

TEGA Low Temp Soil –With Acquire

Reconciled with block: __tega_prep_for_xfer_r30_ta5,
tega_sample_process/r55_____

Objectives:

Power on and perform the low-temperature ramp on a surface soil sample just acquired. This sample will be taken right next to Rosy Red, the sample put into the first WCL cell. After warm up, we will collect residual data for 7 to 43 minutes (depending on the time the shaker runs) then begin the ramp program. We analyze the atmosphere via the TA inlet for 16 minutes followed by 15.5 minutes of carrier gas analysis. We have 10 minutes of supermode 7 which will get background isotope ratios The ramp assumes we start early in the morning (6:00 am). It starts at -40 C and goes to -30 C and holds to look for a temperature change upon oven closing. We then ramp back down to -40 C in anticipation of starting the heating ramp. We will not do a measurement of heat capacity, as it is felt the heating to -10 compromises our ability to detect a low-T melting of ice (due to salt). We turn off the gas flow to prevent blowing any melt water out of the oven, and after allowing time for the pressure to bleed off, we then ramp to +35 C with no carrier gas flow. We do not flow carrier allowing for the vapor pressure of water to drive the water vapor out of the oven. We capture a gas sample following a 3-minute hold at +35 C. At this temperature we allow 61 minutes for any water to vaporize. We run calibration gas at the end of the run and we have two different pressure settings for the TA manifold for calibration of the sensor.

Deleted: NEED REVISED

Deleted: n ice

Deleted: 12

Deleted: 11

Deleted: 20

Deleted: a rise to -10 C for heat capacity.

Deleted: We monitor the gas release up to +15 C when w

Deleted: ; heating continues uninterrupted up to

Deleted: 77

Note: This block will run at **LOW** emission unless otherwise requested by the Instrument Lead.

Configuration:

This is our third sample. Delivery to TA5 on Sol _____. Delivery will be done via sprinkle method with a “tent” delivery.

Constraints:

Verify Door Open for TA Complete: TA5 Door is “partially” opened

This will be an early morning delivery between 5 – 6am. Current ramp assumes a 15 minute oven close.

Gas(es) used: Carrier and Calibration. Mars ATM will also be collected through the TA Sample valve.

Filaments used: 1

SW Version (386): V513

SW Version (EGA): V321

Sweep and hop mode version(s): MODE TABLE V123.

Super modes and Sweep modes used: Supermodes 1, 2, 3, 4, 6, 7, 9 and 12; Sweeps 37, and 38.

TEGA Low Temp Soil –With Acquire

Super modes used in Ramp: 4,6,7,9 & 12

Note: TEGA is checked to see if TEGA is safed. If so, abort self to end activity

Deleted: ¶

Page Break

1. Turn ON TEGA – Call TEGA_power_on – This is controlled by the interop science master
 - 1.1.1. TEGA_MAIN1_PWR "ON"
 - 1.1.2. TEGA_MAIN2_PWR "ON"
 - 1.1.3. TEGA_MAIN3_PWR "ON"
 - 1.1.4. Start the TEGA 386 FSW

TEGA_PREP_FOR_XFER STARTS HERE: reconciled with block R30

2. Pause 3 Minutes (collect engineering data at a high rate before turning down) – This pause is controlled by interop science master, it may vary with pre-heat delay requirements)
3. Call Sequence 30A

Open inlet and outlet valves (on TA-0) to empty manifold

4. Select TA 3 for steps 5 & 6
5. Open Inlet Valve (TA3)
6. Open Outlet Valve (TA3)
7. Pause 30 seconds to allow commands on delayed list to clear before EGA Turn on
8. Turn on EGA
 - 8.1.1. TEGA/FSW:EGA:Change EGA State
 - 8.1.2. Restore the modes from EEPROM 0
 - 8.1.3. EGA Commands:Restore Mode
9. OPEN GEC Vent Valve
10. Activate Sequence 24 A (Turns up readings for regulating temps)
11. Set Manifold Heater to -30C (execute Sequence 3b)
12. Warm up EGA: CALL tega_ega_emission_warmup
 - 12.1. (LOW), Calibration Set 3, 3200V
 - 12.1.1. Note: IF pass through was selected as HIGH, calibration set CANNOT equal 3
 - 12.2. Calls tega_ega_prep, filament-1

TEGA Low Temp Soil –With Acquire

- 12.2.1.1. Sets JPlate 0 to -107V
- 12.2.1.2. Sets Jplate 1 to -92V
- 12.2.1.3. Pause 5 seconds
- 12.2.1.4. Set MV 2800V Pause 1 sec
- 12.2.1.5. Ion Pump ON Pause 30 secs
- 12.2.1.6. Start SM 1, pause 1 sec
- 12.2.1.7. Emission ON
- 12.2.1.8. Pause 2 Minutes
- 12.2.1.9. Stop SM 1

- 12.3. Pause 2 minutes (provides time for ion pump to stabilize)

- 12.4. Change engineering transmit to 10 secs
 - 12.4.1. IF pass thru = 1, emission current will change to HIGH

- 12.5. Call tega_ega_calibration_scans, 3200
 - 12.5.1. MV exits at 3200V

- 12.6. Wait 1 second

- 12.7. Start SM 3

- 12.8. Pause 20 minutes

- 12.9. Stop SM 3

- 12.10. Pause 1 minute

- 12.11. Calls **tega_ega_gain**
 - 12.11.1.1.1. Start SM 2
 - 12.11.1.1.2. Pause 1 minute
 - 12.11.1.1.3. Set MV 2600 – 3400V (1 minute per voltage)
 - 12.11.1.1.4. Remain at 3200V
 - 12.11.1.1.5. Stop SM 2
 - 12.11.1.1.6. Run Sweep 38

EGA is warmed up and ready to go (54 mins)

- 13. Calibrate EGA: CALL tega_ega_calibration_scans (set = 3, exit=3200 V)

Measure residuals

- 14. Start Supermode 7: Soil volatiles (3200 V)

Warm up pressure sensors so we get reliable pressure readings

TEGA Low Temp Soil –With Acquire

15. Set EGA manifold heater to +35 C
16. Set TA manifold heater to -10 C
17. Pause 7 minutes (collect residual gas background prior to collecting sample)
18. Set up LED Ignore Diff Parameters (this has been updated to 20%)

We will get a good calibration point here for the TA manifold sensor at -10 C and ambient pressure.

19. Close Inlet Valve
20. Close Outlet Valve

END OF TEGA_PREP_FOR_XFER

21. Wait for RA ready signal. – RA Waits for TEGA DONE
22. Send signal to RA saying we are ready. (End of tega_prep – TEGA_block_done goes true)
 - 22.1. NOTE: ENDS WITH GEC VENT VALVE OPEN

SAMPLE_PROCESS STARTS HERE

Select Oven TA__5_ –**TWEAKABLE**

23. Start shaker – Call tega_fill_oven(We will measure residuals during shaking)
 - 23.1. shake duration = 180 seconds
 - 23.2. shake cool down = 180 seconds
 - 23.3. fill_cycles = 6 (shaking will continue to loop, unless oven full is detect)
24. Wait for shaker to complete - IF oven does not go full within the 6 cycle limit, TEGA will safe.
25. Start Ramp _____ (**TWEAKABLE**)
26. Initiate oven close (15 minutes) – Need verified for Sol 72
27. **Pre_heater_delay** = 2290 secs – **TWEAKABLE**
28. **Set TA Manifold heater to +65C**
29. **Set Plumbing 1 to +50C**

TEGA Low Temp Soil –With Acquire

30. Run tega_init_heater_control
 - 30.1.1.1. Execute Sequence 24A
 - 30.1.1.2. TA Manifold +65C
 - 30.1.1.3. Plumbing 1 +35C
 - 30.1.1.4. Plumbing 2 +35C
 - 30.1.1.5. Transfer Tube +75C
 - 30.1.1.6. EGA Plumbing +45C
 - 30.1.1.7. EGA manifold to +35 C
 - 30.1.1.8. Wedge Heater @ 10% duty cycle
31. **Pre-Sweep_Delay** = 2500 seconds - **TWEAKABLE**
32. Stop supermode immediate
33. Run sweep mode 38 (Starts ~ 83 mins after ramp started, 30 mins after gas sample is captured)
34. Run Supermode 7: Soil volatiles (3200 V)
35. **Post-Sweep Delay** = 1920 seconds -**TBR** The next step turns on the cal tank heater 10 minutes before gas is needed – **TWEAKABLE**
36. Start Cal Tank Regulate to +10C (TA5)(turn up engineering readings)
 - 36.1. Default value is “99” – Cal Tank heater not turn on)
 - 36.2. Set on Timer 1
37. **Post_cal_tank_delay** = 2460 **TBR** (The next step turns off the cal tank heater 1 minute after we are done with it) – **TWEAKABLE**
38. Turn off cal tank heater (if we had turned it on, so we can see water freeze)
39. Wait for ramp to complete
 - 1.1. Timeout = **TBR (TA5)** (**TWEAKABLE**)

Shut down

40. Run tega_disable_heater_control (Turn all remaining heaters off)
41. Close bypass valve
42. Stop SM 6
43. Close GEC Vent Valve

TEGA Low Temp Soil –With Acquire

44. Turn off EGA: CALL tega_ega_off
EGA Shutdown:
 - 44.1.1. Multiplier Voltage OFF
 - 44.1.2. Wait 5 secs
 - 44.1.3. Emission Off
 - 44.1.4. Wait 5 secs
 - 44.1.5. Ion Pump Control OFF
 - 44.1.6. Activate Sequence 7A to turn the EGA OFF

45. Turn off TEGA: CALL tega_power_off
 - 45.1.1. Turn off the third TEGA switch
 - 45.1.2. Turn off the second TEGA switch
 - 45.1.3. Turn off the first TEGA switch
 - 45.1.4. FPGA Dump – Aker Valve state