

# CDSolutions

APPLICATIONS INFORMATION USING ADVANCED SAMPLE HANDLING TECHNOLOGY

## C<sub>2</sub>-C<sub>12</sub> Ozone Precursors Analyzed Using CDS 9350

In 1990 the U.S. EPA Amended the Clean Air Act to include Volatile Organic Compounds (VOCs) as part of an expanded Title 1. These compounds identified as: "Ozone Precursors" are said to contribute to the formation of ground-level ozone. The implementation of these regulations would be carried out under a program calling for (PAMS) Photochemical Assessment Monitoring Stations.

54 Target analytes were initially identified as Ozone precursors by the U.S. EPA in a report issued by the National Exposure Research Laboratory, Research Triangle Park. This document was entitled EPA/600-R-98/161, "Technical Assistance Document for Sampling and Analysis of Ozone Precursors". Included amongst the 54 target analytes were Ethane, Ethylene, Acetylene, Propane, Propylene, Butane and Butenes. These C<sub>2</sub> – C<sub>4</sub> hydrocarbons had proven to be very difficult to analyze successfully using "traditional" Thermal Desorption and GC techniques.

There is a current trend not only to analyze for these difficult analytes by Thermal Desorption and GC, but to be able to do it in real time, utilizing a continuous monitoring system. CDS Analytical has developed the ACEM 9350 dual tube Thermal Desorption system to collect and transfer all 54 Ozone-precursors to any GC, for near real time continuous analysis.

In conjunction with Baseline (A MOCON company), CDS successfully established operation parameters for complete analysis of the Ozone precursors. A cylinder containing the 54 analytes of interest was purchased from Air Liquide at a concentration of 100 ppb. Samples were collected onto a standard 4 ½" Tenax/Carboxen 1000/ Carbosieve SIII packed thermal desorption tube using the built-in vacuum pump. The ACEM 9350 was connected to the Baseline 9100 GC's equipped with an FID and PID. The resulting chromatograms are shown in figures 1 and 2.

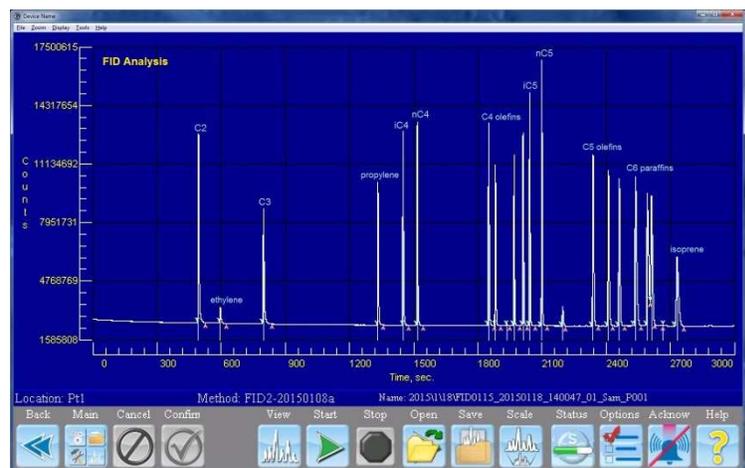


Figure 1: C<sub>2</sub> – C<sub>6</sub> Hydrocarbons on GC/FID

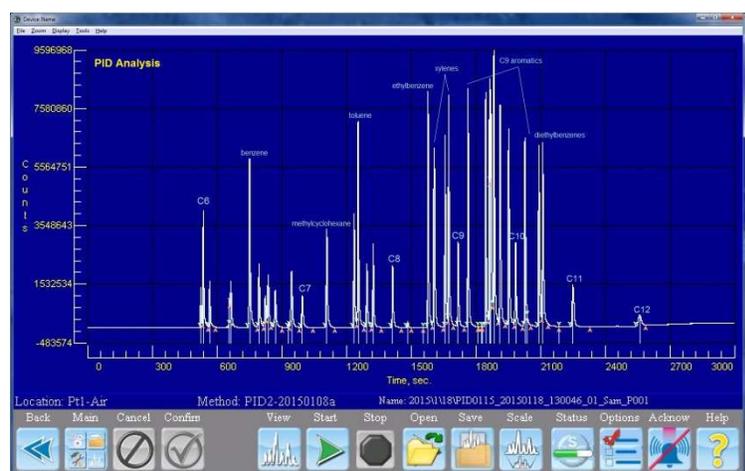


Figure 2: C<sub>6</sub> – C<sub>12</sub> Hydrocarbons on GC/PID

## Equipment

These samples were analyzed using the CDS 9350 interfaced to the Baseline 9100 Gas Chromatograph. Flame Ionization detector was used for  $C_2 - C_6$  hydrocarbons, while a Photoionization detector was used for the  $C_6 - C_{12}$  hydrocarbons.

### CDS 9350 Conditions

Valve Oven: 200°C  
 Transfer Line: 200°C  
 Tube Heat: 325°C/2min  
 Tube Cool: 0.5  
 minutes Trap Idle: 35°C  
 Trap Heat: 325°C/2min  
 Interconnect Line: 200°C

### GC Conditions:

Carrier: Hydrogen  
 Column: FID:  $Al_2O_3/Na_2SO_4$   
 PID: Dimethyl Polysiloxane  
 Detector: FID/PID  
 GC Program: FID: 50°C for 900s  
 1500s to 170°C  
 Hold 170°C until 2500s  
 60s to 200°C  
 Hold 200°C until 3000s  
 PID: 50°C for 900s  
 1500s to 160°C  
 Hold 160°C until 2400s  
 120s to 200°C  
 Hold 200°C until 3000s



Figure 3: CDS ACEM 9350 with Baseline 9100 dual detector system

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CDS Analytical, Inc. has been a leader in the design and manufacture of laboratory instruments for sample preparation and analysis since 1969. We are dedicated to providing the best possible instruments for both research and routine analysis. Well known in the field of pyrolysis, CDS manufactures the Pyroprobe® 5000, 5150, 5200 and 5250 autosampler for the introduction and analysis of solid materials by GC, MS and FT-IR. CDS offers a complete line of dynamic headspace instruments for the analysis of volatile organic compounds in environmental, pharmaceutical and food applications, including the model 8400 four-position autosampler for complex, multicomponent materials investigation. Our customers, their requirements and applications are important to us. To help meet your needs, we offer a wide range of analytical information and the services of our applications laboratory. If you would like additional information, please contact us at the address below, call us at 1 800 541 6593, or log onto [www.cdsanalytical.com](http://www.cdsanalytical.com).