

Advancements in Refinery Gas Analyzers

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Improvements in gas chromatographic instrumentation, columns, and ancillary components have dramatically increased the throughput, reliability, and productivity of refinery gas analyzers. This application note chronicles such improvements and illustrates the performance and analysis of a modern Refinery Gas Analyzer.

There are a number of commonly used methods for the gas chromatographic analysis of refinery gas. Early methodology can be traced to UOP method 539 which was developed in the early 1970s. Despite the ability of the instrumentation to provide adequate separation of most of the analytes of interest, there were many shortcomings that had to be dealt with. 1) Long analysis time of 48 min, 2) Backflush of C_6+ composite occurred after the components of interest eluted lengthening the total analysis time, 3) flow upsets during valve actuation caused integration difficulties, 4) coelution of Butene-1 and I-Butylene and 5) H_2S eluted in the Butane region which again, created integration difficulties. Figure 1 illustrates a typical 48 min long chromatogram achieved on the instrumentation available during the mid 1970s.

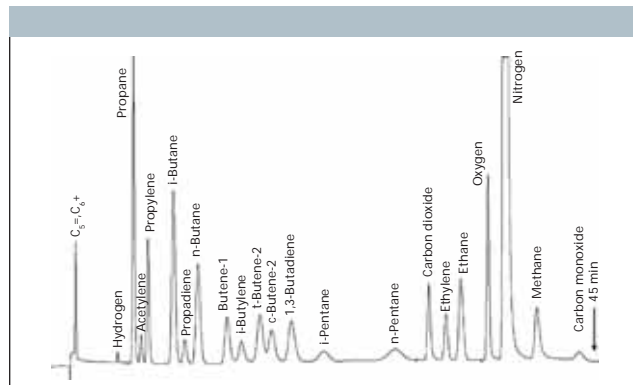


Figure 2: Typical Refinery Gas analysis – circa 1990.

uid phases for these analyzers and are included in the UltraTorr™ line of micropacked columns in their latest refinery gas analyzer offering. Using the UltraTorr™ columns results in a total run time of only 7 min (Figure 3) yet still provides excellent separation of the components of interest.

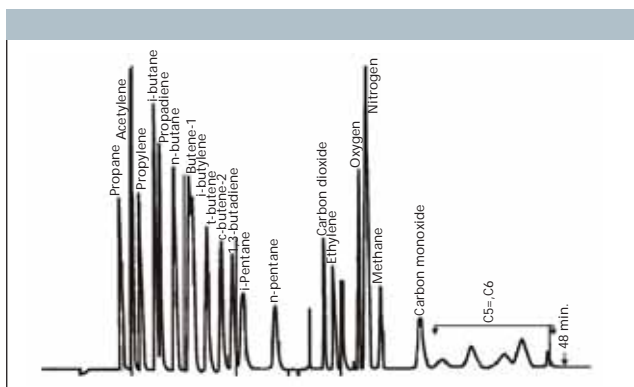


Figure 1: Typical Refinery Gas analysis – circa 1975.

As improvements in instrumentation and column technology progressed during the 1980s and 1990s, so too did the quality of analysis. Arnel was a leading pioneer of the use of the latest technology and developed a Refinery Gas Analyzer which overcame many of the problems associated with this analysis during the previous decade. While the total run time (Figure 2) was only slightly improved, the early backflush of the heavier compounds provided for easier integration. In addition, coelution of Butene-1 and I-Butylene had been eliminated.

Arnel has employed the use of proprietary, reformulated liq-

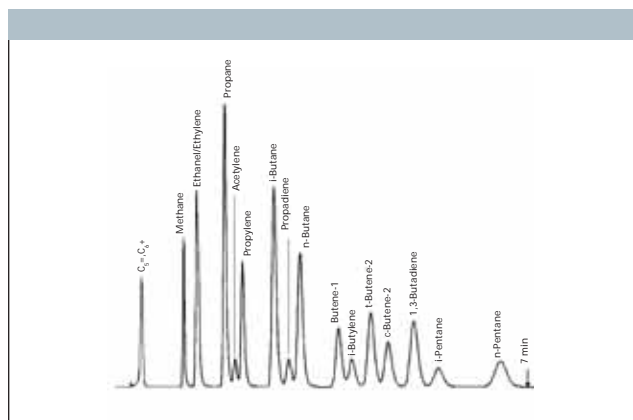


Figure 3: Seven min Refinery Gas analysis (hydrocarbon channel) using Arnel Model 1130 RGA.

Conclusion

A nearly seven fold reduction in analysis time is now possible through the use of advanced technology and improvements in instrument and column design. Significant productivity gains and sample throughput can be achieved without sacrificing resolution or detection levels.

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