

# Oxygenates

## Analysis of trace oxygenates in ethylene

### Application Note

Energy & Fuels

#### Authors

Agilent Technologies, Inc.

#### Introduction

At sub ppm levels, the presence of oxygenated compounds in light hydrocarbons can seriously impair manufacturing process capabilities to effectively produce the desired products. To engage this challenging analytical problem, various analytical techniques have been explored and implemented. These techniques include selective enrichment with adsorbents, multidimension gas chromatography employing columns with dissimilar selectivity and selective detectors such as O-FID and AED. While these techniques performed adequately, key limitations include difficult to maintain, costly to implement and often times, they do not meet the sensitivity required.

A novel analytical technique has been developed which addressed most of the shortcomings mentioned. To deliver ppb level of sensitivity for oxygenated compounds, the “**Stack injection**” technique is employed: Stack injection uses a single injection valve for sample introduction coupled with a highly polar multilayer Lowox column for the trapping and separation of the analytes of interest and a single FID detector.

The analysis is conducted by performing successive (hence stack) injections of the same sample with a sampling valve while the oven is held at a constant low, yet above ambient temperature. Enhancement of the sensitivity is proportional to the number of injections made. As an illustration, a stack of ten injections delivers a detection limit of 35 ppb (w/w) of methanol in pentane. This approach is applicable for a variety of polar compounds such as aldehydes, ketones, and alcohols.



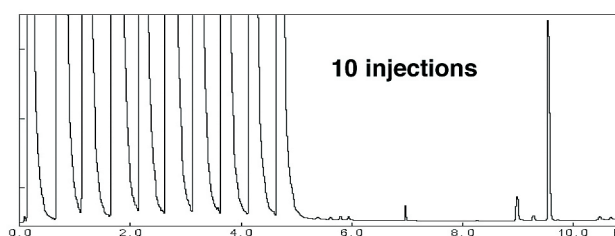
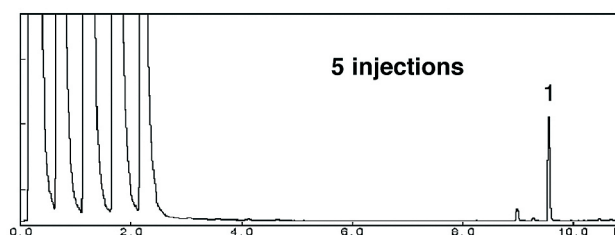
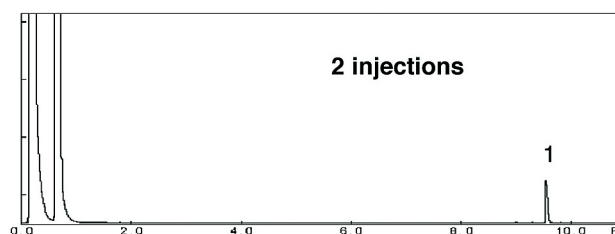
**Agilent Technologies**

## Conditions

Technique : GC-wide-bore  
Column : Agilent Lowox, 0.53 mm x 10 m fused silica PLOT  
(Part no. CP8587)  
Temperature : 50 °C (5 min) → 270 °C, 30 °C/min  
Carrier Gas : He, 41 cm/s, 15 kPa (15 bar, 2.3 psi)  
Injector : Valve, 1, 2, 5 and 10 injections  
T = 150 °C  
Detector : FID  
T = 300 °C  
Concentration Range : 10 ppm methanol in ethylene  
Courtesy : J. Luong, C. Mork, L. Sieben and B. Winniford,  
The Dow Chemical Company

## Peak identification

1. methanol



[www.agilent.com/chem](http://www.agilent.com/chem)

This information is subject to change without notice.

© Agilent Technologies, Inc. 2011

Printed in the USA

31 October, 2011

First published prior to 11 May, 2010

A01611



**Agilent Technologies**