

# Analysis of Doping Drugs in Race Horses

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## Key Words

- TRACE TR-5MS
- DSQ GC/MS
- Doping Drugs
- Fast Analysis
- Horse Racing Testing

## Introduction

Horse racing worldwide is a multi-billion dollar industry and there can be substantial rewards for winning. The pressures to cheat however, can be just as large! The horse racing testing laboratories around the world form the defense against doping to ensure races are fair and horses are safe and healthy. An increasing demand for analysis from these laboratories makes the need to speed up analysis time a priority consideration.

This application note looks at the principles of manipulating developed methods to get shorter analysis times by making alterations that affect speed, but not the quality of the chromatography. As an illustration, a method for a standard doping drugs test mixture was developed using a

0.25 mm Thermo Scientific ID TRACE™ TR-5MS column. This column gave good separation of nine compounds in around 22 minutes for the original analysis. The method was adapted to a shorter column, maintaining the chromatography but reducing the time required for analysis.

## Experimental

The analysis was carried out using a Thermo Scientific DSQ™ GC/MS system in conjunction with TRACE TR-5MS GC columns. A mixture of nine standard doping drugs (Racing Analytical Services Ltd, Australia) was used. The analysis conditions are listed below.

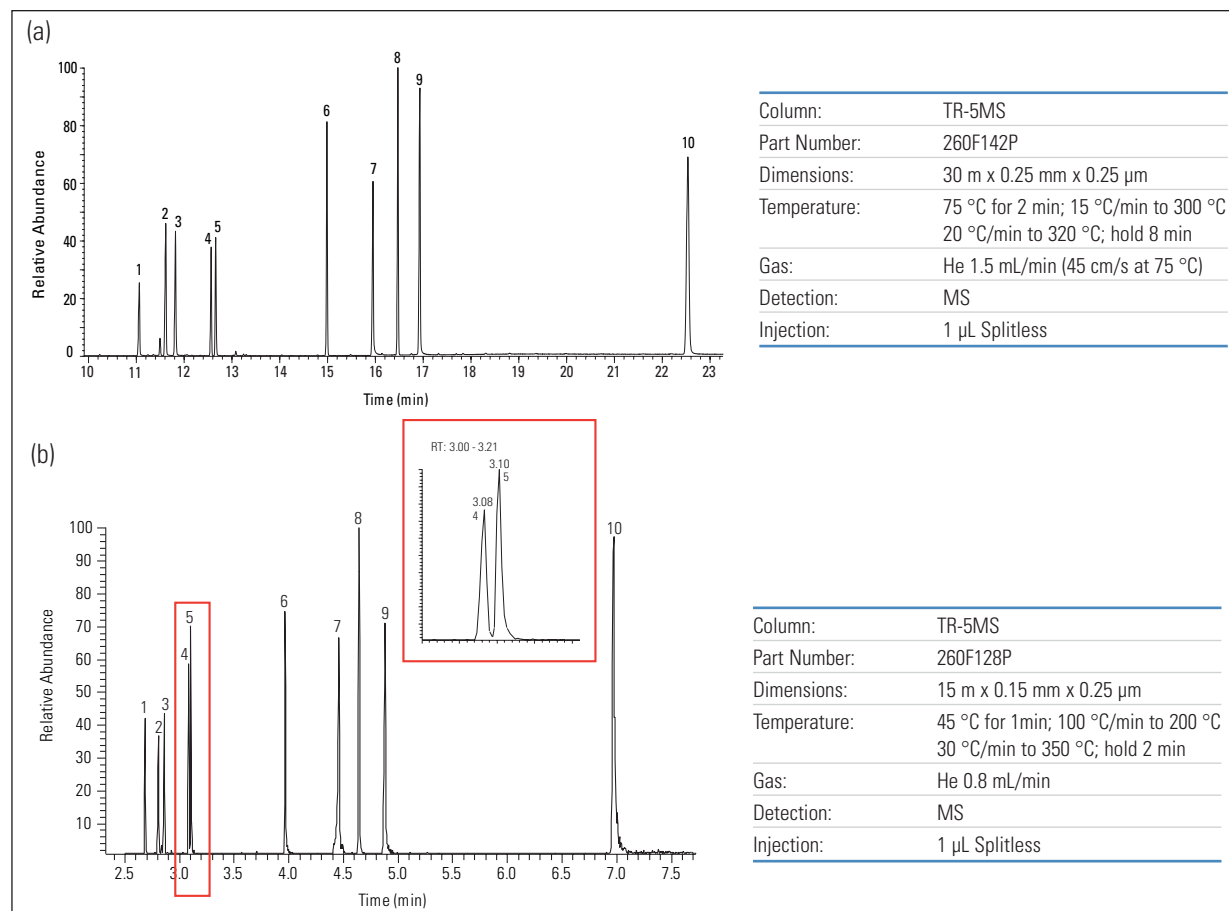


Figure 1: The analysis time of drugs in race horses is drastically reduced from over 22 minutes with a 30 m column (a) to about 7 minutes by using a shorter 15 m TR-5MS column (b). Analytes: 1) metronidazole; 2) amylorbarbitone; 3) pentobarbitone; 4) caffeine; 5) diphenhydramine; 6) trimipramine; 7) phenytoin; 8) diazepam; 9) nordiazepam; 10) diphenoxylate.

## Results and Conclusions

The separation of doping drugs used in race horses was successfully reduced by two-thirds by decreasing the GC column length from 30 to 15 m. In transferring methods to achieve a faster analysis time without altering elution order, the one character that must not change is the phase of the column. In this example we have altered the following characteristics to achieve the faster separation.

- Shorter column length
- Narrower internal diameter
- Ramp rate increase for temperature program

When reducing the column ID, the phase ratio was kept to a similar level to maintain the separation characteristics. It can be seen from Figure 1b that the selectivity was unaffected by the new parameters. By optimizing these parameters the total analysis time for this range of drugs was reduced from 22 to around 7 minutes. This increase in speed can have a great effect on the throughput capability of the laboratory and the productiveness of the instruments.

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