



Drug Abuse Detection

Three forensic workflow solutions that deliver rapid, reliable results and legally defensible data.

Solutions for Alternative Matrices

The Problem: “How can we meet the crushing demands for confirming drugs of abuse in alternative matrix samples?”

From workplace screening... to probation monitoring... to insurance testing... urinalysis has traditionally been the “gold standard” for detecting substance abuse. It does, however, have several disadvantages – namely, invasiveness and the potential for sample tampering or substitution.

As a result, “alternative matrix” testing of hair and oral fluid has increased dramatically, since it is less invasive, and does not require a designated facility or certified collection personnel.

However, alternative matrix analysis pushes the demand for sensitivity and selectivity to the limit. For instance, the proposed U.S. Federal Guidelines for THC are **0.05 pg/mg for hair and 2ng/mL for oral fluid** – and laboratories are typically required to quantitate at *half* these values.

Agilent’s Solution: A three-tiered portfolio designed to fit your lab’s performance, throughput, and cost requirements.

- **Agilent’s GC/MSD with Deans Switch** is ideal for labs that need a cost-efficient “gateway” to alternative matrix analysis. It combines uncompromising sensitivity and selectivity with the reliability and ease of use you expect from Agilent.
- **The Agilent GC/MS Triple Quadrupole** can help you meet your toughest demands for both quality *and* quantity. It’s the right choice for high-throughput labs that require sub-picogram sensitivity, MS/MS selectivity, and minimal sample preparation.
- **Agilent’s LC/MS Triple Quadrupole** delivers outstanding sensitivity, ease of use, and reliability. It is best for high-volume labs seeking faster sample preparation methods by expanding their capabilities to include LC/MS.

In addition, Agilent has partnered with leading suppliers of oral fluid collection kits, so no matter what your collection device requirements might be, Agilent has a method that will maintain the integrity of your samples... and *results*.

Our measure is your success.



Portfolio of Applications:

The science behind Agilent's three-tiered solution for alternative matrices.

Agilent GC/MS with Deans switch

In traditional GC/MS, measurements are taken after just one stage of chromatographic separation, which is inadequate for alternative matrices. But with Agilent's GC/MS Deans switch combination, you get *two* degrees of separation.

Here's how it works: Once the first separation is complete, a Deans switch isolates and transfers the target compound onto a second column. There, it is further separated from any co-eluting materials – improving both specificity and sensitivity. A focusing trap may also be used to further improve chromatographic resolution (**Figure 1**).

Two distinct separations improve sensitivity by isolating the target analyte.

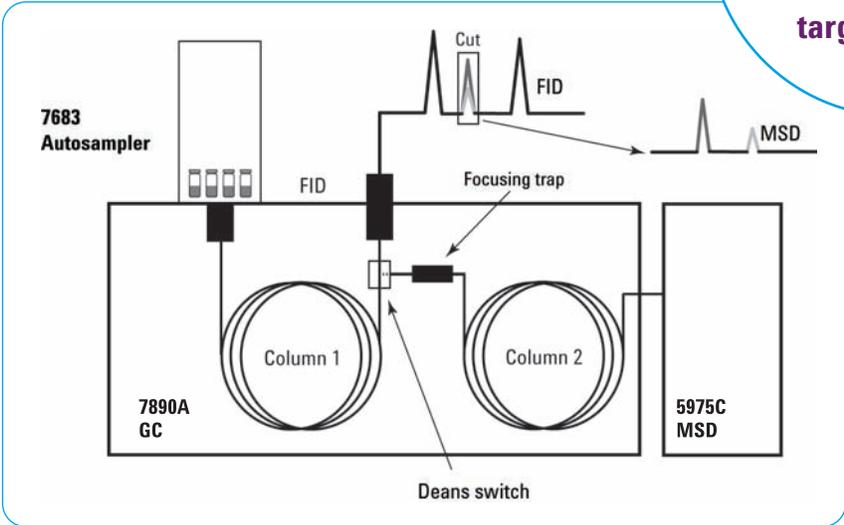
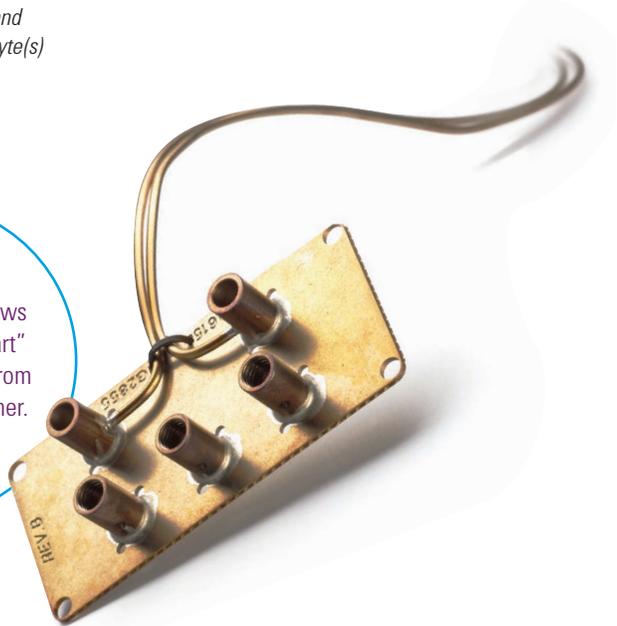


Figure 1: A GC/MS Deans switch pathway. First, the sample is injected into the GC and separated on column 1. The switch then cuts the elution time range around the target analyte(s) before the sample moves through the second column.

A Deans Switch allows you to perform "heart" cutting of samples from one column to another.



Agilent GC/MS Triple Quadrupole and LC/MS Triple Quadrupole

The outstanding sensitivity and selectivity of a GC/MS or LC/MS Triple Quadrupole system are especially beneficial to drug testing laboratories.

Unlike the GC/MS Deans switch system, in which the separation occurs chromatographically on a series of two columns, the Triple Quadrupole separation takes place on a series of two mass analyzers (**Figure 2**).

First, the target analyte is introduced to the instrument, ionized, and isolated from the matrix using a quadrupole mass analyzer. The analyte is then fragmented in a collision cell, where any fragments that correspond to the analyte of interest are transmitted through a *second* quadrupole to increase specificity for the target. (**Figure 3**).

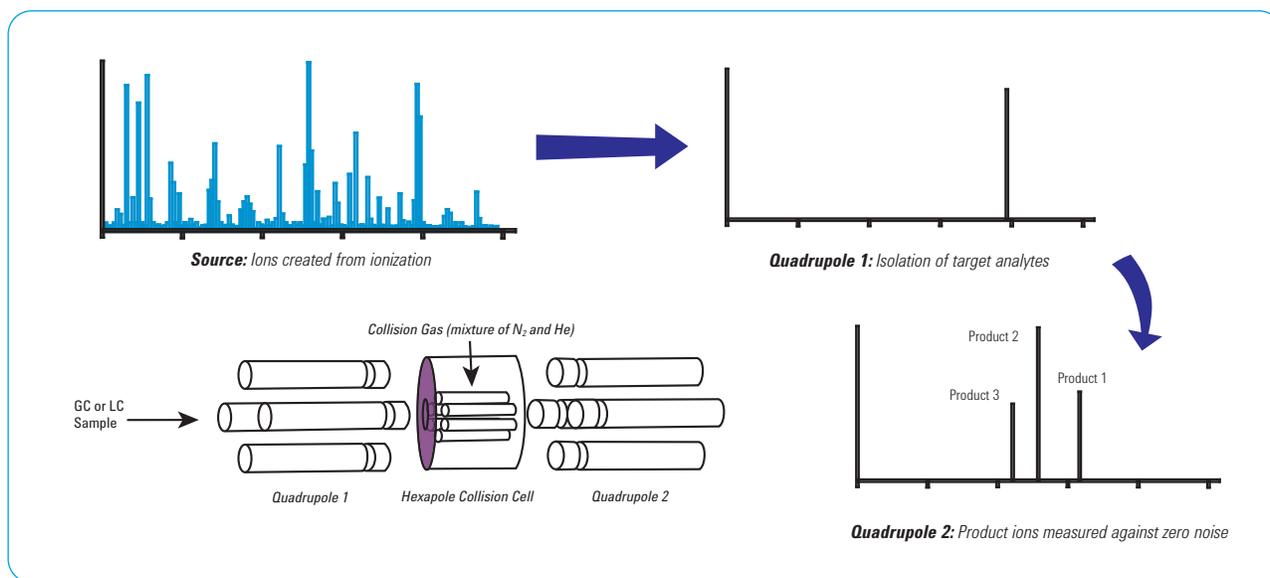


Figure 2: A GC/MS or LC/MS Triple Quadrupole pathway. First, the sample is injected into the LC or GC, and separated by mass in Quadrupole 1. After fragmentation in the collision cell, the product ions corresponding to the target analyte are measured against zero noise.

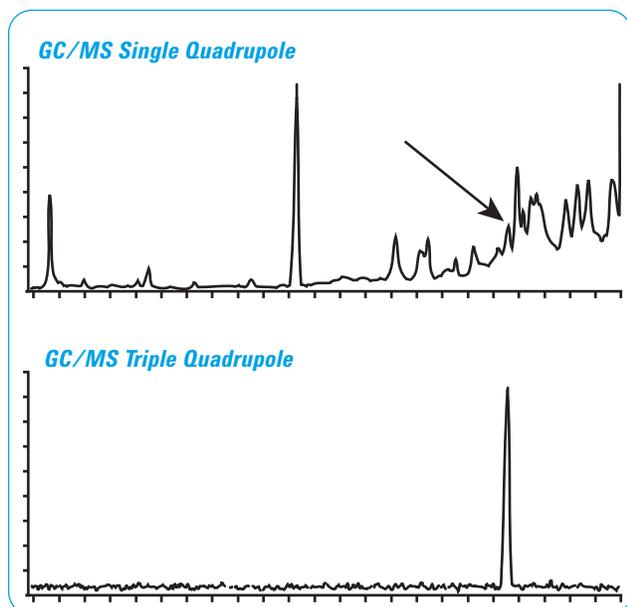


Figure 3: A representation of the difference between GC/MS Single Quadrupole and GC/MS Triple Quadrupole for analyzing drugs of abuse in alternative matrices.



Portfolio of Solutions: Only Agilent helps you maximize your productivity, ensure uninterrupted lab operations, and quantify thousands of substances in complex matrices with:

- **A three-tiered portfolio for alternative matrix analysis:** GC/MS Deans Switch, GC/MS Triple Quadrupole, and LC/MS Triple Quadrupole.
- **Workflow solutions** that let you maintain stringent practices from sample preparation to analysis. So you can achieve rapid, reliable results that stand up to scrutiny.
- **Informatics architecture** for managing large quantities of data while preserving the integrity and security of your results.
- **Agilent-engineered supplies** that expand your hours of continuous uptime.
- **World-class, global service and support** that can save your lab time, optimize instrument use, and increase productivity.

For more information

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