# Agilent 5975 inert GC/MS System for Pharmaceutical Applications

## Data Sheet

5975 inert MSD with G1888 Headspace Sampler and 6890N GC

## Complete Solutions for Pharmaceutical Applications

The 5975 inert Gas Chromatograph/Mass Spectrometer is part of Agilent's pharmaceutical industry solution consisting of instrument, accessories, software, applications, and services. It can be combined with the Agilent 7683 liquid autosampler with bar code reading capabilities and the Agilent G1888 headspace samplers. With the liquid autosampler's capability of on-column injection into 0.25-mm id columns and the use of the 5975 inert source, the system can be used for active compounds that would otherwise be difficult to analyze.

In pharmaceutical laboratories, gas chromatography/mass spectrometry (GC/MS) analyses are important for routine quality control analysis of manufactured drugs, packaging materials, and raw materials, as well as the investigation of out-of-specification (OOS) results by identifying and characterizing specified and unspecified impurities in manufactured drug compounds.

One of the main applications of GC/MS is the analysis of residual solvents in drug substances. Solvents routinely used in synthesis and process chemistry may not be completely removed by practical manufacturing practices such as freeze-drying and drying at high temperature under vacuum. Since there is no therapeutic benefit from residual solvents, all residual solvents should be removed to the extent possible to meet product specifications, good manufacturing practices, or other quality-based requirements. Some residual solvents even have unacceptable toxicity, their presence is very limited and thus placed under high surveillance by USP (United States Pharmacopeia). Therefore, manufactured drugs, as well as packaging materials, have to be closely monitored in order to ensure that those limits defined by regulatory authorities are not exceeded.

Overall mass-selective detectors (MSDs) are becoming more widely used in quality control (QC), eventually complementing or even replacing “traditional” detectors, such as the flame ionization detector (FID). The main reasons may include demand for higher selectivity and sensitivity, changes in regulations, the availability of MSDs at a lower price, and tremendous advantages through time-savings, by acquiring quantitation data as well as “just-in-case” information required for additional confirmation in an OOS situation.

In addition to streamlining processes to optimize the use of available time and resources and to facilitate administration, companies must comply with regulatory requirements such as imposed by U.S. FDA’s 21 CFR, part 11. These needs are being addressed with the new 5975 inert Gas Chromatograph/Mass Spectrometer and the MSD Security ChemStation software by Agilent Technologies. This software addresses all aspects of data security, integrity, and traceability mandated by the regulation. In contrast to the standard MSD ChemStation designed for more general applications, the MSD Security ChemStation offers significantly more restricted access control, audit-trails, and secured electronic records. The latest software revision provides more extensive capabilities to analyze complex samples. In the past, users have had to select whether to acquire conventional scan data (in order to search libraries) or selected ion monitoring (SIM) data (for highest sensitivity). The latest software allows both scan and SIM data to be collected synchronously to offer the advantages of both techniques with little or no loss in sensitivity and the additional benefit of saving valuable time. The tedious job of setting up the SIM ions and groups has been simplified with software that can automatically create the method while providing the option of editing.

Standard methods are critical for pharmaceutical laboratory operations. The Agilent software makes it easy to develop, transfer, and maintain methods. Retention time-locked methods will maintain the same retention times (RTs), even when a column is clipped for maintenance. These methods can be transferred to another instrument and still maintain the same RTs. Optimized methods can be transferred from one laboratory to another through our eMethods process that packages all GC/MS and target compound information for transfer to 5973x and 5975 GC/MSDs.

Centralized and secure record-keeping is essential for pharmaceutical laboratories. The GC/MS data can be integrated with Agilent's Cerity Enterprise Content Management (ECM) system for a secure central repository for both raw and processed data. The administrator simply configures Cerity ECM to backup and/or securely archive all raw data, results and relevant meta data, such as methods and sequences. On the central data server, the data is protected from unauthorized access, maintained for long-term storage, and indexed for accurate and ready retrieval throughout the record retention period.

Agilent provides an extensive network of service people around the world. These people are certified to repair our instruments. The 10-year use guarantee for instrument hardware further protects laboratories that must maintain instruments operational for a long time in compliance with regulatory standards.

## GC/MS and Samplers

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| Mode (standard) | EI |
| Modes (optional) | PCI, NCI, EI with CI source |
| Ion source type | Non-coated, inert EI source |
| Mass fillter | Monolithic hyperbolic quadrupole |
| Maximum mass | 1050 Da |
| Detector | EM with replaceable horn |
| Scan rate (electronic) | Up to 10,000 amu/s |
| Pumping system | 70 L/s or 262 L/s turbo-molecular pump with 2.5 $m^3$/h mechanical pump |
| Gas chromatograph | Agilent 6890N |
| Liquid sampler | Agilent 7683 (available with bar code reader) for 6890 |
| Headspace sampler | Agilent G1888 headspace sampler |

**Installation checkout specifications**

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| EI scan sensitivity | 100:1 S/N for 1 pg OFN scanning from 50–300 amu at nominal *m/z* 272 ion |
| PCI scan sensitivity | 125:1 S/N for 10–0-pg BZP scanning from 80–230 amu at nominal *m/z* 183 ion |
| NCI scan sensitivity | 300:1 S/N for 100-fg OFN |

A complete description of capabilities is available in publication 5989-2015EN.

## MSD Security ChemStation Software

Pharmaceutical laboratories have to comply with FDA's 21 CFR part 11 regulations. For their needs, Agilent has developed the MSD Security Station software. It is based on the MSD Productivity software and addresses all aspects of data security, integrity, and traceability mandated by FDA's 21 CFR Part 11. In contrast to the standard MSD ChemStation designed for more general applications, the MSD Security ChemStation offers significantly more access control, audit-trails, and secured electronic records.

Combined with procedural controls, the Security ChemStation will fulfill the following requirements of 21CFR Part 11:

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| 11.10b | Accurate and complete copies |
| 11.10c | Protection of records |
| 11.10d | Access limited to authorized individuals |
| 11.10e | Secure, computer-generated, time-stamped audit trail |
| 11.10f/g/h | Checks (device, authority, time-stamped audit trail) |
| 11.50 | Signature manifestations |
| 11.70 | Signature/Record linking |
| 11.100 | Uniqueness of electronic signature to the individual |
| 11.200 | Electronic signature components and controls |
| 11.300 | Controls for identification codes and passwords |

- Sample lists for injections can be downloaded from LIMS or other computer systems.
- Retention time locking to maintain RTs, even when transferring methods to another instrument
- Searchable databases consisting of spectral and RT information are available and can be created by the user.
- GC/MS and GC signals can be acquired simultaneously and reviewed.
- SIM groups and ions can be set up automatically from a scan data file.
- SIM and scan data files can be acquired in a single injection.
- eMethods allow transfer of GC/MS setpoints and target compound databases between 5975 and 5973x Series MSDs.
- The custom report writer can create files to upload results to a laboratory information management system (LIMS).

A complete description of capabilities is available in publication 5989-3015EN.

## Enterprise Content Management System

The software can be integrated with the Cerity Enterprise Content Management system to:

- Manage all data including analytical raw data, meta data results and any human-readable data of any file type
- Convert proprietary human-readable data, such as reports into Adobe PDF format, and extracts key information for indexing from PDF
- Automate data uploads through a scheduled background process
- Provide strong regulatory and corporate compliance functionality with
    - Access-controlled data storage on remote file servers
    - Dedicated user access rights
    - Revision controlled data storage
    - Full audit-trail of all changes and activtity
- Central archiving for all records with integrated records retention policy settings
- Integrated archiving solution with HP File Storage Extender (FSE) archiving application
- Direct interface to 3rd party archiving solution on permanent media such as SAN, IBM Tivoli, and EMC Centera
- Serve as a single content repository and unified Web application
- Automate process and workflow activities with the integrated Business Process Management (BPM) examples:
    - Automated result organization based on result data
    - Automated review and approval processes with PDF forms
    - Automated instrument maintenance and calibration procedures
    - Automated SOP change management

A complete description of capabilities is available on CD-Rom in publication 5989-2019EN or as a printed specification in publication 5989-1831EN or on the Web: www.agilent.com/chem/cerityecm

## Web Site Support

The Agilent Web site (www.agilent.com/chem) provides extensive information such as:

- Searchable chromatogram library for column selection
- Downloadable application notes
- Downloadable eMethod applications
- Recorded and scheduled e-Seminars on applications
- e-Learning modules on basic instrument theory and operations
- Interactive troubleshooting
- Software status bulletins, patches, and contributed software

## e-Seminars

Agilent provides on-going, no-charge training on the world-wide Web. Typical topics given during 2004–2005 include:

- Introduction to Capillary GC
- GC Method development
- Injectors Used in Capillary GC
- Installation, Care and Maintenance of Capillary GC Columns
- Selection of a Capillary GC Column
- Secrets of Good Peak Shape
- Techniques for Making Your GC Analysis More Repeatable, Reproducible and Robust
- Techniques, Tips and Tricks to Troubleshoot GC Systems
- Flow Switching GCxGC
- 5973 Inert Performance – Improved Response
- eMethods for 5975
- Agilent Cerity ECM – Manage All of Your Electronic Records in a Single Application

## Application Notes

Agilent regularly publishes application notes with optimized methods for applications of wide interest.

- The Determination of Residual Solvents in Pharmaceuticals Using the Agilent G1888 Headspace/6890N GC/5975 inert MSD System
- Determination of the Vasodilator Isosorbide-5-Mononitrate in Human Plasma Using GC/MS with Electron Capture Negative Ion Chemical Ionization
- Clenbuterol and Norandrosterone by Positive Chemical Ionization with the 5973N MSD
- Fast Drug Analysis
- Use of Liquid Reagents for Positive Chemical Ionization on the 5973 MSD
- RTL: Advantages in GC/MS SIM Acquisitions
- Ionization Methods in Gas Phase Mass Spectrometry
- Micro Liquid-Liquid Extraction with the Agilent 7683 Automatic Liquid Sampler

## eMethods

eMethods are electronic methods that are transferable between 5973x and 5975 GC/MS systems. Agilent provides eMethods at www.agilent.com/chem. Future application notes will have an associated eMethod.

## Services

Agilent offers extensive world-wide support by qualified service engineers. The support services portfolio includes qualification services, service bundles, software support and update contracts.

### Compliance Services

To maintain the highest level of instrument operation, Agilent's services account for the various phases of an instrument's life cycle and create customized compliance programs based on your needs.

### Installation Qualification (IQ)

IQ ensures that new Agilent hardware and software is installed correctly from the moment it is unpacked to the point it is ready for operation – documenting the completeness of shipping, the operating environment and the components of the system.

### Operational Qualification (OQ)

OQ involves a comprehensive test of the complete system using established conditions and known sample characteristics. This procedure ensures basic accuracy and precision of instruments or systems, as well as uncovering potential problems before they occur.

### Key Benefits

- Full automation to increase the qualification scope without adding extra time requirements
- Comprehensive system and application file verification tests for software
- Decreases the risk of financial loss due to noncompliance
- Optimized delivery and reproducible, consistent, and accurate results
- Meaningful, relevant, and understandable tests for the complete system

### Features

- Qualification and documentation of shipment completeness
- Delivered by qualified professionals with training certification

## www.agilent.com/chem

- Standards and procedures included with the shipment, as appropriate
- Verification and documentation of an instrument's ability to meet specified criteria
- Procedures and documentation that meet the requirements of GLP, ISO 9000, and other regulatory agencies
- Measuring equipment traceable to national and international standards

### Pharmaceutical Services Bundle

- On-site repair
- Phone support
- Preventative maintenance service
- Operational Qualification

A complete description of all services is available in publication 5988-8241EN, Agilent Life Sciences and Chemical Analysis Support Services – Exhibit 21A.

### Software Support

Software support options from Agilent provide access to software and informatics experts as well as updates to the software media. Software support includes:

- Unlimited telephone assistance from highly trained technical support professionals
- Software media updates and enhancements
- Software status bulletins

### Agilent Value Promise

Agilent guarantees at least 10 years of instrument use, from the date of purchase, or the residual value of that system will be credited when upgrading to a replacement model.

## For More Information

For more information on our products and services, visit our Web site at www.agilent.com/chem.



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