

Methanol in Natural Gas

Recently a report was published that investigated the effect of methanol on the analysis of natural gas by various gas chromatographs. The report was in response to measurement issues in some offshore applications where methanol is injected into the gas stream to avoid hydrate formation.

The Daniel chromatograph used in the report was a Model 575 of unknown age using a six-minute application with columns that are not used in the current generation of Danalyzer gas chromatographs, and therefore the findings are not representative of most Danalyzers in the field. The four-minute C6+ chromatograph columns used in the Model 570 and Model 770 for the last six years use different column materials and lengths than the unit tested in the report.

Where Methanol Elutes in the Four-Minute C6+ Application

With the current generation of columns used in the Danalyzer four-minute C6+ gas chromatographs, there is no co-elution of methanol and C6+ for significant amounts of methanol. Figure 1 shows the C6+ peak at 27.5 seconds with a 1000 ppm methanol peak eluting just after at 31 seconds. If methanol contamination is a concern with an installed Danalyzer with a column set older than six-years, a replacement column-four (p/n 2-3-0520-101 col. 4) can easily be installed.

Where the effect of not measuring the methanol becomes most apparent is when the composition is used to calculate the speed-of-sound for use in the validation of ultrasonic flow meters. If there is methanol present in the gas stream and the gas chromatograph is not configured to detect it, the gas chromatograph will normalize the measured components to equal 100 % without the methanol. When the theoretical speed-of-sound is calculated, the values will represent the speed-of-sound as if there was no methanol in the stream. However, the ultrasonic meter will measure the speed-of-sound at the true stream conditions with the methanol and there will be a significant error. Additionally, as methanol has a significantly lower BTU content, the calculated BTU from the GC will also differ from the BTU calculated with the methanol. Figure 2 shows an error of over 1.8 BTU/scf and up to ten seconds in the calculated speed of sound at 800 PSIG between a normalized composition without the methanol and the composition with methanol of a typical natural gas mixture.

Figure 1 - The 1000 ppm methanol peak at 31.1 seconds, after the 0.13 % C6+ peak (27.5 seconds), in the standard Danalyzer C6+ four-minute application.

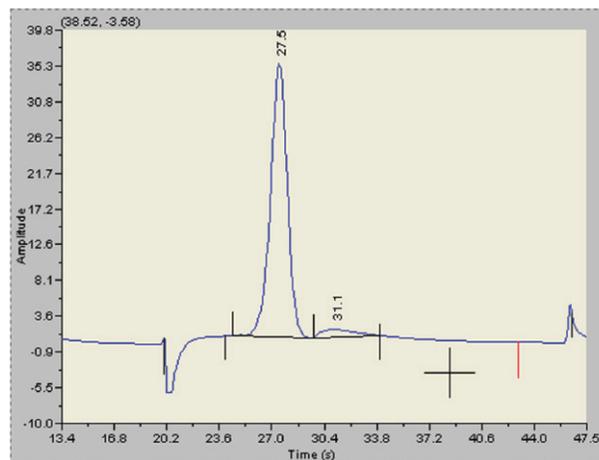
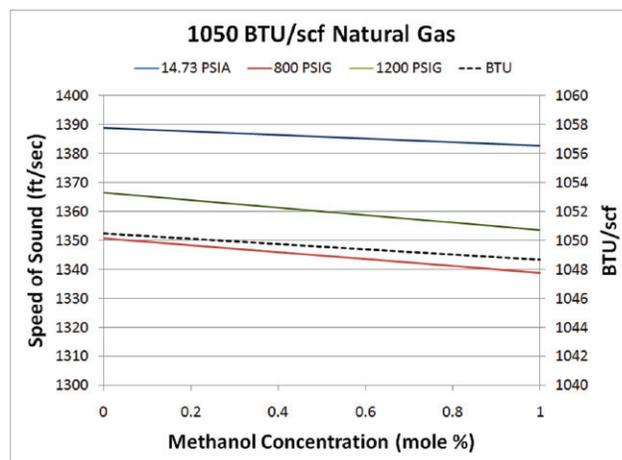


Figure 2 - The effect on the speed of sound from methanol. If the speed of sound is calculated from an analysis method that does not detect the methanol, the calculated value will be higher than the measured value.

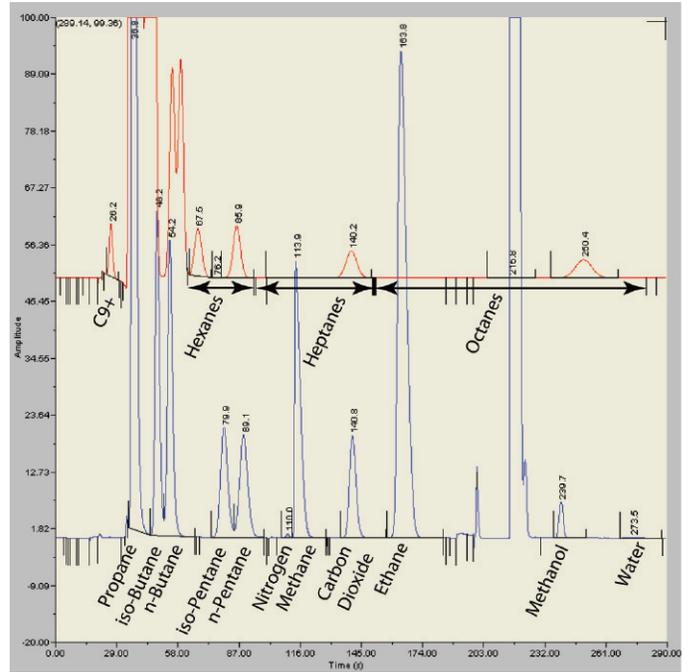


Measuring Methanol

The best solution is to measure the methanol to find the full composition of the gas. During the testing of methanol contamination in our chromatograph lab, the C9+ hydrocarbon dew point application was modified to also measure methanol and water in a five-minute analysis. This application uses a three-path analytical method to separate C1 to C5, CO₂ and nitrogen in one flow path, C6 to C9+ in another flow path, and methanol and water in the third flow path. The methanol is calibrated with a calibration gas that includes methanol to provide an accurate measurement down to 3 ppm. The water measurement uses a relative response factor to use the methanol calibration standard and avoid the difficulties of using a moisture standard.

The application is now available in the 700XA gas chromatograph that provides the extended analysis capabilities in a single Class I, Div 1 enclosure built to withstand the rigors of the toughest environments, including offshore. To learn more about the C9+ HCDP, methanol and water application, contact your local Danalyzer representative, or visit our website.

Figure3 - The chromatogram from the 700XA C9+, methanol and water application showing the Methanol (239 seconds) and water (273.5 seconds) peaks on detector one.



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