ta3000R Method M-001

Determination of Trace Levels of H_2 and CO in Methane from Anabolic Digestors

Introduction

The Trace Analytical™ ta3000R Reduction Gas Analyzer, from AMETEK Process Instruments, is ideally suited for determination of ppb to ppm levels of H_2 and CO in methane evolved from bacteria in anabolic digestors. In this analysis, the Reduction Gas Detector (RGD) is used to provide rapid and reproducible measurements. Several unique qualities of the RGD enable the quantitation of H_2 and CO to extremely low concentrations.

When methane is a major component in the sample, it can overload the analytical column, producing a long tailing peak that requires a long time to return to baseline. This is clearly demonstrated in the "without back flush" chromatogram depicted in Figure 1. Compare this to the "with back flush" chromatogram in the same figure.

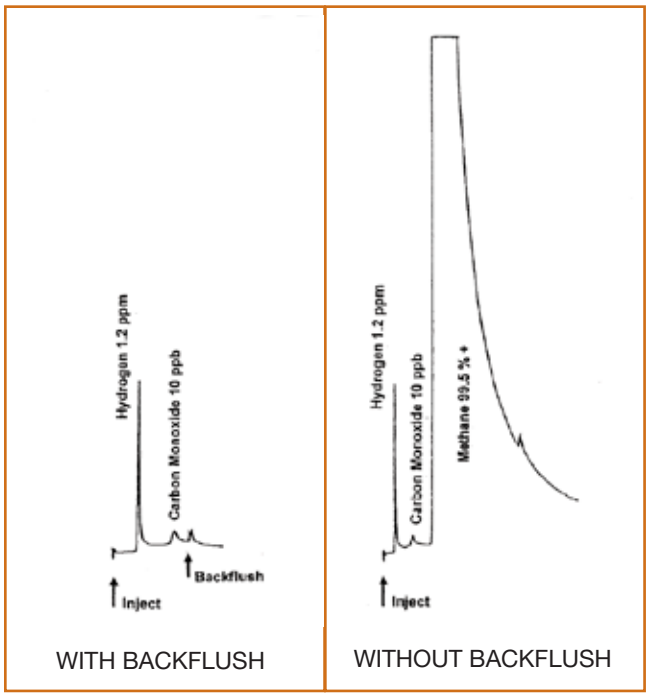

Figure 1. The two chromatograms show the separation of 1.2 ppm of H_2 and 10 ppb of CO in methane. Analysis time for the "with backflush" chromatogram is approximately 1 minute, while the "without backflush" chromatogram takes about 6 minutes to return to baseline.

The Method

The plumbing diagram for method M-001 is demonstrated in Figure 2. Nitrogen carrier gas is preferred because it gives a minimum of upset in the baseline from the injection, is inexpensive and readily available.

A 10-port valve is used to inject sample from the sample loop to the analytical column. We selected a column for this application package which elutes H_2 and CO prior to methane. This allows isolation of the CO peak while eliminating potential contaminants from reaching the detector by using the back flush technique.

After the light compounds have had sufficient time to elute from the analytical column, the 10-port valve returns to the load position. In addition to preparing the analyzer for the next sample injection, the valve in this position is used to back flush methane and higher molecular weight components (such as hydrocarbons and moisture) from the analytical column through the vent port of the valve. Back flushing accomplishes two objectives. It shortens the analysis time and it vents contaminants which can produce an unstable baseline away from the detector.

Method M-001 is one of several application packages developed by Trace Analytical. Our applications group is always ready to consult with you about your specific analytical requirements. Please contact AMETEK Process Instruments or your local AMETEK representative for information on our Trace Analytical analyzers.

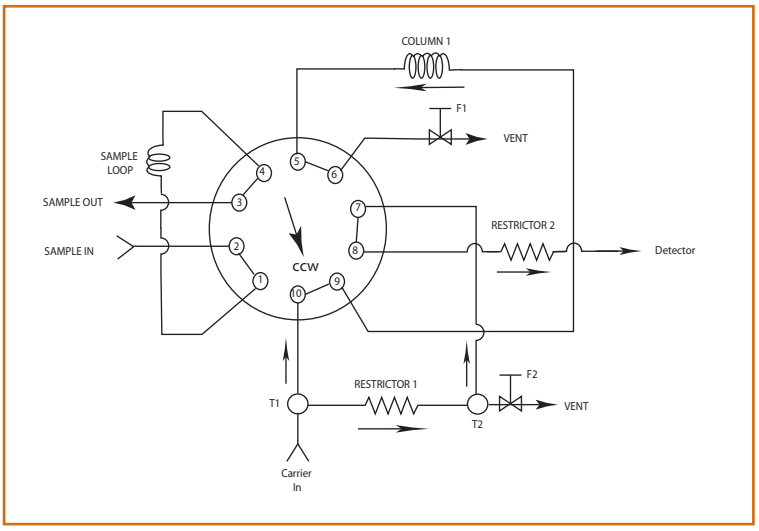

Figure 2. Flow diagram for method M-001.

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Specifications subject to change without notice.