

Natural Gas Analysis with Hydrocarbon Dewpoint Calculation on a Model 591 GC

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Background

Accurate and reliable determination of the hydrocarbon dewpoint in pipeline natural gas has become increasingly important in recent years. Hydrocarbon condensates represent lost gas that causes errors in volumetric flow rate, heating value, and other gas property calculations that are made in custody transfer measurements. Furthermore, these liquids can cause serious damage to both the pipeline and the machinery — such as gas turbines — that the gas feeds. Since the hydrocarbon dewpoint temperature can change drastically between different natural gas mixtures at a given pressure, even historical operating success cannot ensure against condensate formatting in a given pipeline.

Calculation of hydrocarbon dewpoint from gas composition is well-established. However, until recently, the technology enabling users to both carry out the analysis in sufficient detail and perform the complex thermodynamic calculations has not been available for field implementation. Utilizing dual-detector chromatography, Emerson Process Management offers a robust, online hydrocarbon dewpoint tracking system.

Typical C9+ Application

The Model 590/591 Gas Chromatograph performs a standard C1 to C5, N2 and CO2 analysis on one detector and an extended C6 and C9+ on the second detector. Hydrocarbon dewpoints at four operator-defined pressures and the cricondentherm are calculated. Alternatively, dewpoints can be calculated for multiple analysis streams. Physical properties for energy measurement are also determined and all calculation results are made available for transmission to flow computers or other supervisory systems.

Hydrocarbon Dewpoint Calculations

Hydrocarbon dewpoint can be calculated using RKS or PR equations of state and the latest published physical properties. Cricondentherm is also calculated. These calculations have been validated against an industry standard package.

Field Performance

Field performance of hydrocarbon dewpoint systems, based on C9 analysis method, has been good with all installations performing as specified. In terms of calculated hydrocarbon



dewpoint, analysis of a standard C9+ test gas gives hydrocarbon dewpoint values repeatable to within +/- 1°C. Comparison data to the chilled-mirror approach has been established at two sites with excellent agreement.

Test results over several days with an online dewscope show a matching data pattern. Consistent night and day variations are observed. Over the tracking period, the largest difference between dewscope reading and gas chromatograph-calculated results were approximately 3°C, but with most values being within 2°C or less.

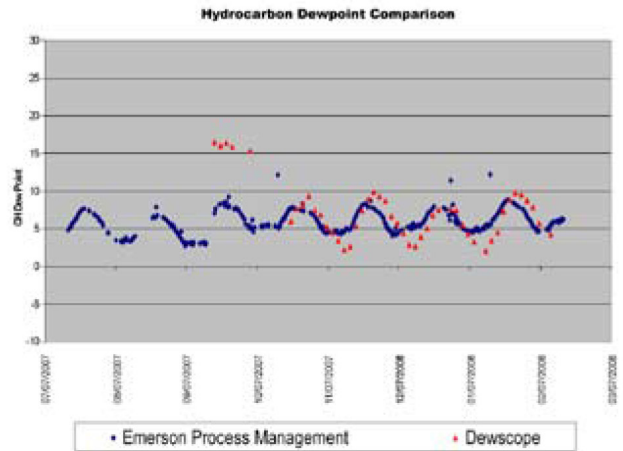
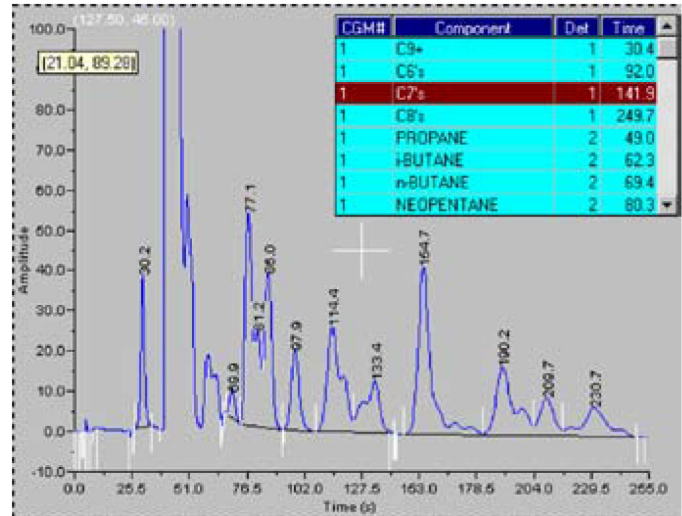
Key Features

- High degree of analytical sensitivity (ppm levels) and excellent repeatability to +/- 1°C
- User-selectable calculation methods, validated against industry-standard package
- Field-proven, rugged, and reliable technology
- Online analysis with five-minute cycle update method

- Flexibility of Emerson’s 2350A Controller
- Existing C6+ applications can be upgraded

Benefits

- Sensitive method, able to rapidly detect small process changes
- Proven hardware technology, with low maintenance costs and low cost of ownership
- Predictive calculation for other process conditions
- Determination of cricondentherm for gas quality contracts



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