Maximizing Your GC's Capabilities

Validating the Operation of Your Gas Chromatograph

Emerson recently hosted the webinar "Validating the Operation of Your Gas Chromatograph". These are the questions asked by the audience members along with the answers provided by our subject matter experts.

■ Do you have a table for RF deviation for C9+?

The relative RFs vary with the GC model, kind of detector used and flow path. We do not publish a relative response factor list.

■ What are the analytic sensitivity and method detection limits?

The analytical sensitivity varies with GC, detector, concentration of the component and temperature range. The rule of thumb is that a Thermal Conductivity Detector (TCD) can be used to detect components down to the 50 ppm concentration. There are TCDs capable to detect limits down to 5 ppm. The rule of thumb for a Flame Ionization Detector (FID) is that it can detect concentrations from 1 Mole % to sub ppm.

■ Can a calibration gas be brought back to original composition if the temperature of the bottle has been accidently lowered below freezing?

If the bottle temperature has gone below its hydrocarbon dew point so that the heavies have dropped out but the bottle has not been open (has been in storage), then yes the calibration gas can be brought back to the original composition. You want to heat the bottle for a long time, at least overnight, at 30 degrees above the gas' hydrocarbon dew point. If calibration gas has been taken out of the bottle while it was cold, then the gas is ruin and the calibration gas bottle should be replaced.

■ Is there any plans to include some of these 370XA features (ideal RF order and auto valve timing adjustment) in future firmware upgrade for the 700XA?

Yes. For standard 700XA applications, we are looking at offering auto-valve timing and other unique features currently only found on the 370XA GC.

■ Should you ever have to force calibrate when changing calibration standard bottle?

Yes, sometimes. The old calibration gas bottle has an uncertainty in measurement, the new calibration gas bottle has an uncertainty in measurement value and the GC has an uncertainty in measurement. When you add up the uncertainties, the smaller components may go outside the response factor alarm limit. This does not happen frequently. If the old calibration bottle has been there for awhile, the heavies may have dropped out and cause an alarm when compared to the new calibration gas bottle. You also get a bad calibration gas cylinder from the supplier despite the certificate. When you do a force calibration, you should still check the response factor order.

■ You said that running your calibration gas as an unknown will not show issues, if i have a certificate that says 2 % N2 and the unknown is coming up at 5 %, would this not indicate an issue?

Yes - this would indicate an issue. If you use the calibration gas as an unknown and the analysis does not match the certificate, you definitely got an issue. The issue with running the cal gas as an unknown is that it can hid an issue such as cutting off a component. Running the calibration gas as an unknown and having the analysis match the certificate, does not mean the GC is operating correctly.

■ If Specific Gravity is not being analyzed, what caused the number to change?

The Specific Gravity (SG) is a calculated value, not a measured value. The GC provides a theoretical density of the gas sample. If the analysis is incorrect, the SG that was calculated using the analysis data will be incorrect.

■ What is the lead time on GC analyzers?

The lead time on the Rosemount GCs vary with the GC model and application. You would need to contact the factory for lead times specific to your application and GC.

■ At what pressure should calibration gas be changed out?

When the pressure in the calibration cylinder get to set point on the regulator, the cylinder should be switched out. If the pressure of the calibration cylinder gets too low, it is possible to get a deviation alarm. The set point on the regulator depends on the GC model.

■ Do all the validation procedures mentioned here apply to the Process GCs as well?

Yes, definitely. The theory still applies. Relative response factors will not be the same compared to C6+ as the concentrations will be different

■ Can you store the calibration gas certificates in the GC somehow for auditing?

Yes for XA Chromatographs (370XA, 700XA, and 1500XA). You can upload and store various types of documents (Word, TXT, PDF, Excel) into the GC memory to have a permanent record. To upload and store a document on the GC, open MON2020, connect to the GC. On the Menu Bar, click on Logs/Reports and select Drawings/Documents.

■ When reading the specific gravity of an analysis, what is that actually telling me about the gas sample? Has there ever been a problem with an analysis of specific gravity?

The Specific Gravity (SG) is a calculated value, not a measured value. The GC provides a theoretical density of the gas sample. If the analysis is incorrect, the SG that was calculated using the analysis data will be incorrect.

■ Are there major benefits to upgrading from MON2000 to MON2020?

One is not able to upgrade from MON2000 to MON2020 without changing one's GC. The Model 700 and Model 500 operate on MON2000 while the 370XA, 700XA and 1500XA operate on MON2020. While MON2000 and MON2020 have a similar look and feel, they are different software platforms. Model 500 and Model 700 GCs can not be run with MON2020. Some of the improvements of the MON2020 software over the MON2000 software include an administrator role, ability to view unlimited number of chromatograms in any configuration, multiple users being able to be connect to the same gas chromatograph simultaneously and the ability to perform trend analysis. Along with software improvements, there have been GC improvements over the years. Newer GC models have smaller footprints, use less carrier and calibration gases and are easier to maintain. If it has been awhile since your GC was purchased, it may be cost-effective to upgrade your GC and software.

■ Can you get the response factors' graphs in a simple menu in the MON2020 software?

Yes. On the Menu Bar, click on Logs/Report, then click on Molecular Wt. Vs Response Factor. It is available for XA chromatographs (370XA, 700XA and 1500XA) although only shows the normal hydrocarbons (C6+) because it is according to GPA standards

■ What is the maximum RF % deviation that is acceptable?

Rosemount sets the alarm at 10 % RF Deviation by default. The value is a compromise between getting too many alarms and not catching an issue with the GC early . Some customers set the alarm limit as low as 5 %.

■ What is the expected range of deviation for RF Deviation %?

The expected RF Deviation % is less than 10 %, with typical day-to-day variation expected to be less than 2 %. Most typical RF Deviation on a day-to-day basis is 1 %. If you have a changed in the atmospheric pressure, example a cold front coming through, you may see a 2 % RF Deviation. Rosemount sets the alarm at 10 % RF Deviation by default. Some customers set the alarm limit as low as 5 %.

■ Where does the ideal Response Factor (RF) ratio and ideal RF deviation show up? Is it in MON2020?

The ideal Response Factors (RF) show up on the Calibration Reports and the Component Data Table in MON2020. For the 370XA, the Calibration Report also shows the RF % Deviation from Ideal.