

Analysis of Barbiturates on a Thermo Scientific Ultrafast GC Column

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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⁽¹⁾. 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”⁽²⁾. 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 UFMCO020000000
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
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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.

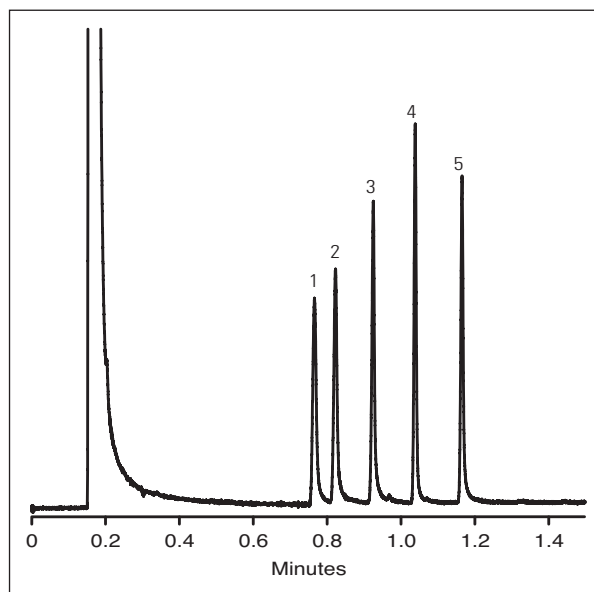


Figure 1. Barbiturates Analysis by Ultrafast GC

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