

# Analysis of Barbiturates on a Thermo Scientific Ultrafast GC Column

Bob Wiedemer, Thermo Fisher Scientific, Bellefonte, PA, USA

## Key Words

- Ultrafast
- Barbiturate
- Drug
- Pharmaceutical
- GC
- Clinical
- Pain panel
- Drugs of abuse

## Abstract

Chromatographic drug analysis is done for multiple purposes such as drug screening in emergency situations and monitoring drug use for medical or legal purposes. Rapid analysis can be critical for drug screening as it may be a medical emergency and fast analysis in other situations means laboratories can do more analyses per day. Barbiturates have several medical uses and also have abuse potential. About a dozen types of barbiturates are in medical use today<sup>(1)</sup>. Gas chromatography is often used for drug analysis and Thermo Scientific Ultrafast technology facilitates very high-speed GC resulting in the separation of five common barbiturates in approximately 1.2 minutes.

## Introduction

Barbiturates, used in the treatment of epilepsy, anxiety, insomnia, and for general anesthesia, have both physical and psychological addiction potential. Chromatographic drug testing is done to assess for accidental or intentional overdose, to determine the cause of acute drug toxicity, to monitor drug dependency, or to determine the presence of substances in the body for legal or medical purposes. Barbiturates have “a narrow therapeutic index between the dose required for sedation and the dose that will cause coma and death”<sup>(2)</sup>. Thermo Scientific Ultrafast technology facilitates rapid gas chromatographic analysis for drug screening as well as for fast turnaround for standard chromatographic analysis. Fast turnaround means more runs per day, which means higher profits for analytical laboratories.



## Experimental Details

### Chemicals and Reagents

Barbiturates mixture

### Peak ID

|    |                               |
|----|-------------------------------|
| 1. | Butabarbital (0.766 minutes)  |
| 2. | Amobarbital (0.822 minutes)   |
| 3. | Secobarbital (0.926 minutes)  |
| 4. | Hexobarbital (1.039 minutes)  |
| 5. | Phenobarbital (1.167 minutes) |

### Sample Handling Equipment

### Part Number

Vials and closures: 2 mL clear vial and Si/PTFE seal

60180-5999

### Separation Conditions

### Part Number

|                       |                                                                                     |                |
|-----------------------|-------------------------------------------------------------------------------------|----------------|
| Instrumentation:      | Thermo Scientific Trace Ultra GC (Ultrafast configuration) with TriPlus Autosampler |                |
| Column:               | UFC-5, 5 meter X 0.1mm ID X 0.40 µm film UltraFast Column                           | UFMC0020000000 |
| Septum:               | Thermo Scientific BTO 12.7 mm septa                                                 | 31303228       |
| Liner:                | PTV Siltek Metal Liner, 2 X 2.75 X 120 mm                                           | 45302044       |
| Injection syringe     | 10 µL fixed needle, Thermo Scientific                                               | 36520060       |
| Carrier gas:          | helium                                                                              |                |
| Split flow:           | 50 mL/minute                                                                        |                |
| Column flow:          | 0.5 mL/minute                                                                       |                |
| Split ratio:          | 100:1                                                                               |                |
| Oven temperature:     | 200 °C (0.3 minute hold)-280°C (0.2 minute hold) at 80°C /minute                    |                |
| Injector type:        | PTV                                                                                 |                |
| Injector mode:        | Constant temperature                                                                |                |
| Injector temperature: | 300 °C                                                                              |                |

#### FID parameters:

Temperature: 340°C

Air flow: 350mL/minute

Hydrogen flow: 35 mL/minute

Nitrogen makeup flow: 30 mL/minute

#### Data Processing

Software: ChromQuest

## Results

The Ultrafast columns consist of a metal cage containing a fused silica column combined with a heating element and a temperature sensor to ensure direct resistive heating of the capillary column. The Ultrafast column module is housed inside the GC oven and is capable of heating rates as high as 1200 °C/minute. This technology is shown to be capable of achieving extremely fast analysis of a mixture of five common barbiturates with a total run time of approximately 1.2 minutes.

## References

1. <http://www.justice.gov/dea/concern/barbiturates.html>
2. <http://www.ncbi.nlm.nih.gov/pubmed/9255991>

## Conclusions

Thermo Scientific Ultrafast columns provide a means to achieve excellent GC separation of a mixture of barbiturates in less time that it takes for the solvent peak to elute on a conventional capillary GC column.

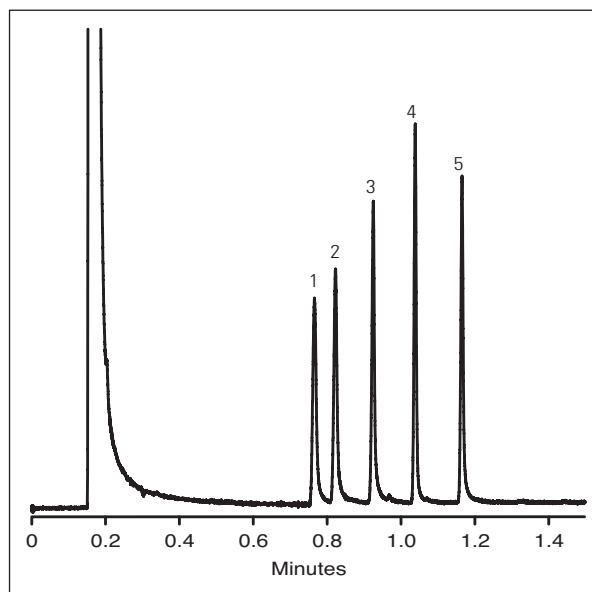


Figure 1. Barbiturates Analysis by Ultrafast GC

*In addition to these offices, Thermo Fisher Scientific maintains a network of representative organizations throughout the world.*

**North America  
USA and Canada**  
+1 800 332 3331

**Europe  
France**  
+33 (0)1 60 92 48 34

**Germany**  
+49 (0) 2423 9431 -20  
or -21

**United Kingdom**  
+44 1928 534110

**Asia  
Japan**  
+81 3 5826 1615

**China**  
+86-21-68654588  
or +86-10-84193588  
800-810-5118

**India**  
+91-22-6742 9494

**Thermo Fisher  
Scientific Australia  
Pty Ltd**  
1300 735 292 (free call  
domestic)

**Thermo Fisher  
Scientific New  
Zealand Ltd**  
0800 933 966 (free call  
domestic)

**All Other Enquiries**  
+44 (0) 1928 534 050

## Technical Support

**North America**  
800 332 3331

**Outside North  
America**  
+44 (0) 1928 534 440

[www.thermoscientific.com/chromatography](http://www.thermoscientific.com/chromatography)

© 2012 Thermo Fisher Scientific Inc. All rights reserved. All trademarks are the property of Thermo Fisher Scientific Inc. and its subsidiaries. Specifications, terms and pricing are subject to change. Not all products are available in all countries. Please consult your local sales representative for details.

ANCCSBARULCOL 0212