Model 405 nm Calibration

Patrick O’Keeffe  
2017 Dec 21, Thu

# Summary

Prepping unit for deployment in Spokane as part of the Urbanova WSU Spokane campus air quality reference site. Has been running in PETB 417 for many days sampling either rooftop or laboratory air.

# Calibration Plan

Unit reporting range is 2 ppb to 2 ppm for NO/NOx and 2 ppb to 10 ppm for NO2; reasonable ranges of interest are 0-200 ppbv for all species (ref: Teledyne analog output range, configured for HCHO/IAQ studies).

N.B. ensure analyzer is set to fast (20sec) output rate.

## Sources

* Calibrator: Teledyne T700U, s/n 294
* NO standard: cylinder JB03993 (NO @ 4.02 ± 0.03 ppmv EPA, NOx @ 4.02 ppmv, NO2 @ < 0.02 ppmv, balance O2-free N2)
* NO2 standard: Teledyne 700U, s/n 294
* Zero source: Teledyne 701H, s/n 195

# As-Found Status

Values currently programmed into analyzer memory:

* NO2
  + Slope: 1.000
  + Zero: 000.0
* NO
  + Slope: 1.000
  + Zero: 000.0
* Flow
  + Cell\_flw: 1.40
  + O3\_flw: 1.00
* O3
  + *…selecting this menu throws analyzer back up to Cfg menu…*

# Notes

*Disregard initial data points in file.. had set calibrator to wrong gas output type.*

10:05 Begin flowing 3.0 LPM zero air past analyzer via overflow tee.

10:07 Observe analyzer still in config menu, exited

10:09 Start first data collection run in logger program

10:43 Halt first run. Change gas delivery to 180 ppb NO

Results 🡪 NO: avg -36.72 std 243.1; NO2: avg -21.36 std 88.1; NOx: avg -58.1, std 243.6

… oops need to record start of run time…

11:30 Halt second run collection. Change gas delivery to 60 ppb NO

Results 🡪 NO: avg 173.5 std 16.32; NO2: avg -21.4 std 4.02; NOx: avg 152.1 std 16.2

11:33 Begin third run data collection while sampling 60 ppb NO.

12:25 …Placed calibrator back into standby and halted third run data collection.

Realized experimental setup is missing inline Nafion humidifier…

12:32 Added inline nafion humidifier to setup, but calibrator still in standby

Also, need to setup calibrator for gas phase titration for NO2…

13:51 Begin flowing zero air again from calibrator unit

14:11 …OK, finished screwing with logger run settings… After restarting and clearing data (earlier data set was already retrieved and uploaded to OneDrive), began collecting zero run data

14:47 Halt data collection for zero run. Change delivery stream to 180 ppb NO (still 3LPM)

Results: NO2 avg -20.58 std 5.42, NO avg 1.376 std 3.82, NOx avg -19.2 std 6.36

14:57 Begin data collection for NO @ 180 ppb --- oops, have wrong source ref listed

15:00 Re-begin data collection for first NO span

15:36 Halt data collection for this run. Change delivery concentration to 90 ppb NO

Results: NO2 avg -19.75 std 3.76, NO avg 166.9 std 3.77, NOx avg 147.1 std 4.07

16:04 Returned to find run had never been started. Damnit

…Strangely, notice datalogger keyboard display presents different summary of table `stats` than LoggerLink does: has additional record for 14:47:20.00. Took photo with phone.

Also noticed that despite LoggerLink public table showing NOx\_conc was set to 180, data tables hold value of 0 for this var!

16:09 Begin collecting data for NO=90 ppb run

16:57 Halt collection for this run. Change delivery concentration to 15 ppb NO.

Results: NO2 avg -17.27 std 3.31, NO avg 84.7 std 3.61, NOx avg 67.47 std 3.55

17:13 Begin collecting data for NO=15 ppb run

17:51 Halt collection for this run. Set calibrator into stand-by mode and leave tubing alone.

Results: NO2 avg -17.68 std 3.04, NO avg 14.78 std 3.04, NOx avg -2.9 std 2.94

GPTPS

19:51 Begin GPTPS ozone pre-step with NO=250ppb, O3=150ppb

20:00 Has reached ozone setpoint and ‘O3 Gen Stabilizing’ now *No*

20:03 Initiate GPT with same params, NO=250ppb, O3=150ppb…. Valves are closed still… opening

20:04 GPT again

20:14 NO2 concentration stable around 124 ppb.. starting run acquire.. began at 20:16

20:47 Halt run acquisition and change operating mode to GPTZ

20:59 Begin run acquisition for GPTZ mode

21:31 Halt run acquisition. Begin GPTPS mode again with NO=50 ppb, O3=30 ppb

21:45 Steady ozone generator concentration… switching to GPT mode, same params

21:57 Begin run acquisition for GPT with NO=50, O3=30 ppb

22:18 Halt acquisition for GPT, switch calibrator mode to GPTZ same params

22:30 Begin data collection for GPTZ run (final run)

22:52 Halt data collection for very last run. Place calibrator into stand-by mode.

22:56 Retrieve data sets from logger