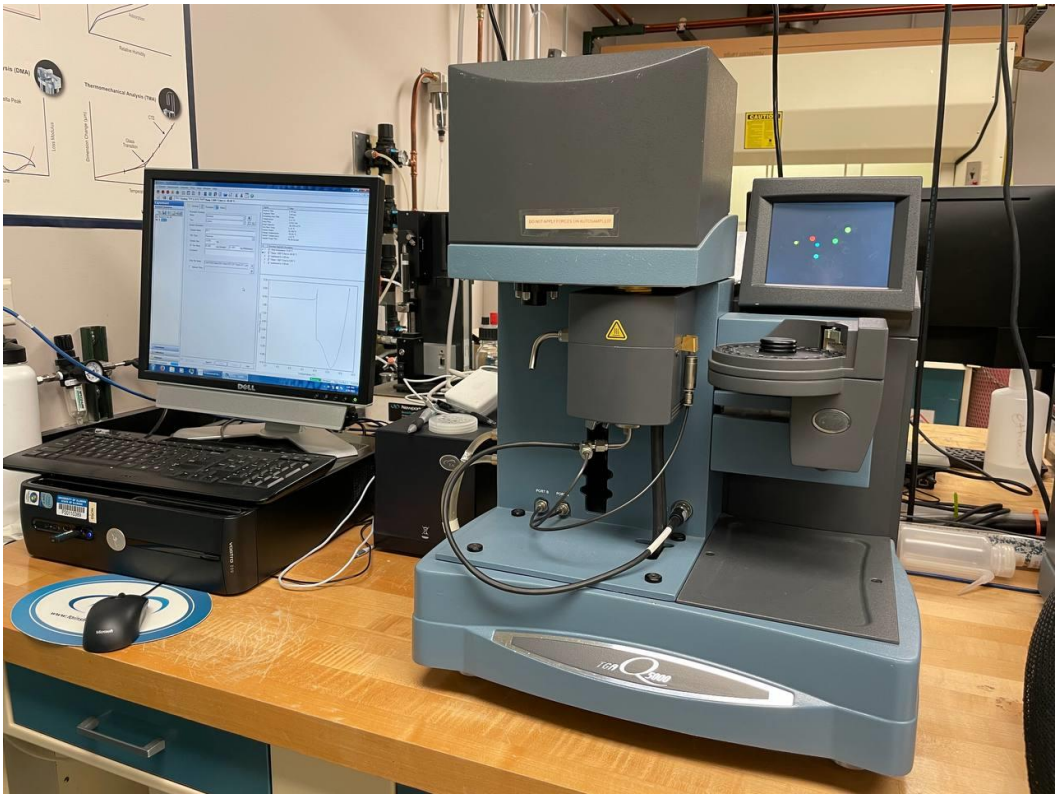
TGA Q5000 User's manual



Thermogravimetric analysis (TGA) is a weight change analysis system. The Thermogravimetric Analyzer measures the amount and rate of weight change in a material, either as a function of increasing temperature or isothermally as a function of time, in a controlled atmosphere. It can be used to characterize any material that exhibits a weight change and to detect phase changes due to decomposition, oxidation, or dehydration.

Location: Packaging Bay

Training: 3 sessions (2training and a checkout session)

System specifications:

- Temperature Range: Ambient to 1000 °C
- Mass sensitivity: 0.1µg
- Accuracy: 0.1 % or 10 µg
- Sample size:10mg -1 g
- Heating rate: 0.1 to 100 °C/min (normally 5, 10, or 20 °C/min is used)
- Autosampler
- Sample pans: Platinum, high Temp. platinum, ceramic. Under 600C should place your sample in a DSC pan and then place it in the platinum pan.
- Controlled Atmosphere: Nitrogen, (Ar, O_2 can be requested if needed)
- The correct flow rate is 40 ml/min for the balance and 60 ml/min for the furnace.

Safety notes:

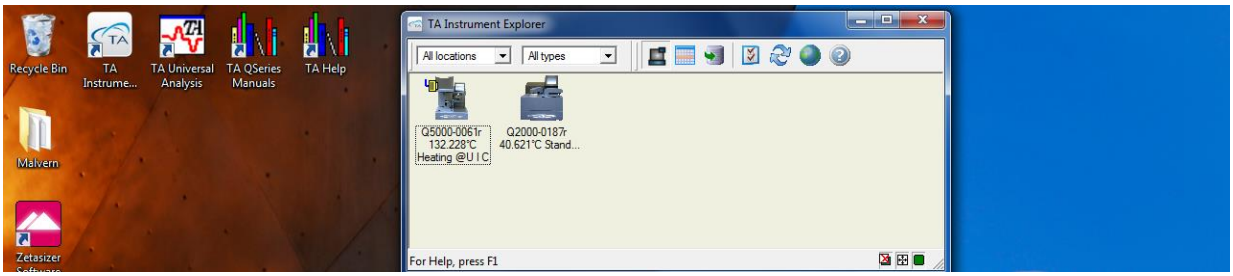
- Do not open the furnace when the temperature is higher than 40 °C, it can damage the balance and increase water absorbance.
- Never try to load/unload your pan manually on the hang-down wire.
- Furnace should be kept always closed (before loading your pan into the autosampler and after unloading it)
- Before running the experiment, make sure your sample will not boil at the designed temperature (check the literature before use).

Experimental Procedure:

1. Open the N_2 tank valve (make sure the proper gas tank is connected and use the proper tag)

2. Open the gas valve by the wall next to the instrument.

3. Fill out the Logbook.
4. Open the TA instrument controller.
5. Choose Q 5000 system.



6. Choose your pan type:

- Platinum: For general use and <u>temperatures below 600 °C.</u>

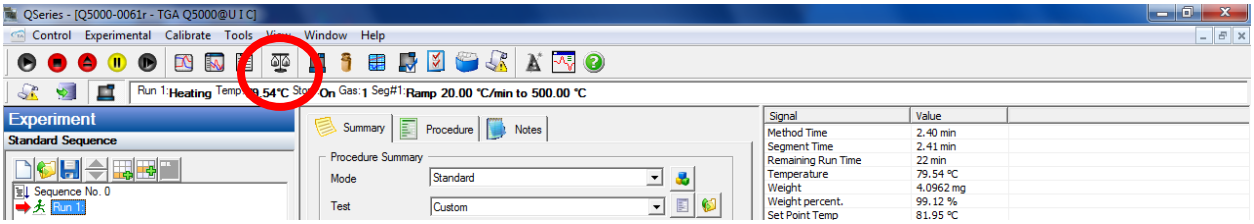
- High-temperature platinum (with Inconel alloy handle): Can go up to 1000 °C.

- Ceramic Pan: Used for samples that react with platinum.

7. Tare your pan(s) and load the sample:

- Place your cleaned pan(s) in the autosampler pan holder. <u>DO NOT</u> load your pan on the hang-down wire manually. Make sure to have a DSC pan obtained from NCF staff on the platinum TGA pans if the temperature range is below 600 °C (the DSC pans need to be purchased prior to the experiment from the NCF website)

- Click on the Tare button and select your pans, then click Tare. This function will subtract the weight of the pan from the sample.



-Load your material in the DSC pan (if below 600 °C) and then load it onto the TGA platinum pan. If the temperature goes higher than 600 °C, load your sample directly onto the TGA high temp. platinum pan (make sure to clean the pan after use)

-Put your TGA pan on the autosampler.

-Select pan number.

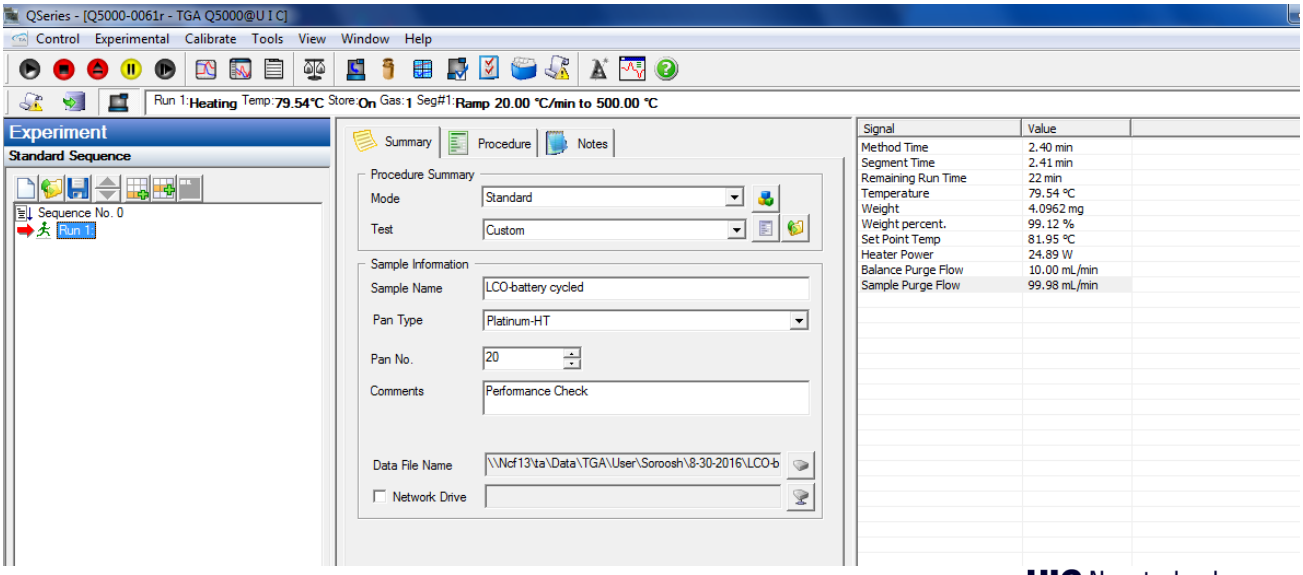
-Press Control > Furnace > Down.

-Press Control > Sample > Load.

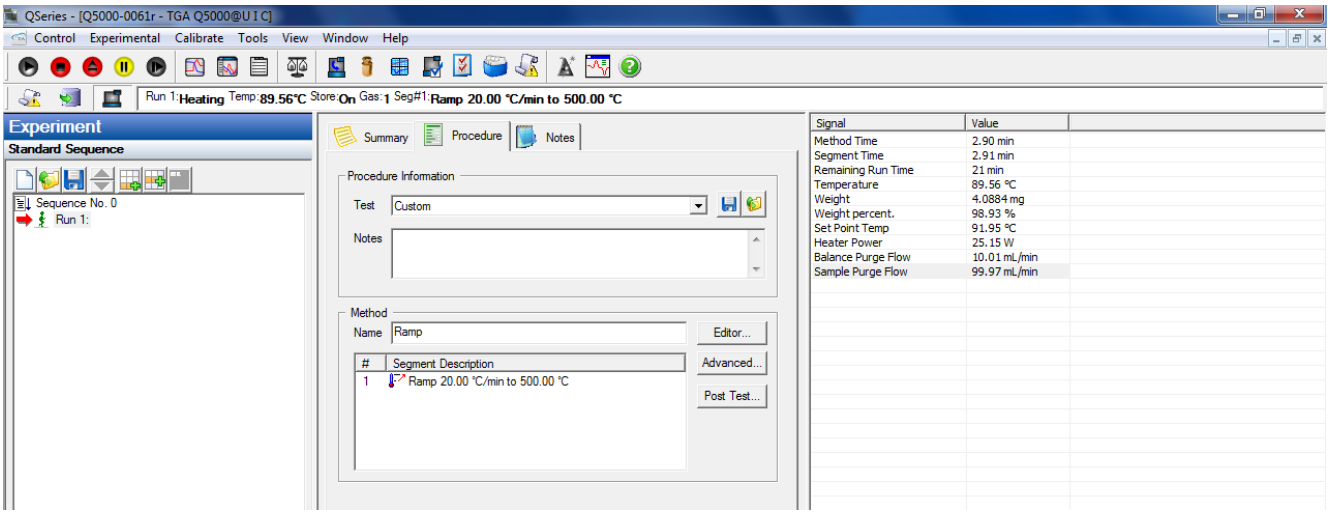
- Press Control > Furnace > up.

8. Design your experiment:

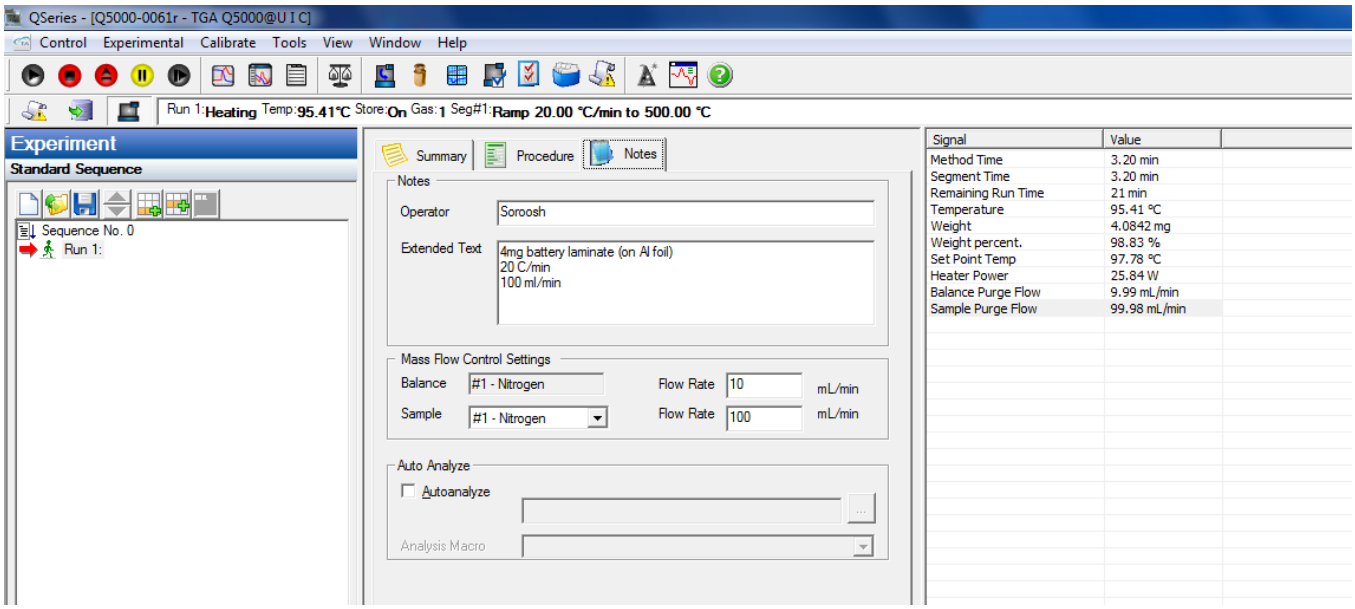
- Click on the summary tab and input the procedure summary and sample information, select the pan type you are using and select where the results you want to be saved.



- Click on the procedure tab and design your experiment conditions. You can save and load your procedure. Click on the editor and you can see different functions that can be added to your procedure. After designing your procedure, click **apply**.



- Click on Notes and enter your name as operator. Make sure the gas is flowing at the rate of 10 ml/min for balance and 100 ml/min for the sample.



9. To run more samples using autosampler, click on **Append** to add more runs and repeat the past three steps to design them.
10. Finally start Run1 by double-clicking on the red arrow or clicking on the green button on top and wait for the calculated time.
11. Using "TA universal analysis software", you can watch your data and analyze them while the experiment is running. (You can download the software on your own computer for free from the TA instruments website)
12. At the end of the experiment when the temperature is below 40 °C unload your sample:

-Press Control > Furnace > Down.

-Press Control > Sample > Unload.

-Press Control > Furnace > up.

13. Clean the pans using the flame and put them back in the box.
14. Close the two gas valves (Next to the system and the gas tank)
15. Fill the Logbook.