The GCMS-QP2010 Series...i solutions for a Higher Standard of Performance

The GCMS-QP2010 Series, consisting of the QP-2010 and QP-2010s, continues Shimadzu’s tradition of superior performance, flexibility, and quality. The instruments are packed with advanced features, including an extended mass range from 1.5 to 1024 Daltons and optional Positive (PCI) and Negative Chemical Ionization (NCI). The QP-2010 Series is the top of the line, offering the most powerful benchtop GC/MS systems available today.

Rise Above Your Competition

In the competitive analytical market, the demand is for better and broader analytical services at reasonable costs. The quality and flexibility of Shimadzu QP systems help you to exceed all expectations.

Shimadzu is the leader in quadrupole GC/MS design. These powerful instruments will enable you to perform accurate identification and quantitation at low levels. All QP systems produce classical, library searchable spectra with a dynamic range of $10^6$ and scan speeds of up to 10,000 AMU/sec and 50 scans/sec. Scan and SIM modes in the same run are possible. In the SIM mode, monitor up to 64 sets of ions with up to 64 ions per set—potentially determining hundreds of compounds simultaneously.

Shimadzu’s QP instruments are ideal for many applications, including forensic analyses, drug testing, environmental monitoring, component identification, and product impurity identification. Optimization of the chromatographic method is done simply through software control.

Extraordinary Sensitivity

The QP-2010 is the most sensitive GC/MS on the market. Increased ionization efficiency coupled with the highest ion transfer and increased detection results in the best overall sensitivity achievable. Computer-designed optics generate and focus the highest density of ions. Pre-quadrupole and post-quadrupole lenses stabilize the ions, minimizing losses in ion transmission.
Superior Vacuum Ensures Better Performance

The QP-2010 is equipped with a high-capacity dual differential turbo-molecular pumping system, which provides an optimized rate of 260 L/sec under the ion source, and 65 L/sec for the detector region. An ion gauge ensures the precise measurement of the source pressure. After maintenance is performed, the tandem (rotary and turbo) pump design generates a high vacuum in four minutes.

Switch Between EI, PCI, and NCI Modes without Slowing Down

The QP-2010 NCI option has a unique advanced ion source design. Now you can analyze compounds in CI mode and then in qualitative EI or NCI mode, without changing ion source components. Imagine the time you'll save by generating a CI spectrum with a molecular ion, then, by selecting an option in the software, generating an EI mass spectrum. These methods can be switched automatically in the batch table.

Constant Linear Velocity for Best Separation

The GC-2010 offers constant linear velocity, which maintains the optimum sample velocity during column temperature profiles. Six pressure ramps, both in positive and negative modes, and twenty temperature ramps simplify complex separations. The timed-split mode controls inlet pressure to reduce sample loss and increase injection port sweeping. High-pressure injection mode improves sample loading and OCI/PTV dramatically increases sensitivity. When moving assays from one GC to another or GC to GC/MS, constant linear velocity and the automatic retention time updating of Lab Solutions Software sets up the new unit by running only one standard.
Utilizing many of the high-end features of the QP-2010, the QP-2010s offers high throughput and excellent productivity, providing users with an excellent performance-to-cost ratio. Like the QP-2010, the QP-2010s features patented constant linear velocity for optimum separation, 20 temperature ramps, and both scan and SIM modes. The SIM mode enables monitoring of up to 64 sets of ions with up to 64 ions per set—potentially determining hundreds of compounds simultaneously.

Shimadzu GC/MS instruments are equipped with an inert source that does not react with unstable compounds. The source heater can be independently adjusted to 260°C. Our high luminosity ion source creates more ions! This provides more electron-sample interaction by improved electron focus and emission compensation for matrix effects. High luminosity dual-coil filaments improve system stability over time and auto-switch to the other filament on failure. Emission current is optimized for analysis. Adjustable electron energy from 10-200 EV optimizes spectrum and allows for an enhanced molecular ion without reagents. The ion energy is adjusted as a function of mass to simplify tuning. The QP-2010 Series has unmatched tune stability for any matrix, allowing for more runs to be made without maintenance.

The QP-2010s is equipped with a Pirani gauge and a 65 L/sec turbo pump for a clean background and quick pump down. Both instruments quickly equilibrate at analysis temperature settings and your instrument is operational in less than an hour.
DI-2010

Input samples directly into the ion source at temperatures up to 500°C without disconnecting the chromatograph. The DI-2010 Direct Inlet option for the QP-2010 delivers the fastest sample identification available.

Additional Injector/Detector Options

The QP-2010 Series has the ability to add up to three additional detectors (FID, TCD, ECD, FPD, FTD) as well as the MS. Up to two additional injectors can also be added, making GCMSsolution our most complete and flexible software package. Full independent GC control can be achieved through GCMSsolution.
Shimadzu’s GCMSsolution software sets a new standard for laboratory productivity in the 21st century by offering new and innovative solutions to the challenges of high-sample throughput, instrument control, diverse data handling, and integration with regulatory compliance.

**One-Window Technology**

Many innovative ideas are included in GCMSsolution software. Our software engineers have worked with customers to create the most complete and friendly instrument control and processing software for the QP-2010 Series. With “one-window” design, the user can simplify operation and put total control within the reach of the mouse.

“One-window” means that all data reduction information is now visible on one screen. Changing parameters for the viewed compound in the quantitation table simultaneously changes the display for the quantitative results, peak integration, spectrum, ion ratio, and peak locator on the TIC.

“One-window” also means that compound calibration, private library editing, chromatogram comparison, and reporting software are accessed from the same place. Use the right mouse button to enable manual integration, search for matches in any commercial library, or identify chromatographic peaks with the base peak m/z. It’s Simple and Easy!

**Improved Method Development**

Acquisition parameters for the GC oven, AFC flow and pressure profiles are displayed behind the TIC trace. Constant linear velocity optimizes separation with one-button operation. Tune the GC/MS by setting the software ion ratios, and GCMSsolution delivers every time. On the “acquire” display, a reference chromatogram behind the acquisition trace speeds method development. Changes to all method parameters are made graphically. The ability to time-program the GC and MS is standard. High-speed GC/MS, high-pressure injection mode, Programmed Temperature Vaporization, and Large Volume Injection (PTV/LVI) are unique capabilities offered by GCMSsolution in conjunction with our AOC-20 autosampler.
Analytical Flexibility

Scan up to 50 times per second or select 64 ions in 64 ion sets in SIM mode. It is now possible to run SIM and full-scan modes in a single analytical run. SIM mode can be used when a target analyte is expected to elute, and full-scan mode when no target analytes are expected. With Lab Solutions you can switch from scan to SIM 64 times within an analysis.

Calibrate using 64 concentrations and up to 10 level replicates with 64 internal standards for maximum flexibility. Use any curve fit method required and set the fit type individually for each compound. Curve fits for internal and external standard with mean response, linear regression, and multi-point modes are included. To simplify methods maintenance, set the detector voltage for acquisition relative to the tune profile. This means you never have to manually update a method file again.

Simply Powerful Quantitation

Post-run processing places all needed information for quantitation visually available and graphically accessible. The Data Explorer keeps the working project visible and a simple “click and drag” loads the data file. Search for a file visually on the Preview window below the file or icon list.

The chromatogram window presents TIC, extracted ion profiles, SIM profile, multiple ion chromatograms with integration, compound name labeling, and base peak m/z labels to allow easy peak identification. Data files can be overlaid for comparison.

The spectrum shown is generated from the integrated peaks or from manual spectrum generation and background subtraction. Multiple background subtraction points can be used. Right-mouse clicking provides library search results from any commercial library or up to five total libraries in any search. Library spectrum can be subtracted from the current spectrum and the search results.

The compound table contains the identification information for ion ratios or full spectrum scan data. By using scan spectrum, GCMSsolution provides more accurate compound identification and the “Compound Finder” can locate a compound anywhere in the chromatogram, ensuring easy method transfer between instruments and when changing columns.
Wizards Work for You

Wizards lead you through creating methods, target compound tables, and batch acquire tables to simplify the process of using the system. Integration parameters, curve type, fit, and other parameters are set using the wizard. Analyze all compounds using the same calibration type or use individual performance monitoring criteria for each compound.

Method Wizard

Set up parameters for analyzing samples using the QP-2010 Series automatically with the Method Wizard. Create simple or complex assays quickly and accurately. From the most experienced to new users, the wizard speeds your method development.

Compound Table Wizard

The Compound Table Wizard leads you through the sequence of operations to build a compound table with minimal effort. New or experienced users can easily create the table for quantitative analysis by only typing the name for each identified peak.

Select calibration method fit parameters for the list, then select the peaks to be included. Group peaks as needed to quantify multiple peak measurements easily and accurately.

Batch Table Wizard

Creating new batch tables in GCMSsolution is simple. Each line of a batch can have visual basic programmability for pre-run, post-run or decision-based operations. Post-run or run-mode processing allows GCMSolution to control and integrate many other lab systems’ functions into one automated process. This minimizes the required time to perform your research.

Select table entries in two ways: (1) by viewing the spectra and selecting the proper compounds for the quantitation table, or (2) by first processing the results into the spectrum process table, then selecting from the list of library-searched names.

“Next functionality” guides you through the process and allows you to change or verify setup with minimal effort.
Quantitation Browser

It is now possible to process more samples with less effort than ever before. The quantitation browser is designed in the style of spreadsheets and includes many advances unavailable until now, and is enhanced by QA/QC selected intelligence sequencing.

GCMSsolution can process up to 1000 samples per batch, and 1000 batches in the sample queue, providing the ultimate in unattended operation. All file results are reviewed together and printed as one report.

Automatic calibration and sample processing are made easier by the “walk-up access” format of the quantitation browser design. The browser shows only what is important to view from run to run. A single switch setting automatically integrates all the data, which is saved to each file. Re-quantitate or fix integrations for all files from the same window.

The Future of Reporting

Report in your own style with visually customized formats. The new report generator allows you to go from blank page to custom report graphically in only a few minutes. No macro programming required!

Add pictures, logos, or custom text anywhere in the report using WYSIWYG functionality. When you have created a style, view the output with print preview and save the template for future use.

GCMSsolution includes many fully prepared report selections. You can modify existing templates or create your own for infinite possibilities.

All chromatographic, spectral, qualification, and quantitation data can be placed anywhere on the page graphically. GCMSsolution reporting complies with USEPA, ASTM, and NIDA requirements for format and completeness, with surrogate and internal standard recovery standard.
CLASS-Agent Database, Electronic Record, and Electronic Signature

CLASS-Agent enables data archiving for Shimadzu Instruments’ control software packages, and provides tools for CFR 21 Part 11 compliance for Electronic Signature and Electronic Record security. Establish and manage databases. View and review chromatographic results as well as calculated data. Electronically sign file results, review or give final authorization from a distributed network system with Agent Manager.

Dual-level security is standard for all operations with audit trail and complete time and date-stamped recording to manage data records. Visually overlay multiple files for batch review; export database information to spreadsheet programs, or e-mail results as needed. Single users or groups use Agent with different access and processing rights to electronically sign archived files.

GCMSsolution, together with CLASS-Agent, provides the tools to help you comply with FDA or other regulations for electronic data handling.

Better Compliance

The heart of the compliance system is the versatility afforded by multilevel user access as assigned by the system administrator. Groups can share access to the functions of the software, or rights can be customized for each user as required. Dual-level password security and time limits for passwords ensure only authorized users will be able to access your data.

GCMSsolution provides the tools for CFR 21 Part 11 compliance in cooperation with CLASS-Agent. Audit trail records and all updates to the GCMSsolution files are maintained. The original calculations and methods are maintained in the data file for data integrity. Overwrite protection for data, method, batch, and report files ensures the strictest compliance is met. No overwrite of header or report formats ensures that printouts are secure.
QA/QC is now defined according to your requirements for quantitation, RSD, check standard values, and reference ion ratios. Each compound’s quality criteria differ and GCMSsolution can adjust accordingly. You can specify individual testing criteria, insert text or ion ratio limits.

Superior Data Quality and Flexibility

GCMSsolution QA/QC software is the most comprehensive available. Verify quantitative precision, spectral integrity, column performance, and system degradation for all compounds. Verify spectra in accordance with USEPA methods for BFB or DFTPP compliance, and verify spectrum for every target compound that the system measures. Perform testing for minimum and maximum RF, calibration accuracy, standard deviation from the calibration curve, and an MDL study using the QA/QC software.

System Checking

System checking software monitors the entire system for each analysis. Verify column integrity by all standard methods or specify your own criteria. Verify MS performance by testing air leaks, ion ratio, isotopic resolution, and baseline noise, and re-tune on failures. Correct any performance variance or stop the analysis during batch operation. Check GC maintenance to ensure that the septum or liner has been maintained properly.

A batch of files can be quantitatively processed together, and quantitation results for all compounds in the batch can be validated. Files are listed with concentration. The re-quant window has an auto and manual integration correction. Data files, the requantitation window, and the compound table are linked, simplifying review and reprocessing.
GC/MS for Environmental Analysis
...a Higher Standard for EPA Methods

A Complete Package for EPA Analysis
Environmental labs face unique challenges, having to adhere to strict analysis guidelines, while maintaining high sample throughput and keeping analysis costs competitive. To keep costs low and meet tight deadlines, instrument downtime must be minimized.

Shimadzu is a leader in environmental GC/MS analysis, both in the U.S. and abroad, with systems that are fast, accurate, reliable, and reasonably priced. Shortened run times combine narrow-bore columns with enhanced instrument sensitivity, and our systems have the fastest scan cycle time of any major manufacturer. Shimadzu is the first manufacturer to produce a system that can perform a CLP semivolatile analysis in less than 21 minutes, and an EPA method 524.2 run in 10.2 minutes.

Purge and Trap or Automated Headspace Analysis
Shimadzu's QP family can utilize a variety of automated headspace samplers. These include the AOC-5000, which is completely supported by Lab Solutions software, and the OI Analytical Eclipse, which is controlled from its own software and triggers the start of analysis by the GC/MS.
PBBs/PBDEs Analysis

GC/MS is the most effective tool for quantification in the analysis of Polybrominated Biphenyls (PBB) and Polybrominated Diphenyl Ethers (PBDE). Detection limits of a few ppb can be obtained. Screening can be done using EGA-MS, EGA-GC/MS, and DI-MS methods.

Verify Method Criteria with GCMSolution EPA Software

To help you meet the challenging demands of EPA methods, our optional EPA module complements GCMSolution software. This module includes all EPA requirements for tune checking, data acquisition, calibration, Tentatively Identified Compound (TIC) identification, and data reporting. Select automated batch processing to reduce the time spent compiling data and verifying standard curve, spike, and check standards. The software automates criteria checking, nontarget quantitation, and library searches. The wizards save time in creating new methods–all instrument method files for EPA methods are shipped with the instrument, ensuring the shortest start-up time.

Shimadzu Solutions

Whether you are running TO, CLP, or the 500, 600, or 8000 method series, Shimadzu has the solutions. Make Shimadzu your choice for environmental analysis.
Confirming Identification of Complex Drug Samples

GC/MS is the method of choice for confirming and quantitating many difficult samples, such as illegal drugs in urine, hair, or blood. Conclusive measurements are obtained when analysis is combined with chemical derivatization, solid phase extraction cleanup, and optimum choices of mass fragments for identification.

High-Speed GC/MS

Rapid analysis is needed because of the number of drug-related cases that come into the laboratory. Shimadzu provides speed and accuracy for drug labs. The top figure shows speed coupled with separation possible from a standard QP series system. Barbiturates separations can be difficult when shorter run times are needed.

QP-2010 adds high sensitivity to the high-speed capability of Shimadzu GC/MS systems. It shows drugs from Phenobarbitol to THC run at 6.25ng on column.

<table>
<thead>
<tr>
<th>Compound</th>
<th>RT (min)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methamphetamine</td>
<td>0.23</td>
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<tr>
<td>Benzocaine</td>
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<tr>
<td>Lidocaine</td>
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<td>PCP</td>
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<td>Cocaine</td>
<td>0.37</td>
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<tr>
<td>Heroin</td>
<td>0.79</td>
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</table>

*Conditions optimized for each compound

QP-2010 High-Speed Drug Screen with High Sensitivity

Table 1: High-Speed GCMS Drug Screen Analysis Times

QP-2010 Series High-Speed GCMS of Barbiturates 50ng 10/1 split
THC in Saliva

The determination of THC is one of the most challenging GC/MS applications. Detection levels in the ppb (ng/mL) range are required due to the rapid elimination of THC from saliva, the low amount of drug required for an “active” dose, and the small sample volume that is available for collection. With 1 µL injected onto the GC/MS, the detection limit is 0.2 ppb.

THC in Blood

Blood measurement is required by many court systems to confirm drug presence and level. The chromatogram to the left shows the results of a blood sample containing the Delta 9 THC at the spiked level of 0.5 ppb. The QP-2010 system used for this assay could have measured this compound with quantitation ions and qualifiers at lower levels of detection than this sample shown with adjustments to the detector gain. The limiting factor is the contamination of the matrix and derivatization agents needed to process the sample.

Screening for Inborn Metabolic Errors

Elevated levels of certain organic acids can result in nervous system disorders, toxicity, and premature death. These organic acid levels can be used to diagnose several inborn metabolic diseases. A highly sensitive GC/MS method has been developed for detecting 104 compounds. Retention indices are used to accurately predict retention times. Diagnostic software has been developed to correlate analytical results with the proper diagnosis.
Flavors and Fragrances
Determining the concentrations of low-level compounds relative to other ingredients is critical, whether for quality control or competitive analysis. The QP-2010 Series has a wide linear range of $10^6$ in scan mode so trace components in the complex mixtures of flavors and fragrances can be determined.

Automated SPME (Solid Phase Micro Extraction) is fully supported by our AOC-5000 and GCMSsolution software. This technique greatly reduces the time required for the extraction and sample preparation to improve productivity.

For the most complex samples, GCMSsolution software can automatically generate background-subtracted spectra, which can then be library searched. The flavor and fragrance library was searched and the best match was inserted into the name column in the peak report, along with the normalized concentrations of each component calculated from the TIC. Flavor constituents from as low as 0.01 to as high as 95 percent of the total can be easily determined with a Shimadzu GC/MS system.

Flavor and Fragrance Library
Minimize translation of IUPAC names from library search results. Simply search the flavor and fragrance library normally and compound names are listed by industry standard names. Match components by similarity index to increase data throughput.

Aroma Analysis
Aromas from different food compounds are central to their marketability and quality, and in discovering packaging contamination. The Entech sample concentrator coupled to our GC/MS system allows both identification of normal process analysis and the lowest possible detection of contaminants. Cryo-trapping the compounds of interest from each of the 21 automatic sampling positions enhances detection, allowing the sample input to the GC/MS to be split, and minimizing maintenance for the column and detector.
Chemical Ionization Facilitates Identification of Aromatic Compounds

The Shimadzu QP-2010 offers Positive and Negative Chemical Ionization (CI, NCI) as alternative ionization methods. To switch to CI mode, simply select the CI option in the software.

An EI spectrum of an aromatic compound is shown. The molecular ion for this compound, m/z 213, is present, but its intensity is so low that positive identification is difficult. CI removes ambiguities about correct identification.

The methane CI spectrum shows that the molecular ion is, indeed, 213 [in CI, the base peak is the (M+H)+, ion, m/z 214]. For this example, the peak identification tentatively made with EI is conclusively confirmed with CI.

Analysis of Menthol in Cigarette Smoke

A screening procedure was developed for the rapid evaluation of gas phase, semivolatile, and particulate smoke constituents contained in cigarette smoke. Low to medium-level concentrations of whole smoke constituents were detected. It was found that the menthol delivery increases in later puffs due to deposition and redistillation down the tobacco rods.

Butter FAMEs Fast Analysis to C28.2. Run time: 2 minutes. Speed gain of 16.5 over conventional analysis.

Column: Omega Wax 10 m x 0.10 mm i.d. 0.10 mm film, Inj. Vol.: 0.2 mL (1:20 in hexane); Split Ratio: 1:200 (250°C)

T. Progr: 50°C to 250°C at 90.0°C/min

P. Progr: 400 kPa at constant linear velocity Carrier: H2; u: 116.0 cm/s;

Detector: FID (250°C) H2: 50 mL/min, Air: 400 mL/min,

Make-up: 50 mL/min kPa (N2)

Sampling Rate: 4 msec; Filter Time Constant: 50 msec

Multiple samplings of real-time smoke, direct from cigarette

Smoke machine valve system in the inject position
GC/MS Accessories for All Reasons
...a Higher Standard for Sampling Flexibility

Accessories that not only play the notes—they make the music!

The AOC-20 is the most precise sample delivery system available. With 0.3% reproducibility for 1 µL injection, the AOC-20 offers a high-throughput answer to high-precision measurements. The Shimadzu AOC-20 autoinjector performs fast, precise liquid injection, ambient headspace, and PTV/LVI from one platform. The sampler holds up to 150 1.5 mL vials or 96 4.0 mL vials, and has options for sample heating, cooling, and barcode reading. Performance and value define the AOC-20 autosampler system.

AOC-5000 for GC/MS

AOC-5000 offers SPME, headspace, liquid injection, and micro titer plate injection from one autosampler. Optional accessories include cooled tray holders for 1mL/2mL/10mL/20mL vials, SPME fiber cleaning station, stacks for 96/384 well micro- or deepwell plates, a solvent/reagent reservoir, and a large-volume wash station. The top-mounted design on GCs saves valuable bench space. High precision, low carryover, and proven reliability are standard for many applications. Control of the AOC-5000 within GCMSolution includes all functions using the Cycle Composer software embedded into GCMSolution.
PY-2020 is the Answer for Pyrolysis GC/MS

Pyrolysis GC/MS provides critical information about nonvolatile sample components and additives in solid or nonvolatile matrices, such as polymers. The decomposition of a component under very high temperatures yields characteristic decomposition products based on the thermal stability of chemical bonds. The PY-2020 and GC/MS creates and separates these fragments and compounds, and aids in their identification. Because the samples are decomposed, not vaporized, this technique applies to nonvolatile, liquid, or solid samples, such as resins, paints, and polymers.

The PY-2020 Pyrolyzer is coupled directly with the capillary injection port. The pyrolyzer oven precisely regulates its temperature to 1°C accuracy from 200°C to 800°C. Sample preparation is minimal; simply place a small portion in a platinum holder. The unique “sample drop” design of the PY-2020 introduces the sample instantly to the pyrolysis temperature, minimizing the loss of more volatile constituents and shortening the time needed to load the fragments onto the column. All of the compounds in the sample show good chromatography, even the most volatile components.

The application of precisely controlled temperature results in pyrolysis fragmentation that is both adjustable and reproducible. The pyrolysis temperature can tailor the disassociation energy applied to the sample. Pyrolysis, along with the QP Series in EI mode or PCI and NCI modes, supplies the highest degree of separation and identification. Pyrolysis analysis reveals valuable “fingerprints” of samples having molecular weights much higher than those analyzed by conventional GC/MS techniques.

Auto-shot Pyrolysis Analysis Autosampler

Sample throughput is a challenge for the material science laboratory. With the AS-1020E autosampler, the analysis of up to 48 samples can be automated. The Auto-shot autosampler is programmable to reinject a single sample up to four times, allowing reprocessing of the same sample with differing temperature programs. Along with reliable quantitation, this unique capability makes the PY-2020D the best tool for pyrolysis polymer characterization.

Polymer Library

Search the polymer library for matches to EGA fraction results and additives as well as polymer breakdown spectra. Identify the polymer by chromatographic and mass spectral results. A friendly user interface makes adding spectrum to the library easy. For characterizing unknown polymers or development, this is an essential tool that finds known and unknown products, and makes your work more precise and easier than ever before.
Shimadzu Commitment to Support

The goal of the Shimadzu product support staff is to ensure our customers’ success with their instruments. Highly trained field service technicians, strategically located throughout the country, are equipped to enable fast and efficient response to any situation. They are supported by experienced product engineers and applications specialists at the Shimadzu Technical Support center in Columbia, MD.

Available Optional Shimadzu Accessories

AOC-20i Autoinjector/AOC-20s Autosampler—150 1.5 mL vials or 96 4 mL vials and barcode reader performs direct injection, PTV/LVI, ambient headspace using 1-250 μL syringes

PCI and NCI ionization modes optional for GCMS-QP2010

AOC-5000 Autosampler—SPME, liquid injection, headspace, and micro titer plate capability

PY-2020D Pyrolyzer—single or double shot

AS-2010 Pyrolyzer Autosampler

Direct Inlet Probe—concurrent with GC analysis through second ion source port

Shimadzu GC/MS Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>GCMS-QP2010</th>
<th>GCMS-QP2010s</th>
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<td>Automatic Tuning: System checking or Peak monitor</td>
<td>Automatic Tuning: System checking or Peak monitor</td>
</tr>
<tr>
<td>Column Oven</td>
<td>Temperature Range:</td>
<td>Temperature Range:</td>
</tr>
<tr>
<td></td>
<td>90°C–450°C</td>
<td>90°C–450°C</td>
</tr>
<tr>
<td></td>
<td>28 x 17.5 x 28 (13720 cm³)</td>
<td>28 x 17.5 x 28 (13720 cm³)</td>
</tr>
<tr>
<td></td>
<td>±0.01°C/C</td>
<td>±0.01°C/C</td>
</tr>
<tr>
<td></td>
<td>20 and 21 holds (heating or cooling ramps) up to 8 tuning masses/user selected</td>
<td>20 and 21 holds (heating or cooling ramps) up to 8 tuning masses/user selected</td>
</tr>
<tr>
<td></td>
<td>250-250°C/min</td>
<td>250-250°C/min</td>
</tr>
<tr>
<td></td>
<td>9999.99 min</td>
<td>9999.99 min</td>
</tr>
<tr>
<td>Injection Port</td>
<td>Maximum split/splitless injector units:</td>
<td>Maximum split/splitless injector units:</td>
</tr>
<tr>
<td></td>
<td>2 with optional additional wide bore injector unit, single Split/Splitless standard</td>
<td>2 with optional additional wide bore injector unit, single Split/Splitless standard</td>
</tr>
<tr>
<td></td>
<td>2 WBI injectors optional</td>
<td>2 WBI injectors optional</td>
</tr>
<tr>
<td>Advanced Flow Controller (AFC)</td>
<td>Pressure Range:</td>
<td>Pressure Range:</td>
</tr>
<tr>
<td></td>
<td>0-970 kPa</td>
<td>0-970 kPa</td>
</tr>
<tr>
<td></td>
<td>2 Positive or Negative pressure ramps</td>
<td>2 Positive or Negative pressure ramps</td>
</tr>
<tr>
<td></td>
<td>400-400 kPa/min</td>
<td>400-400 kPa/min</td>
</tr>
<tr>
<td></td>
<td>0-1500/1</td>
<td>0-1500/1</td>
</tr>
<tr>
<td></td>
<td>0-1200 mL/min</td>
<td>0-1200 mL/min</td>
</tr>
<tr>
<td>Constant Linear Velocity:</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Libraries:

NIST 2002 Library; Wylie 7th Edition Library; Pfleger-Mauer Drug Library; Pesticide Library and Database; Flavor and Fragrance Library with Covat’s Indices; EGA/Thermal Desorption/Pyrolysis Library; Inborn Errors of Metabolism Screening System; Convert Existing User Libraries to Shimadzu Format with Mass Transit

Other Shimadzu Locations:

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