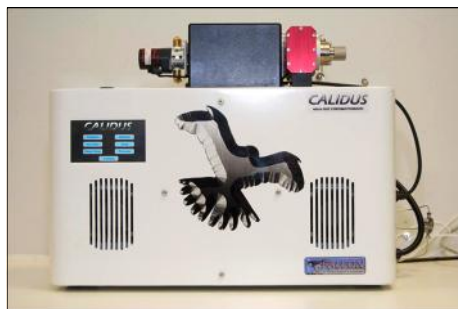
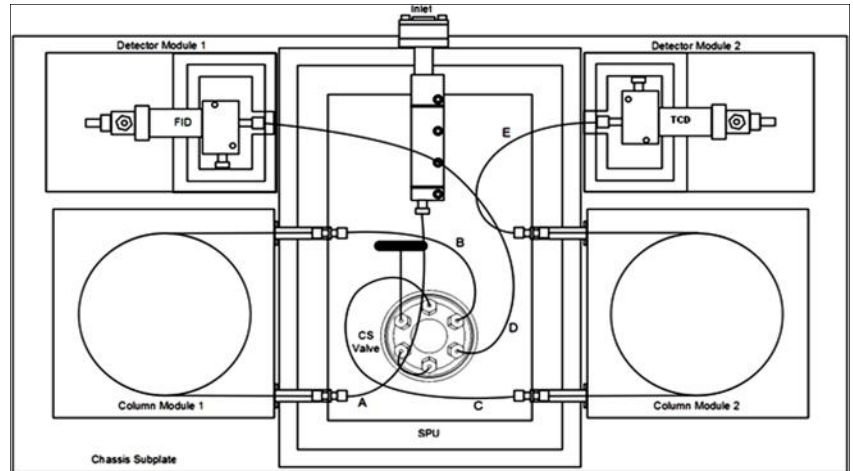


Application Note:

**CALIDUS™ CS microGC
Extended Natural Gas
Application ~ July 2012**

GC analysis for extended Natural Gas, i.e. fixed gases and C₁ – C₁₂ hydrocarbons for laboratory, at-line, transportable, or on-line, in less than six minutes.

Figure 1: CALIDUS Model CS Functional Diagram.



Application Overview (Reference Figure 1)

The Sample Processing Module with a standard split/splitless injection port and a heated gas sample valve deliver the sample to a column switching valve for analysis on two independent Programmed Temperature Column Modules (PTCM). The inlet includes septum purge to prevent bleed components from entering the system.

The two PTCMs are independently controlled by the method. PTCM 1 contains a MXT Q-Bond resistively heated stainless steel capillary column and is operated in a temperature programmed mode. This column provides separation of CO₂ and C₁ – C₁₂.

(See Figures 2A & 2B)

Figure 2A: PTCM 1 MXT Q Bond Separation of CO₂ & C₁ – C₁₂.

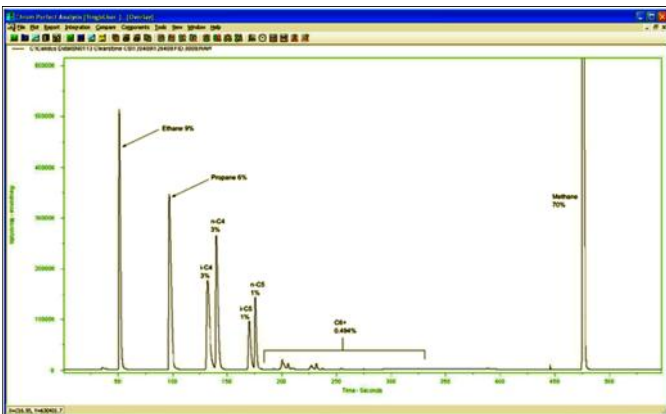
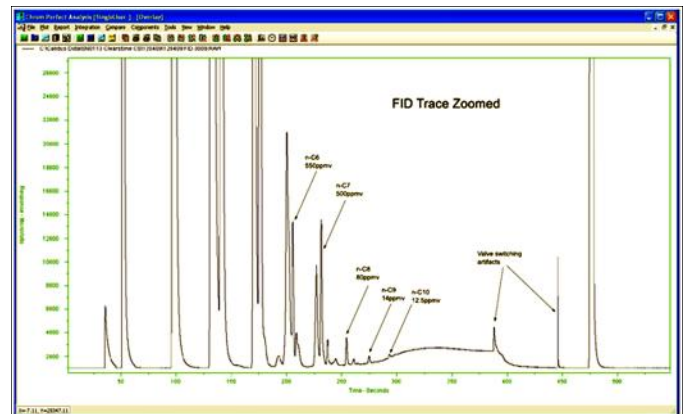


Figure 2B: PTCM 1 MXT Q Bond Separation of CO₂ & C₁ – C₁₂.



Application Note:

CALIDUS™ CS microGC Extended Natural Gas Application July 2012 ~ Page 2

Major Analytical Advantages

Fastest analysis time in the industry for Extended Natural Gas, with excellent performance and reliability.

Incorporates patent pending Resistively Heated Stainless Steel Capillary Column Module and its thermal management system, resulting in a paradigm shift in GC analysis.

Simplest hardware analytical approach for achieving Extended Natural Gas Analysis.

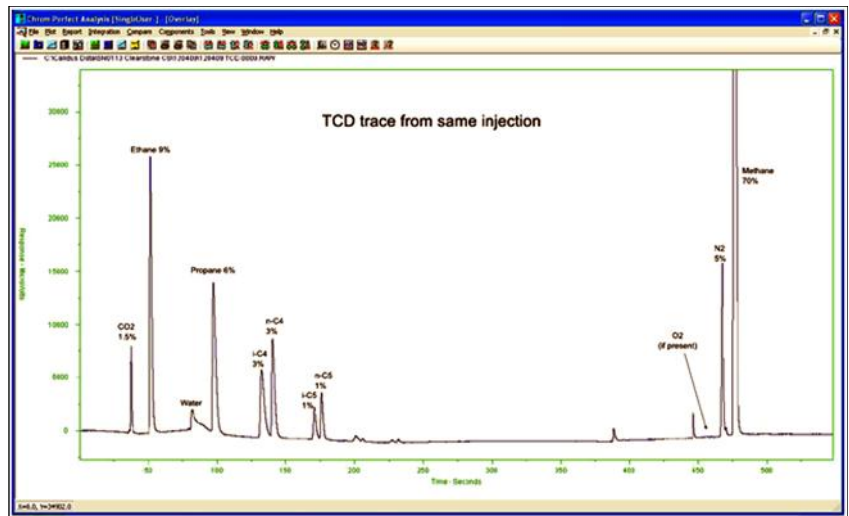
One of the most durable, compact and transportable analytical solutions for Extended Natural Gas Analysis (43 cm L X 21.5 cm D X 27.9 cm W, wt. 9.07 kg).

PTCM 2 contains a MXT mole sieve 5A resistively heated stainless steel capillary column and is operated in an isothermal mode. This column provides separation of CO, O₂, N₂, and C₁.

The analyzer includes ChromPerfect software for calculating and reporting BTU content as well as other physical properties such as specific gravity and compressibility.

(See Figure 3)

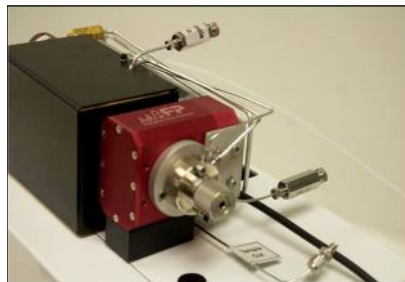
Figure 3: PTCM 2 MXT Mole Sieve 5A Separation of CO, O₂, N₂ & C₁.



Expanded Application Capability for Minimal Cost

Expand capability to include LP Gas by selecting a CALIDUS CS with a simple compact Heated Gas/Liquid Sample Combo Valve. When measuring LP gas, just flip the Sample Selector Switch located on the side of the combo valve to Liquid. The valve adds less than 10% to cost while doubling the analyzer's capability to two applications.

(See Photos Below)



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