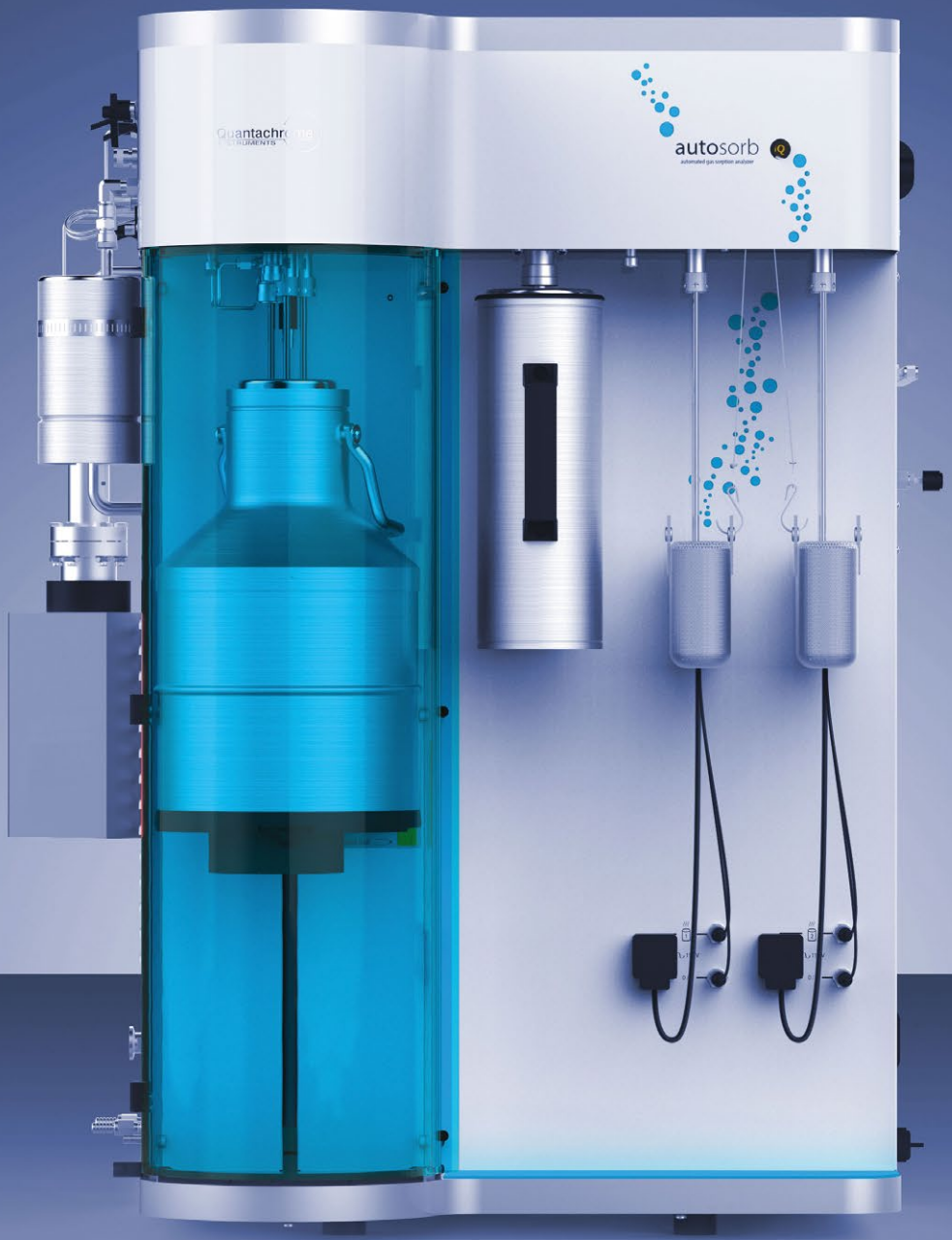
High Vacuum Adsorption Analyzers

Anton Paar

autosorb iQ
Series



autosorb iQ: Your gateway to intelligent particle analysis

autosorb iQ is a flexible automated gas sorption instrument that is capable of determining the specific surface area, active area, pore volume, and pore size distribution of porous solids in compliance with more than 20 ASTM, DIN, and ISO standard test methods.

ACCURATE

Perform the most challenging measurements of non-porous, mesoporous, and microporous materials with accuracy and precision. The autosorb iQ series is capable of measuring pore sizes down to 3.5 Å (0.35 nm) and surface areas down to less than 0.01 m^2/g.

ADAPTABLE

The autosorb iQ series is built on a modular platform designed for customization and upgradeability. Purchase for your laboratory's requirements today, with confidence that the instrument's capabilities can be expanded to meet your future analysis needs. You can choose between 40+ physisorption and chemisorption capable models, upgrade to 2 or 3 analysis stations for increased throughput, and further expand capabilities to include a built-in vapor source, additional gas inputs, and much more.

AUTOSORB

Autosorb has been a trusted name in adsorption science for over 35 years. With 1000+ units installed in 50+ countries and references in 7000+ publications, the autosorb iQ series continues this legacy of accuracy and adaptability relied on by both industry and academia.

Accurate:
Because differences at the angstrom level matter

The **auto**sorb iQ series represents a major leap forward in measurement technology, providing researchers with a highly sophisticated and accurate platform for materials research and development.

HIGH ACCURACY TRANSDUCERS

Low-pressure transducers (0.1 or 1 torr) with an accuracy better than 0.15 % of reading housed in a temperature-monitored chamber form the core of the instrument.

DEDICATED SATURATION PRESSURE STATION

Each instrument in the autosorb iQ series includes a dedicated station to automatically and continuously monitor the saturation pressure of the analysis gas. Continuous saturation pressure measurement is critical for highly accurate pore size measurements and an improvement over instruments with shared transducer designs that only allow periodic measurements of the saturation pressure.

ACTIVE COOLANT LEVEL CONTROL

Coolant level control is critical for accurate and reproducible results when dealing with evaporative coolants like liquid nitrogen. Rather than relying on passive wicking systems or empirical corrections, the autosorb iQ combines a 90+ hour analysis Dewar, coolant level sensor, and responsive elevator in an advanced active coolant level control system that ensures highly sensitive and accurate measurements regardless of analysis time.

ROBUST CONSTRUCTION FOR OPTIMAL VACUUM PERFORMANCE

Metal-to-metal seals in critical measurement zones ensure the integrity of the analysis and the best possible vacuum performance. Micropore (MP) and Extended Range (XR) models feature an internally mounted 90,000 rpm turbo-molecular pump and dry backing pump.

INTEGRATED AND HIGHLY PRECISE SAMPLE PREPARATION

Precisely prepared samples are the foundation of accurate analysis data. Four built-in degassing stations – with access to analysis-quality levels of vacuum through a dedicated cold trap – ensure that even the most difficult microporous samples are properly prepared for analysis. User flexible programming of test protocols, including pressure rise limit and test for completion methods, minimize elutriation and steaming damage to susceptible samples.

Instrument appearance and colors subject to change.

Adaptable:
Because laboratory instruments should expand your research, not hold it back

Available as physisorption-capable (autosorb iQ) or chemisorption-capable (autosorb iQ-C) base models, autosorb iQ instruments have been designed to be the most flexible, versatile, and customizable gas sorption analyzers on the market. Whether you study carbons, ceramics, energy storage materials, pharmaceuticals, or other novel materials, the autosorb iQ series has the tools and configurations to meet your analysis needs.

MULTIPLE ANALYSIS STATION OPTIONS

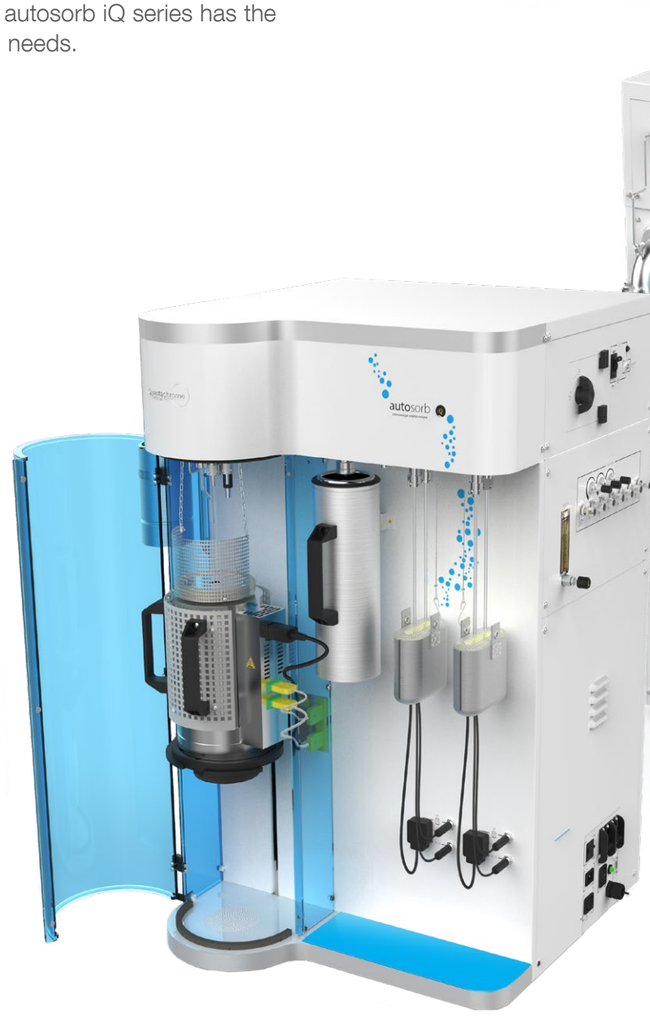
Upgradeable to 2 or 3 analysis stations for increased throughput. Each analysis station can be customized with its own dedicated transducer set, allowing maximum flexibility in analysis conditions without compromising speed or performance.

HEATED MANIFOLD AND VAPOR SORPTION OPTIONS

Upgradeable to include a heated manifold chamber with built-in vapor generator enabling precise measurements in applications by using water and organic vapors.

FLEXIBLE ANALYSIS SETUP

A variety of measurement techniques, such as our DoseWizard method, are included to optimize data point spacing in the measured isotherm. Multiple adsorbate gas inputs allow for seamless and automatic gas switching between or during analyses. Perform advanced analytical techniques that require scanning the isotherm hysteresis loop, or switch between chemisorption and physisorption measurements in minutes.



autosorb iQ-C

autosorb iQ-C with mass spectrometer option

THERMAL CONDUCTIVITY DETECTOR (TCD) AND MASS SPECTROMETER OPTIONS

A built-in TCD or close-coupled mass spectrometer on the autosorb iQ-C models enables fully automatic flow-based experiments, which include temperature-programmed desorption (TPD), oxidation (TPO), and reduction (TPR). An optional built-in loop injector allows for automated pulse titration measurements.

POTENTIAL FOR HIGH CHEMICAL COMPATIBILITY

The high chemical compatibility version features PFE valves, O-rings, and a turbo pump backed by an oil pump for maximum chemical resistance.

21 CFR PART 11 COMPATIBLE SOFTWARE

The autosorb iQ software (ASiQWin) is available in a version that can support your compliance with 21 CFR Part 11 requirements. Software features include multiple user/ access levels, password expiration, incorrect password lockout, audit trail, and more.

MULTIPLE TEMPERATURE CONTROL OPTIONS

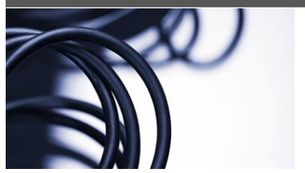
Instruments come with a 90+ hour cryogen Dewar and 1100 °C furnace*. Or they can be paired with external temperature control accessories like a recirculating bath, cryocooler, or our patented CryoSync accessory, which is capable of enabling experiments between 82K and 115K, using only liquid nitrogen.

*autosorb iQ-C models only

Autosorb: Because your particle analysis is too important to leave to anyone else

With references in over 7000 publications and compliance with more than 20 ASTM, DIN, and ISO standards, the autosorb iQ series is relied on by industrial and academic researchers in more than 50 countries. Backed by local support from more than 30 Anton Paar subsidiaries, you can be confident that wherever you are and whatever your application, the autosorb iQ series is the right choice for determining the surface area, active area, pore volume, and pore size distribution of your particles.

SELECTED APPLICATIONS



CARBONS

Optimize the surface area, pore size, and pore volume of activated carbons and carbon blacks to maximize their effectiveness as additives or adsorbents.

CATALYSTS

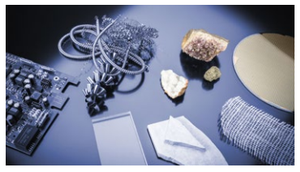
Obtain key performance measures of heterogeneous catalysts and catalyst supports, including their activity, selectivity, stability, and regeneration requirements.

PHARMACEUTICALS

Understand how the exposed surface area of pharmaceutical active and excipient powders affects their dissolution behavior and bioavailability.

GEOLOGICAL SAMPLES

Predict the storage and transport of gases and liquids in underground reservoirs by measuring their pore size distribution and pore volume.



NANOMATERIALS

Characterize the physical properties of novel nanoporous materials such as coordination polymers and metal-organic frameworks.

BATTERIES

Optimize the surface area and porosity of battery raw materials to enhance their charge-carrying capacity, stability, and performance.

METAL POWDERS

Monitor your additive manufacturing process by tracking key indicators like the surface area of the raw metal powder and the extent of sintering.

CERAMICS

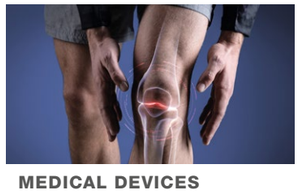
Control the strength, texture, and appearance of ceramics by optimizing the surface area and porosity of the raw and final material.

PLASTICS, RESINS AND RUBBERS

Monitor the surface area of powder additives to understand their impact on the mechanical performance of the final material.

COATING AND PAINTS

Understand how the surface area of a pigment or additive can affect the texture, color, and adhesion properties of the paint or coating.



MEDICAL DEVICES

Control the porosity of implants and biosensors to imitate real tissue and prevent rejection by the body.

ADSORBENTS AND MEMBRANES

Predict the selectivity of your separation process by measuring key performance indicators like the total pore volume and pore size distribution of your adsorbent or membrane.

CAPABILITIES		MP/XR	C-AG	C-MP/C-XR
Total BET surface area	N_2 at 77K	✓	✓	✓
	Kr at 77K	✓		✓
External surface area		✓	✓	✓
Micropore volume/area		✓	✓	✓
Total pore volume		✓	✓	✓
Isosteric heat of adsorption		✓	✓	✓
Adsorption kinetics		✓	✓	✓
Mesopore size distribution (2 nm to 50 nm)		✓	✓	✓
Micropore size distribution (<2 nm)	N_2 at 77K	✓		✓
	CO_2 at 273K	o	o	o
	Ar at 87K	o		o
Thin film pore size distribution (Kr at 87K)		o		o
Water/organic vapor uptake		•	•	•
Strong chemisorption: Reactive metal area, dispersion, crystallite size			✓	✓
Total chemisorption, weak chemisorption, spillover			✓	✓
Acid site surface concentration			✓	✓
Reduction/oxidation temperatures			•	•
Acid site strength distribution: Lewis/Brønsted acid site distribution			•	•
Activation energy			•	•

✓ with minimum required accessories | • with factory/service-installed option | o with user-installed accessory or attachment

SELECTED INTERNATIONAL STANDARDS

ASTM C1274: Advanced ceramics	ASTM D4780: Catalysts and catalyst carriers	ISO 9277: Solids
ASTM C1069: Alumina or quartz	ASTM B922: Metal powders	ISO 15901 (2-3): Solid materials
ASTM D1993: Precipitated silica	ASTM D4365: Zeolites	DIN 66135 (1-4): Particles
ASTM D6556: Carbon black	ASTM D3908: Supported platinum catalysts	USP 846: Pharmaceuticals

Anton Paar
Certified Service

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We are confident in the high quality of our instruments. That’s why we provide **full warranty for three years**.

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All new instruments* include repair for 3 years.
You avoid unforeseen costs and can always rely on your instrument.
Alongside the warranty, we offer a wide range of additional services and maintenance options.

*Due to the technology they use, some instruments require maintenance according to a maintenance schedule. Complying with the maintenance schedule is a prerequisite for the 3-year warranty.

Service and support directly from the manufacturer
Our comprehensive service provides you with the best individual coverage for your investment so that maximum uptime is ensured.

SAFEGUARDING YOUR INVESTMENT
Regardless of how intensively you use your instrument, we help you keep your device in good shape and safeguard your investment – including a 3-year warranty.

THE SHORTEST RESPONSE TIMES
We know that sometimes it’s urgent. That’s why we provide a response to your inquiry within 24 hours. We give you straightforward help from real people, not from bots.

CERTIFIED SERVICE ENGINEERS
The seamless and thorough training of our technical experts is the foundation of our excellent service provision. Training and certification are carried out at our own facilities.

OUR SERVICE IS GLOBAL
Our large service network for customers spans 86 locations with a total of 350 certified service engineers. Wherever you are located, there is always an Anton Paar service engineer nearby.

AUTOSORB IQ SERIES

Physisorption analysis stations	1, 2, or 3
Chemisorption analysis stations (-C models)	1
Construction	Metal-to-metal seals in critical measurement zones Choice of EPDM, Viton, PFE elastomers
Adsorbates	N_2, Ar, Kr, CO_2, O_2, H_2, etc.
Analysis Dewar	3L, 90+ hours (Liquid nitrogen)
Cryogen level control	Active sensor/elevator
Saturation pressure measurement	Dedicated cell with dedicated transducer
Chemisorption furnace (-C models)	Maximum temperature: 1100 °C Ramp rates: 1 °C to 50 °C per minute Furnace cooling by built-in fan
Dosing modes	Target p/p_0 with: - MaxiDose feature (automatically adapts to individual sample’s sorption characteristics) - VectorDose (fixed volumes in multiple ranges) - DoseWizard (uses prior analysis as template)
Void volume modes	Automatically measure and re-measure during analysis, re-use value already measured, helium-free method
1/0.1 Torr transducer accuracy (MP/XR)	< 0.15 % of reading *
Vacuum system (MP/XR)	Turbomolecular drag pump and dry backing pump ultimate vacuum: $5x10^{-10}$ mbar *
p/p_0 Range (XR using nitrogen/argon)	10^{-8} to 0.999
Minimum surface area	0.01 m^2/g **
Minimum pore size	0.35 nm **
Degassing	Four dedicated and built-in degassing ports Operate simultaneously with analysis Up to 450 °C with quartz mantles/glassware Vacuum level monitored with Pirani
Physical and utilities	Width: 699 mm (28 inches) Height: 1035 mm (41 inches) Depth: 705 mm (28 inches) Weight: 148 kg (325 pounds) Electrical: 100 to 240VAC, 50/60Hz, single phase Controller: PC with Windows® 7 or newer, 64-bit compatible software

* Manufacturers' specification | ** Dependent on analysis gas and temperature

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