APPLICATION NOTE

Methanol in E85

- **Fast Analysis**
- **Excellent Repeatability & Linearity**
- **Robust Analysis with Deans Switch Technology**
- **No matrix interference**
- **Analysis within 10 minutes**

Keywords:
E85, Gasoline, EtOH, Ethanol, MeOH, Methanol, Deans, Oxygenates

INTRODUCTION

E85 is an abbreviation for an ethanol fuel blend of up to 85% denatured ethanol fuel, and gasoline or other hydrocarbons (HC) by volume. E85 is commonly used by flex-fuel vehicles in the US, Canada, and Europe. Some of the benefits of E85 over conventional gasoline powered vehicles include the potential for localized production of fuel in agricultural areas. Another benefit is reduced emissions of carbon dioxide, a known greenhouse gas, into the earth's atmosphere.

Figure 1. Pre column analysis - Valve in OFF position
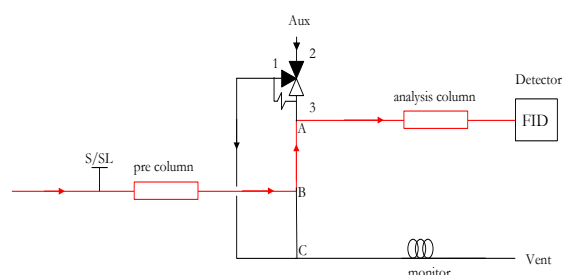
Figure 2. Cutting components - Valve in ON position

METHANOL REGULATION

Methanol is naturally present in industrially produced ethanol in small quantities, and can contribute to the combustion as an oxygenate. However, methanol is toxic, it has a very high heat of vaporization, it is strongly hydroscopic and contributes strongly to the formation of azeotrope and thus high vapor pressure. It may require a co-solvent to prevent separation and can be aggressive towards certain metallic and non metallic materials in fuel systems. Thus its volume should be limited

The ASTM specification D4806 for ethanol as a blending component limits methanol content in ethanol to 0.5 % maximum. The European gasoline specification EN228 permits up to 3% methanol in gasoline, with the presence of co solvents to prevent separation.

ANALYSIS DESCRIPTION

The sample is introduced into an Oxytracer™ system, modified with S/SL inlet. After splitting the sample in the inlet it is pre-separated on the pre column. Methanol (and a part of Ethanol) is cut from the matrix by applying a pressure switch, directing the effluent from the pre column either to the monitor column or to the analysis column. Methanol and Ethanol are separated on the analysis column in a temperature programmed oven run and detected by the FID.
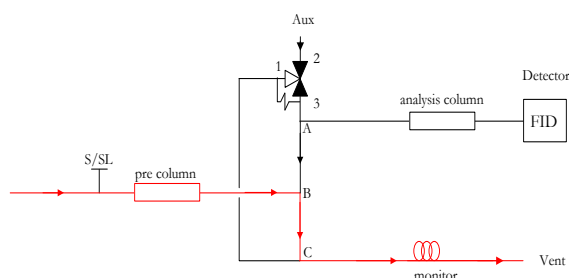

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APPLICATION NOTE

Pre column chromatogram

Ethanol

Methanol
directed to 2nd
column

Gasoline
matrix

Methanol on analysis channel

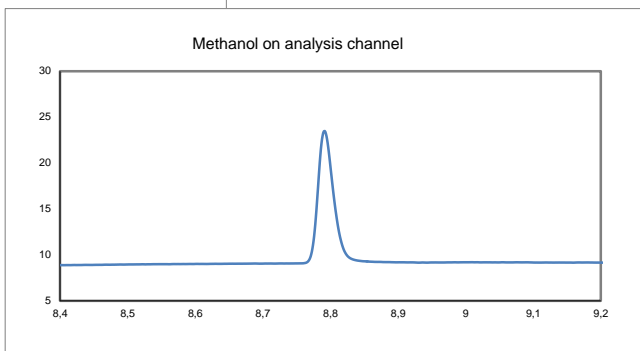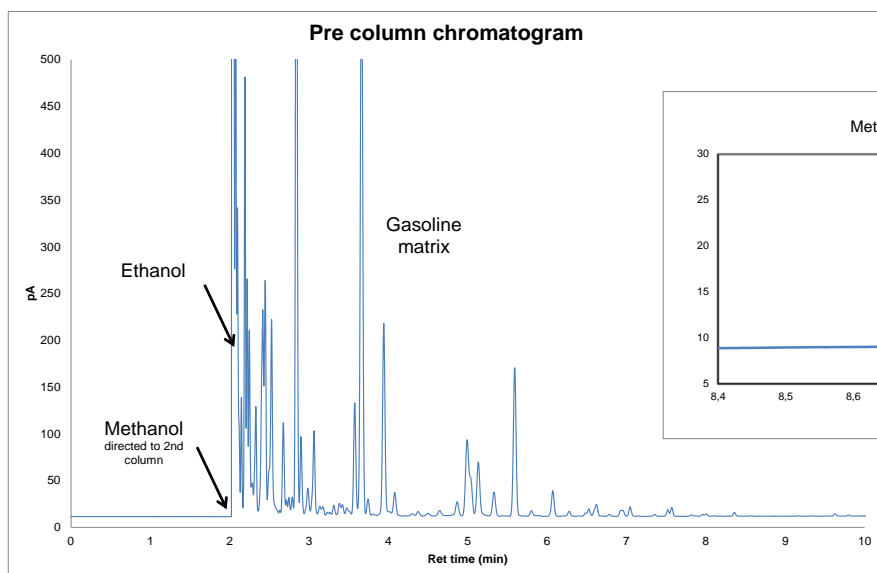*Figure 3. Pre-column analysis. Only methanol (and a part of ethanol) are transferred to analysis column.*

	Concentration %				
	0.15	0.56	1.07	1.58	2.13
1	23.2	88.7	173.7	259.5	344.0
2	23.1	88.8	173.5	256.4	350.9
3	23.1	88.6	172.9	256.2	348.5
4	23.0	88.9	173.9	254.2	351.9
5	23.0	90.0	174.1	255.0	348.7
6	23.3	90.3	174.6	255.1	351.0
7	22.8	89.9	171.5	255.2	351.7
8	23.0	89.8	172.7	252.5	347.5
9	22.9	89.2	175.0	256.2	350.3
10	22.8	89.9	173.3	258.5	352.8
Average	23.0	89.4	173.5	255.9	349.7
stdev	0.154	0.601	0.952	1.911	2.484
RSD %	0.67%	0.67%	0.55%	0.75%	0.71%

Table 1. Excellent repeatability

Matrix	E85 fuel
Quantification Range	0.1 % - 2.0 % methanol
Linearity (R^2)	> 0.999
Analysis Time	Approx. 10 minutes
Area Repeatability	Below 1 % RSD

Table 2. Analysis specification

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CONCLUSION

Gas chromatography using Deans switch heart-cutting technology provides a rugged, fast and reliable way of determining Methanol in E85 fuel. No sample treatment is required and the system can be calibrated on a single external standard. This and the fact that the FID detector, well known for its stability and ruggedness, is used for Methanol in E85 detection makes it very user friendly.

Because only Methanol and a part of Ethanol are directed to the analysis column, the analysis column is free of interfering components, providing unambiguous identification and quantitation. High boiling hydrocarbons and aromatics are switched to the monitor column and directed to vent (or FID) for a fast analyses in under 10 minutes.

Linearity MeOH in E85

R² = 0.9999

Figure 4. Linearity of Methanol in E85

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