



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.



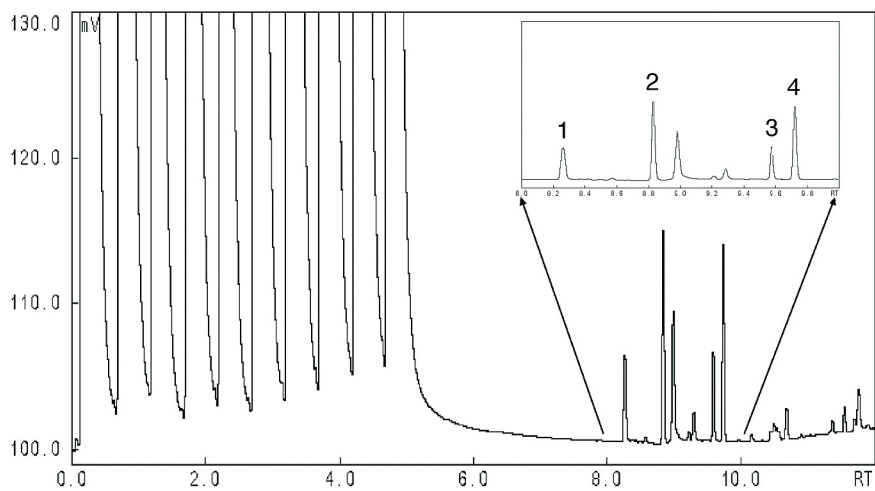
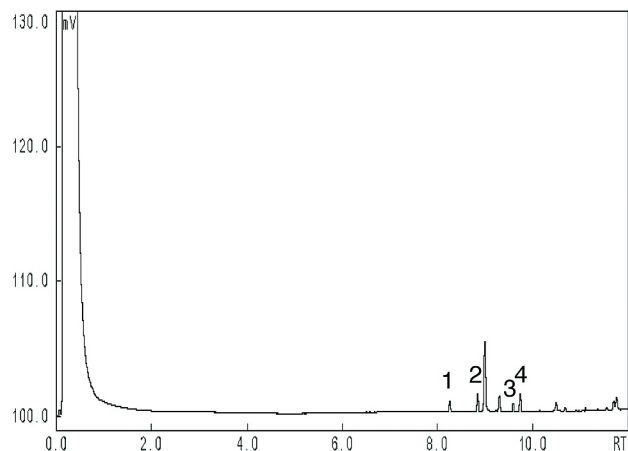
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Conditions

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 and stack of 10 injections
T = 150 °C
Detector : FID
T = 300 °C
Concentration Range : 10 - 50 ppm oxygenates in pentane
Solvent Sample : pentane
Courtesy : J. Luong, C. Mork, L. Sieben and B. Winniford,
The Dow Chemical Company

Peak identification

1. acetaldehyde
2. propanal
3. methanol
4. acetone



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This information is subject to change without notice.

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