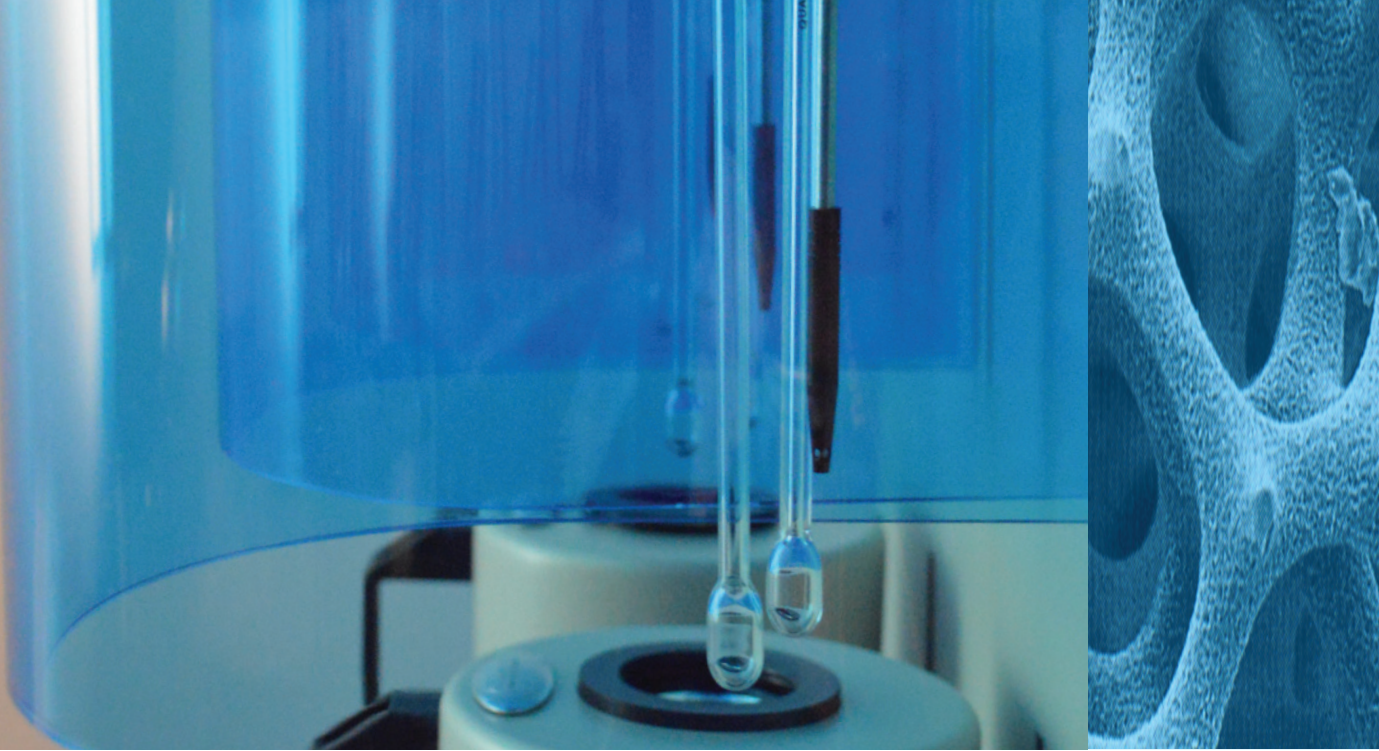




autosorb[®]

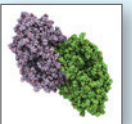
Surface Area & Pore Size Analyzer



SURFACE AREA & PORE SIZE



Catalysts



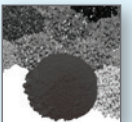
Ceramics



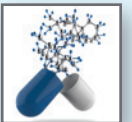
Energy



Carbon



Pharma



Overview

Introduction

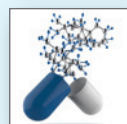
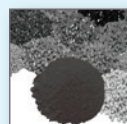
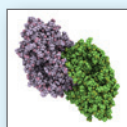
The new **Autosorb[®] 6iSA[™]** provides six ports for independent analysis of 1 to 6 samples. Dedicated pressure transducers, dewar flasks, coolant level sensors, and Po cells allow independent and simultaneous operation of each station. Its Windows[®]-based software, available as a CFR-21 Part 11 version, provides the ability to perform a multitude of data analysis methods including single and multi-point BET Langmuir surface area, mesopore volume and size distribution, micropore area, total pore volume and much more. Modern data communication provides ease of data input and export.

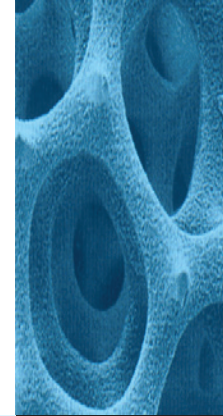
Features - Benefits

- Quantachrome's **AUTOSORB[®] 6iSA[™]** is designed to satisfy the needs of laboratories with high analytical throughput for rapid and accurate surface area and pore size data.
- Fully automated analysis of surface area, pore volume and pore size measurements.
- High resolution adsorption and desorption isotherms defined with up to 180 equilibrium data points.
- Six analysis ports, each with its own dewar (coolant flask) and pressure sensor, provides independent and simultaneous analyses for the highest analytical throughput.
- Dedicated station pressure transducers ensure equilibration is monitored in smallest enclosed volume in addition to allowing simultaneous operation.
- Dedicated Po cells ensure accurate P/Po values.
- Fresh samples can be started while other analyses are already in process.

(continued)

- Low maintenance, vacuum volumetric system with stainless steel manifold construction.
- Speed and precision ensured by **MAXIDOSE[™]** a proprietary dosing algorithm that responds and adjusts to the adsorption demand of the sample.
- Windows[®] based software provides for instrument control and a comprehensive range of classical and modern models for reporting surface area and pore size.
- System supplied complete and ready for operation includes vacuum pump, dewar flasks and sample cells.





Specifications

USB Port for PC control via Windows[®] based software

Six sample and Po stations (three on each side)

Six coolant level sensors (one per station)

Easy to fill 60 hour dewars

Automated, independent dewar elevators



Digital vacuum gauge
Calibration chamber

Multifunction Temperature/
Pressure Displays:
Manifold pressure
Manifold temperature
Station pressure

Front panel LEDs display
continuous system status
information

Analysis

Transducer Accuracy:
0.11% full scale

A/D Converter:
22-bit (1 part in 4,190,000)

Ultimate Vacuum:
 5×10^{-3} mbar achieved by dedicated 2 stage-
rotary, direct drive pump (included)

Adsorbates:
Nitrogen and any other non-corrosive
gas with appropriate coolant including Ar, CO₂ and H₂

Surface Area Range:
0.01 m²/g to no known upper limit

Minimum Pore Volume:
(liquid)- 1×10^{-6} cc/g
(STP)- 5×10^{-5} cc/g

Pore Size Range:
3.5 to >4000Å / 0.35 to >400nm

Coolant Level:
Controlled to ± 0.5 mm with RTD sensor

Minimum P/Po:
 1×10^{-3}

Physical

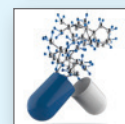
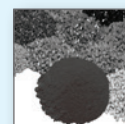
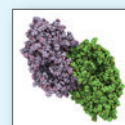
Dimensions:
Height 44.5 inches (101.6 cm)
Width 29.5 inches (64.8 cm)
Depth 37.1 inches (73.7 cm)

Weight:
380 Pounds (172 kg)

Electrical:
100 - 240 VAC, 50/60 Hz

Ambient:
10 - 38°C operating range - 90% maximum
relative humidity

SURFACE AREA & PORE SIZE



ASWin Software

Windows®-based Performance

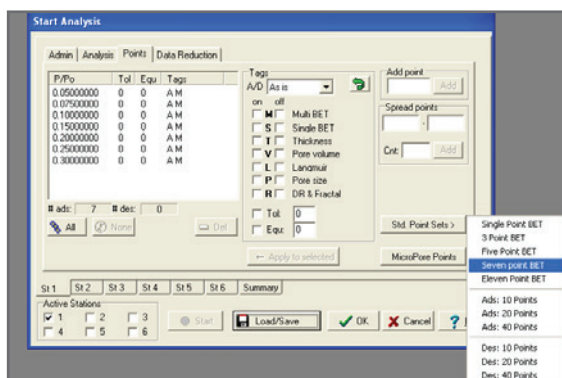
The Autosorb® 6iSA™ analyzer is microprocessor controlled, and communicates with a Windows® based PC utilizing Quantachrome's state-of-the-art, data acquisition and data reduction software.

Comprehensive software to meet modern needs

The Autosorb® software is highly functional and user friendly. It function incorporates an advanced database that allows users to quickly search accumulated data files by specific ID, description, operator, comment or range of dates.

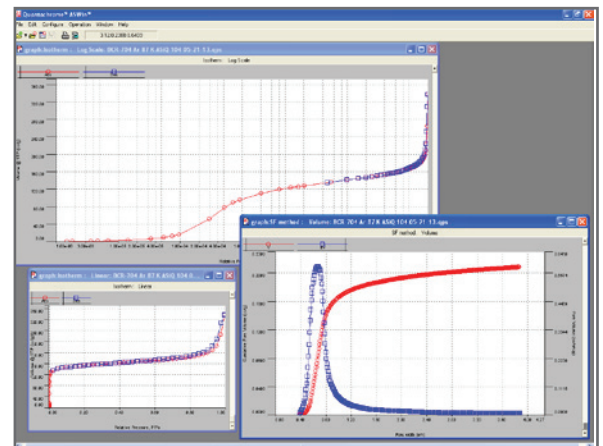
The Autosorb® software is superior for data reduction, incorporating classical methods and the latest DFT (Density Functional Theory) and Monte Carlo models.

The user-friendly software guides you through analysis setup, preprogrammed parameter recall or making settings for operations, data reduction, graphs and report printouts.



► Analysis parameters in Autosorb software

During operation one can view the accumulated data, the isotherm and all associated graphs and analytical results up to that point. After a run, reports and graphs can be archived across local network and/or printed automatically or the operator can use the software to determine the best fitting method, to compare data by overlaying curves or to adjust graph, size, scaling, titles, plot markers and line colors for best print out.

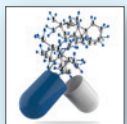
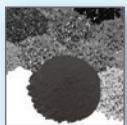
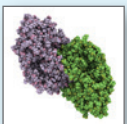


► Multiple graphs to view isotherm and related plots.

Data Presentation

A comprehensive range of surface area and pore size methods is available:

- Adsorption and desorption isotherms.
- Multi and single point BET surface area (including constant and correlation coefficient). Micropore BET assistant uses ISO 9277:2010 method
- Langmuir surface area.
- Mesopore volume and area distribution (BJH and DH methods).
- Standard micropore size distribution - (MP method) and t-method by deBoer, Halsey or carbon black STSA.
- Total pore volume, average pore size and sample density.
- Dubinin-Radushkevich, micropore surface area.
- Horvath-Kawazoe, Dubinin-Astakhov and Saito-Foley micropore distribution.
- Full Density Functional Theory library for unified micro- and mesopore analysis using N₂, Ar and CO₂ on materials such as zeolites, MCM-41, carbons and silicas.
- Monte Carlo based pore size model.
- Fractal dimension by FHH or Neimark - Kiselev models.



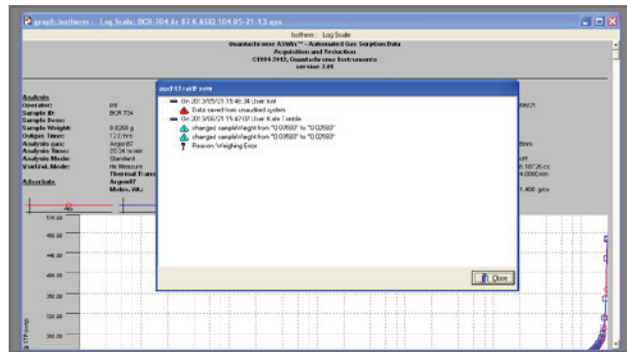
21 CFR Part 11 Software

Includes many features that support these regulations and provide the necessary tools for customer compliance.

ASWin-CFR Software

Functions Relating to System Access, Electronic Signatures and Security.

- Required login with unique user i.d./ full name combination.
- Password aging and forced change.
- Automatic user account expiration and / or manual suspension.
- Selectable minimum i.d. and password length.
- Three user levels gives three privilege levels.
- Access level programmable by administrator level.
- Programmable session time-out (auto log-off through inactivity).
- Tamper resistant binary-encoded data files.
- Data security is established through the closed Autosorb® / ASWin system.
- Data reduction parameters (metadata) used to calculate final results are included as part of the data file.
- "Operator" user level does not have the access privileges to change meta-data.
- Changes to meta-data are reflected in the audit trail.
- Data files acquired by means other than directly from the Autosorb® instrument are flagged as such in the audit trail.



► CFRb Software- Audit Trail.

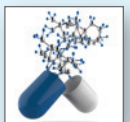
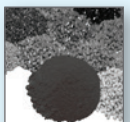
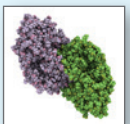
21 CFR Part 11

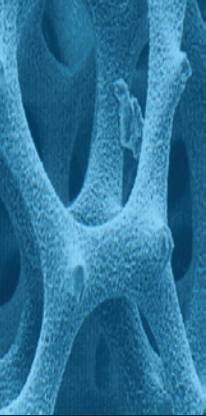
The Autosorb® 6iSA™, when configured for security and used with its 21 CFR Part 11 version of ASWin software, is designed to allow the user to meet the regulatory requirements for electronic records within the pharmaceutical and allied industries as set forth by the US Food and Drug Administration (FDA). The FDA intends to enforce Part 11* compliance under FDA Regulations, the Federal Food, Drug, and Cosmetic Act and the Public Health Service Act as outlined in its 2003 Guidance for Industry "Part 11, Electronic Records; Electronic Signatures — Scope and Application" prepared by the Office of Compliance in the Center for Drug Evaluation and Research (CDER). This version of the Autosorb® 6iSA™ software adopts software design features to allow for easy integration into pharmaceutical and other GLP laboratories.

* Final Rule, Federal Register / Vol. 62, No. 54, pp13429-13466, 1997

Audit Trail Functions & Reporting Features

The audit trail does not obscure previous entries; old and new values are both recorded and visible. The audit trail itself cannot be edited and is included as part of the securely encoded data file it cannot become disconnected. Changes to meta-data require that the user enter a reason, to be in accordance with the underlying predicate record rules, which is then retained as part of the audit trail. The audit trail is included in all human readable formats, screen display, print preview, PDF and hard copy formats. Multiple page report sets are linked by a unique report i.d. generated automatically by ASWin.





Sample Preparation: Degassers

Consistent and reliable surface area and pore size results depend upon proper sample preparation procedures. In terms of B.E.T. analysis, the limitation in throughput is often sample preparation. The complete degassing of samples can often require several hours, while surface area measurements may require as little as 30 minutes.

Quantachrome manufactures several models of degassers to fulfill your sample preparation needs. These degassers provide a virtually continuous supply of properly prepared samples for the AUTOSORB® 6iSA™ Surface Area and Pore Size Analyzer.

XeriPrep™ Degasser



The gold-standard in sample preparation for physisorption analyzers. It provides PC control of all heating zones with individual heating ramps and times. The Built-in cold trap enable efficient removal of condensables at low degassing temperatures and for a clean vacuum. Turbo- pumped version available for rapid high-vacuum degassing.

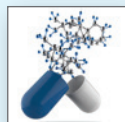
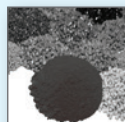
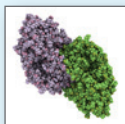
Vacuum pump included.

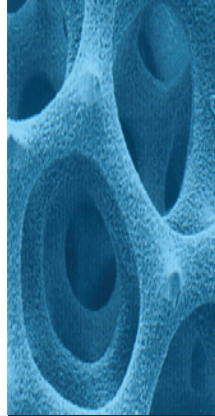
MasterPrep™ Degasser



Fully featured preparation unit. Individually heated stations with programmable heating profiles for R&D, commercial labs and multi-user laboratories. Dual modes (vacuum or flow) for further flexibility and optimization. Temperature control and logging via PC software (included). Integral cooling stations provide additional convenience.

Vacuum pump not included.





Degassers

Flow Degasser



The popular Flow Degasser has the same heating and cooling features as the FloVac but without vacuum capability. Ideal for quality control applications, teaching and start-up labs. Each sample station has its own adjustable flow rate control.

FloVac™ Degasser

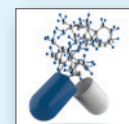
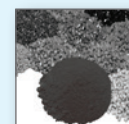
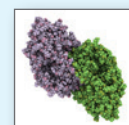


The FloVac provides cost effective vacuum degassing. Complete with single-zone heater (to 400°C), digital temperature controller and built-in digital vacuum gauge. Each sample station has its own adjustable evacuation/backfill rate control. Flow degassing is also possible and can be advantageous in removing large quantities of moisture prior to vacuum degassing. Individual cooling stations.

Vacuum pump not included.

DEGASSERS

| Features | Flow | FloVac™ | MasterPrep™ | XeriPrep™ |
|------------------------------|------------|-----------------|-----------------|---|
| # of Sample Ports ▶ | 6 | 6 | 6 | 6 |
| Heating Zones ▶ | 1 | 1 | 6 (ovens) | 6 (mantles) |
| Maximum Temperature ▶ | 400°C | 400°C | 425°C | 350°C (450°C with optional high temperature mantles for quartz cells) |
| Temperature Control Via PC ▶ | Optional | Optional | Yes | Yes |
| Flow Degas Mode ▶ | Yes | Yes | Yes | No |
| Vacuum Degas Model ▶ | N/A | Yes | Yes | Yes |
| Digital Vacuum Display ▶ | N/A | Yes | Yes | Yes |
| Cold Trap ▶ | N/A | No | No | Yes |
| Vacuum Pump ▶ | N/A | Sold Separately | Sold Separately | Included (turbo pump optional) |
| Valve Type ▶ | Mechanical | Mechanical | Mechanical | Electric solenoid |





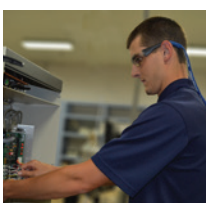
For 45 years, Quantachrome's scientists and engineers have revolutionized measurement techniques and designed instrumentation to enable the accurate, precise, and reliable characterization of powdered and porous materials. We have an unwavering commitment to providing state of the art technology, and unparalleled superior customer service and support. Our commitment to customers is to support you before, during, and after the sale throughout the lifetime of our instruments. This is a big commitment because our products are so robust and reliable that we regularly find many still in use for decades.

Renowned innovator for today's porous materials community.

Quality Function Dependability

The quality of Quantachrome's after sales service support is the reason we are proud to maintain life time relationships with our customers.

Field Service



Our global service staff assure you that Quantachrome Instruments will continue to be the reliable engines of material characterization laboratories. We offer you the flexibility of choosing from service contracts tailored to provide you with the response time, service package, and spare parts discounts that best fit your needs.

Spare Parts



Quantachrome spare parts are certified to work with our instruments. We provide rapid response spare parts orders, and keep large inventories of replacement parts and hardware available.

Application Lab



Our fully equipped, state-of-the-art powder characterization laboratory, LabQMC (www.labqmc.quantachrome.com, qc.lab@quantachrome.com), provides the option of contracting for expert testing services. Laboratory services are also available to validate the applicability of our products prior to your purchase using your actual samples.

Lifetime Application Support



We view the field support of our instruments as an essential component of our business strategy. Our expert scientists are always available to answer questions on applications, or the use of our instruments. We do this as a standard service regardless of whether you have a service contract with us or not.

Partners in Science



Quantachrome has a scientific research department who are world renowned experts in material characterization. Our staff, led by Dr. Matthias Thommes, conduct collaborative research projects with leading material research labs around the world. They regularly publish articles in leading peer reviewed journals, and speak at technical symposiums around the world.

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