

TEGA High-Temp Soil

AS RUN TA0 Sol 68

Reconciled with block: [tega_high_temp/R43](#)

Objectives:

Power on and perform the full high-temperature ramp on a soil/ice sample that had been previously heated via a mid-temperature ramp. The purpose of this run is to look for the enthalpy associated with decomposition of altered minerals and to measure the gases given off by the decompositions. After warm up, we will collect background data for 30 minutes then begin the ramp. The ramp starts at -60 C and runs to + 1000 C at 20 K/min followed by a 5 minute hold to measure the heat capacity of the oven before the ramp returns to low temperatures. We also measure the heat capacity at low temperature (where it should be a more sensitive measurement. The procedure also shuts off the manifold heater when the oven and shield are at high temperatures to avoid drawing too much current from the lander.

Configuration:

Mid-temperature ramp has been completed previously.

Constraints:

Review data from Checkout II to confirm dN numbers for regulation in activity block and ramp segments.

Need to make sure we do not begin too early in the morning PRIOR to the TA manifold temperature greater than or equal to -40C for a duration of at least 40 minutes (TBR)

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

Filaments used: 1, LOW Emission

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, 6, 7. and 12; Sweeps 37, and 38.

Supermodes running in ramp: 6, 7 & 12

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

1. Turn ON TEGA – Call TEGA_power_on
 - 1.1.1. TEGA_MAIN1_PWR "ON"
 - 1.1.2. TEGA_MAIN2_PWR "ON"

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- 1.1.3. TEGA_MAIN3_PWR "ON"
 - 1.1.4. Start the TEGA 386 FSW
2. Pause 3 Minutes (collect engineering data at a high rate before turning down)
3. Call Sequence 30A
4. Turn on EGA
 - 4.1.1. TEGA/FSW:EGA:Change EGA State
 - 4.1.2. Restore the modes from EEPROM 0
 - 4.1.3. EGA Commands:Restore Mode
5. OPEN GEC Vent Valve
6. Warm up EGA: CALL tega_ega_emission_warmup (filament 1, emission low, cal set 3)
 - 6.1.1. Note: IF pass through was selected as HIGH, calibration set CANNOT equal 3
- 6.2. Calls **tega_ega_prep, filament-1**
 - 6.2.1.1. Sets JPlate 0 to -107V
 - 6.2.1.2. Sets Jplate 1 to -92V
 - 6.2.1.3. Pause 5 seconds
 - 6.2.1.4. Set MV 2800V Pause 1 sec
 - 6.2.1.5. Ion Pump ON Pause 30 sec
 - 6.2.1.6. Start SM1, pause 1 sec
 - 6.2.1.7. Emission ON
 - 6.2.1.8. Pause 2 Minutes
 - 6.2.1.9. Stop SM 1
- 6.25 Pause 2 minutes (provides time for ion pump to stabilize)
- 6.3. Change engineering transmit to 10 secs
 - 6.3.1. IF pass thru = 1, emission current will change to HIGH
 - 6.3.2. MV exits at 3200V)
- 6.4. Wait 1 Second
- 6.5. Start SM 3
- 6.6. Pause 20 minutes
- 6.7. Stop SM 3
- 6.8. Pause 1 minute
- 6.9. Calls **tega_ega_gain**
 - 6.9.1.1.1. Start SM 2

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- 6.9.1.1.2. Pause 1 minute
- 6.9.1.1.3. Set MV 2600 – 3400V (1 minute per voltage)
- 6.9.1.1.4. Remain at 3200V
- 6.9.1.1.5. Stop SM 2
- 6.9.1.1.6. Run Sweep 38

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

- 7. Set EGA manifold heater to +35 C
- 8. Set TA manifold heater to -10 C
- 9. Calibrate EGA: CALL tega_ega_calibration_scans (set = 3, exit=3200 V)
- 10. Start Supermode 7: Soil volatiles (3200 V)
- 11. Select Oven TA___ (**TWEAKABLE**)

Remember to turn on current monitoring to shut down manifold heater

- 12. Start Ramp (**TWEAKABLE**)
 - 12.1. Ramp Segments File: B30 to B48 for TA0
- 13. Pause for **pre_heater_delay** (1891 sec;) - **TWEAKABLE**
- 14. Run Heater Init (tega_init_heater_control)
 - Execute Sequence 24 B to increase readings on temperature regulation.
 - 14.1.1. TA Manifold +65C
 - 14.1.2. Plumbing 1 +35C
 - 14.1.3. Plumbing 2 +35C
 - 14.1.4. Transfer Tube +75C
 - 14.1.5. EGA Plumbing +45C
 - 14.1.6. EGA manifold to +35 C
 - 14.1.7. Wedge Heater @ 10% duty cycle
- 15. Pause for **pre_sweep_1_delay** (270 sec;) - **TWEAKABLE**
- 16. Stop SM 7
- 17. Start Sweep 38 (Sweep of carrier gas)
- 18. Start Supermode 6: Soil volatiles (3200 V)
- 19. Pause for **pre_cal_tank_delay** (4821 sec;) - **TWEAKABLE**

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20. Start Cal Tank heater to +10C (= off) (turn up engineering readings)
 - 20.1. Set Cal Tank to Timer 1
21. Pause for TA Manifold delay (300 seconds)
22. Manifold Heater on at +65C
23. Pause for post cal tank delay (2092 seconds)
24. Turn OFF Cal Tank Heater
25. Wait for ramp to complete (timeout _2308 seconds____) - **TWEAKABLE**

Ramp Ends as Follows:

- 25.1.1 SM 6 running
- 25.1.2 Carrier and Calibration Closed
- 25.1.3 Inlet & Outlet closed
- 25.1.4 TA Sample Closed
- 25.1.5 Bypass OPEN

Shut down

26. Run tega_disable_heater_control (Turn all remaining heaters off)
27. Close bypass valve
28. Stop SM 6
29. CLOSE GEC Vent Valve
30. Turn off EGA: CALL tega_ega_off
 - 30.1.5.1 EGA Shutdown:
 - 30.1.4 Multiplier Voltage OFF
 - 30.1.5 Wait 5 secs
 - 30.1.6 Emission Off
 - 30.1.7 Wait 5 secs
 - 30.1.8 Ion Pump Control OFF
 - 30.1.9 Activate Sequence 7A to turn the EGA OFF
31. Turn off TEGA: CALL tega_power_off
 - 31.1.6 Turn off the third TEGA switch
 - 31.1.7 Turn off the second TEGA switch
 - 31.1.8 Turn off the first TEGA switch
 - 31.1.9 FPGA Dump – Aker Valve state

August 2, 2008

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