

# Raising the Bar in Capillary GC Column Inertness Performance

**Agilent Technologies**

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## Abstract

Over the evolutionary development of GC capillary columns, test compounds used for evaluation of column performance have varied widely. Early in the life cycle of capillary GC columns Grob's mix consisting of a series of alkanes, a substituted phenol (acidic component), an amine (basic component), an alcohol and a diol was used to evaluate column performance. This mixture worked well to evaluate column efficiency, system suitability for injection, and potential damage from exposure to water or oxygen. Inertness evaluation based on single acidic and basic species though valuable does not meet rigorous demands for inertness that applications on modern capillary GC columns require. Modern capillary GC columns demand a more comprehensive approach to properly investigate column inertness.

The implementation of a more rigorous testing procedure to certify GC capillary columns is illustrated in this presentation. The test mix selected to evaluate inertness includes 1-propionic acid, octane, 4-picoline, trimethyl phosphate, 1,2-pentanediol, propyl benzene, 1-heptanol, 3-octadecane, and n-decane. Key column evaluation criteria include efficiency of n-decane elution at a 1 of 5 probe peak shapes, and peak height ratios of 4-picoline and trimethyl phosphate relative to closely eluting alkanes. This testing procedure raises the bar in qualifying capillary columns in terms of inertness and provides a more reliable baseline for comparison.

The implication for the user of these more rigorously tested columns is better assurance of inertness performance for challenging applications. Active analytes such as pesticides, semi-volatile organics, and drugs of abuse are highlighted in the application section. More highly inert columns can lead to better limits of detection and consistently more reliable analytical results.

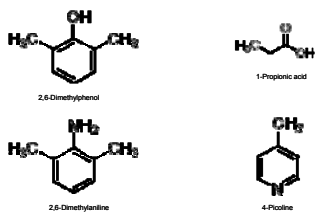
## Introduction

- Ultra inert columns are built on top of existing Agilent J&W GCMS columns
- Better column inertness enables better peak shapes for active analytes
- Exceptionally low bleed profile you have come to expect
- Ultra inert columns are the result of continuous process improvements through Six-sigma and Lean Manufacturing programs at our Folsom manufacturing site.
- New here at Pittcon 2009
  - HP-1ms UI column family in various formats
  - DB-1ms UI column family in various formats
- In addition to HP-5ms and DB-5ms UI series in various formats

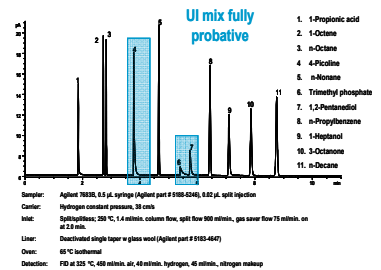
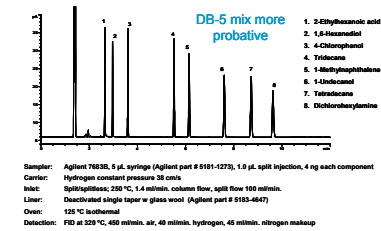
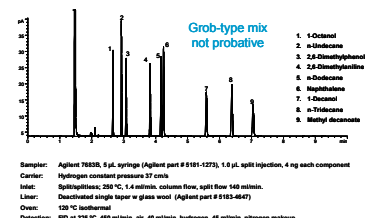
## Why is Inertness Important ?

- Active analytes can give low recoveries or even disappear
- Basic species
- Acidic species
- Organo phosphates
- To accurately quantify low levels of active analyte species
- Sharper peaks shapes
- Less tailing better integration
- Trace analysis
- Analysis of Unknowns

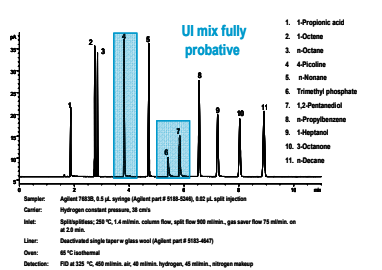
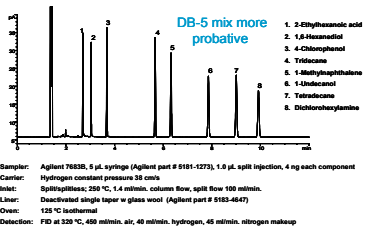
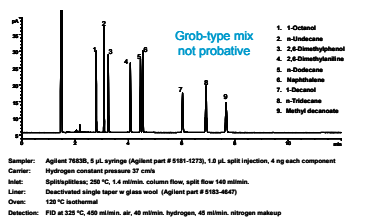
## Weak versus Strong Probes



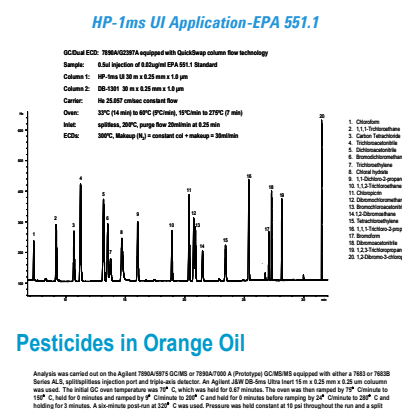
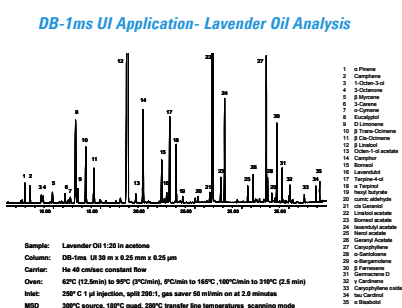
## Inertness Testing Alternate Vendor



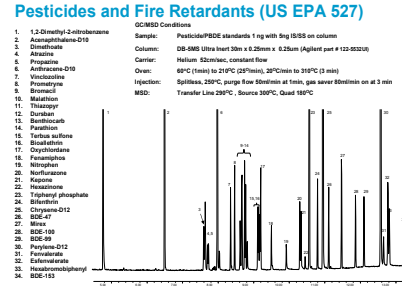
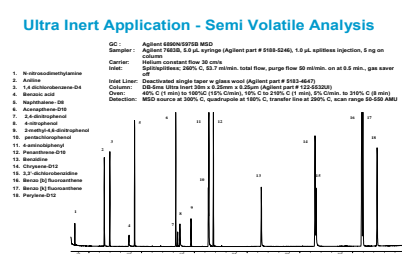
## Inertness Testing DB-5ms UI



## Agilent J&W Ultra Inert Applications



## More Ultra Inert Applications



## Conclusions

- Always Quality. Always Innovative. Always Agilent.
- From the inventors and world leaders in capillary column technology, now comes the Ultra Inert capillary GC column line
- Raising the bar and setting a new industry standard for column inertness GC testing
- Selectivity remains the same for consistent predictable separation
- Low bleed profiles maintained, minimizing interferences
- The bottom line
  - highest and most consistent inertness performance

To receive a reprint of this poster and additional information regarding Agilent J&W Ultra Inert columns please place your business card in the envelope provided.

## Discussion of Results

- Grob style test mixes not probative for inertness
- Ultra Inert mixes fully probative for inertness
- Well designed test mix uncovers potential acid and base adsorption sites and raises the bar in inertness QC
- Same selectivity as corresponding HP-1ms, HP-5ms, DB-1ms and DB-5ms stationary phases

