Agilent 7000 Series Triple Quadrupole MS

The Agilent 7000 Series Triple Quadrupole MS is a standalone triple quadrupole mass spectrometer for use with the Agilent 7890A GC system.

The 7000 Series Triple Quad features:

- One split flow turbomolecular vacuum pump
- Rotary vane foreline pump
- Independently MS heated electron-ionization ion source
- Two independently MS heated hyperbolic quadrupole mass filters\
- Single hexapole collision cell
- High-energy dynode (HED) electron multiplier detector
- Independently GC heated GC/MS interface

This configuration has advantages for many applications. The data is interpreted through the use of the MassHunter Workstation software, which provides quantitative and qualitative analyses of the data obtained. The 7000 Series Triple Quad is the only triple quadrupole GC/MS combination that incorporates a hexapole collision cell blanketed with a combination of nitrogen and helium gas, to improve the ion fragmentation prior to final filtration and detection quantification.

Application info Agilent G7000B

The 7000 Series Triple Quad combination can quantify trace organic compounds in complex matrices. The following applications use this type of quantification:

- Food safety studies
- Environmental studies
- Drug discovery
- Toxicology
- Forensics

Paired with Agilent's 7890A GC system, the 7000 Series Triple Quad delivers sensitive, reproducible analyses of target compounds in complex matrices. This provides the following:

- Femtogram-level limits of detection and quantification
- Selective quantification of target compounds in high chemical background samples
- Improved signal-to-noise ratios (s/n) in complex matrices
- Ability to meet stricter regulations regarding sample analytical limits for certain applications
- Simplified operation with Agilent's data a

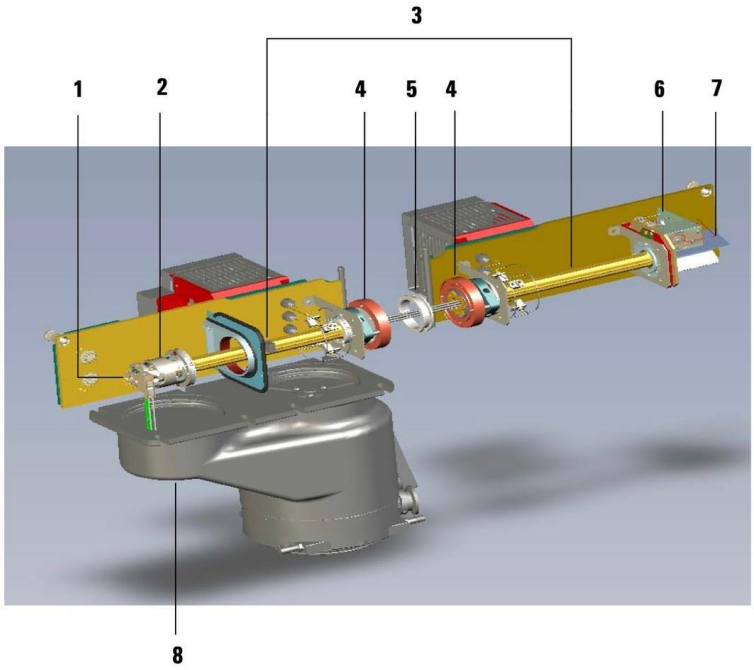
The 7000 Series Triple Quad offers the improved sensitivity in GC/MS/MS analysis that is required by many commercial and regulatory applications

The triple quadrupole mass spectrometer consists of an ion source, followed by ion optics that transfer the ions to the first quadrupole.

Sensitivity is a performance standard for the 7000 Series Triple Quad. It is expressed as the signal-to-noise ratio (s/n). Triple quadrupole mass spectrometers exhibit multiple sources of noise, including interference from chemical and cluster backgrounds and electronics.

In the design of the 7000 Series Triple Quad, sensitivity was addressed within all stages of instrumentation, from the ion source to the detector.

How the 7000 Series Triple Quad instrument increases sensitivity



1. Sample enters the 7000 Series Triple Quad from the 7890A GC. The 7890A GC incorporates capillary flow backflush technology to produce better separation and reduce column bleed, providing a cleaner sample.
2. Electron ionization ion source incorporates dual filaments with tuning capabilities to optimize ionization and filament use.
3. Front and rear analyzers use hyperbolic quadrupoles to optimize ion transmission and spectral resolution.
4. RF quadrupole segments (pre- and post-filters) enhance ion transmission into and out of the collision cell.
5. High-pressure collision cell with linear acceleration optimizes MS/MS fragmentation while eliminating crosstalk, even at very low dwell times. A small-diameter high-frequency hexapole assembly assists with capturing and focusing fragmented ions. Helium quench gas assists in the fragmentation process while reducing the neutral noise in the data.
6. Off-axis high-energy dynode detector with log amp signal compression permits a high gain, long life, and low noise. This design allows neutrals to pass without hitting the detector.
7. Multiplier has a long life since only electrons impact its surface, never ions. Gain normalized tuning of the detector provides consistent sensitivity over the life of the multiplier.
8. Vacuum system incorporating the use of a split flow turbomolecular pump efficiently eliminates neutral materials prior to the detector.

Source: Agilent 7000 Series Triple Quadrupole GC/MS System Concept quide