AMI-Meso 400 Series

BET Surface Area and Pore Size Analyzer

"Accurate, Accessible, Advanced Gas Sorption"

Range of Pore Diameter
0.35 – 500 nm

Range of Specific Surface Area
> **0.0005 m^2/g**

Repeatability of Median Pore Diameter
< 0.02 nm

Repeatability of Specific Surface Area
±1%

- Adsorption and desorption isotherms
- Single-/Multipoint BET Surface Area
- Langmuir surface area
- Pore size distribution according to BJH
- Dubinin-Radushkevich
- Horvath-Kawazoe
- Saito-Foley
- t-plot

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INTRODUCTION

The **AMI-Meso 400** is a compact, high-performance sorption analyzer designed for the precise characterization of mesoporous and macroporous materials. Equipped with four fully independent analysis stations, it enables the determination of BET surface area, total pore volume, and pore size distribution with maximum efficiency.

Each analysis station features an individual dosing volume, allowing fully autonomous operation with independent programming and initiation at any time—eliminating downtime between analyses. This design ensures highly reproducible results and optimized throughput.

The **AMI-Meso 400** supports a wide range of non-corrosive adsorptive gases, including N_2, CO_2, Ar, Kr, H_2, O_2, CO, NH_3, and CH_4, providing exceptional flexibility for various research and industrial applications. Additionally, all four stations function as in-situ degassing units, enabling efficient sample preparation within the same system.

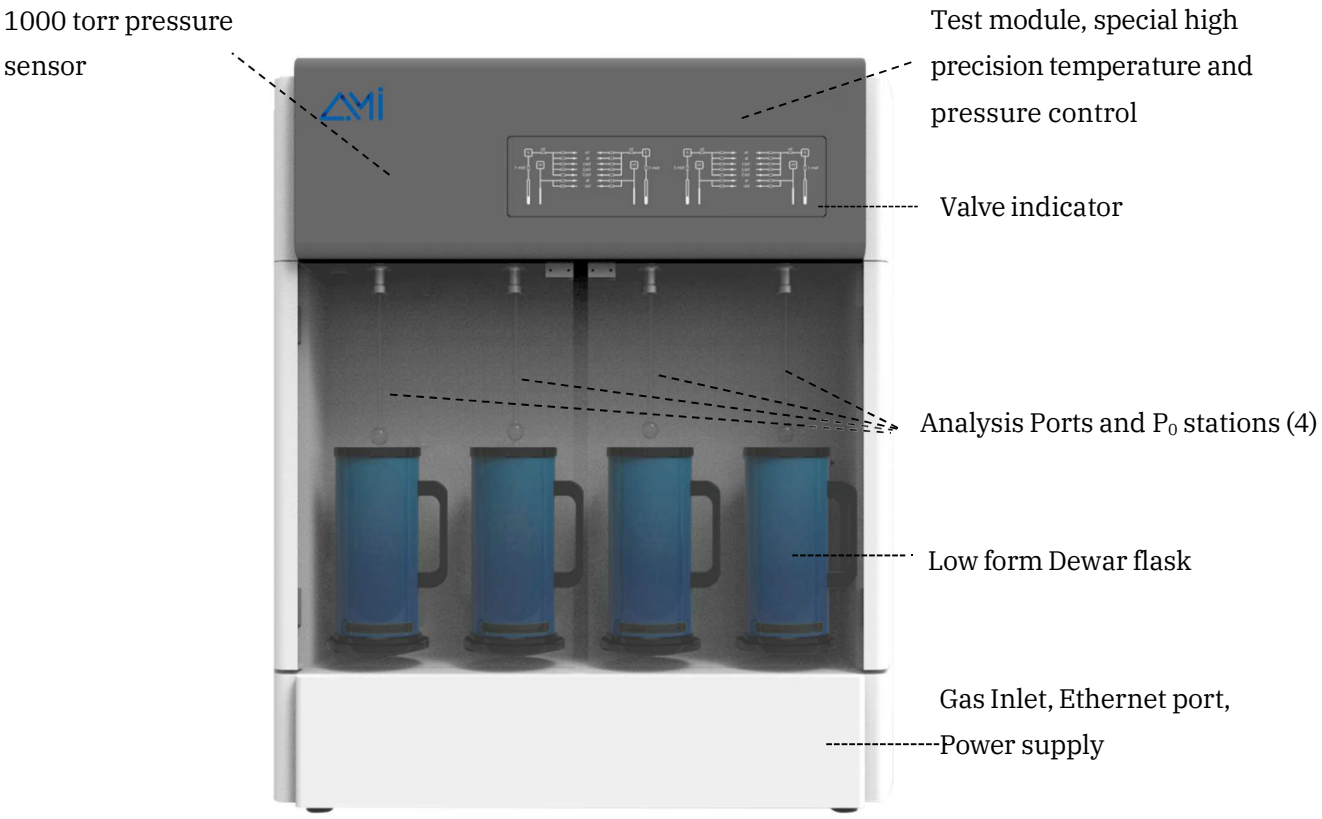


*Fig.1 Structural diagram of **AMI-Meso 400** Series*

FEATURES

Module Design for Minimal Dead Volume
The internal gas path design of the instrument adopts a unique integrated metal module design, which not only reduces the internal dead volume space but also helps mitigate possible leaks.

Saturated Vapor Pressure P_0
An independent P_0 pressure transducer is configured at 133 kPa for P_0 value testing, enabling real-time P/P_0 measurement for more accurate and reliable test data. Alternatively, an atmospheric pressure input method can be used to determine P_0.

Independent analysis ports
With independent analysis ports, the system employs a unique vacuum control logic that allows each station to operate without disruption, even when using a single mechanical pump or pump group. This enables simultaneous, independent experiments, meeting diverse adsorbent testing needs while ensuring high efficiency.

Thermal Stabilization
A core rod in the sample tube reduces dead volume and stabilizes the cold free space coefficient, while an iso-thermal jacket maintains a constant thermal profile along the tube. Additionally, automatic helium correction ensures precise calibration for any powder or particulate material, minimizing temperature- related deviations during analysis.

High Accuracy Pressure Transducers
Equipped with 1000 Torr pressure transducers, the Meso Series enables precise physical adsorption analysis, achieving a partial pressure (P/P_0) as low as 10^{-2} for nitrogen (N_2) at 77 K.

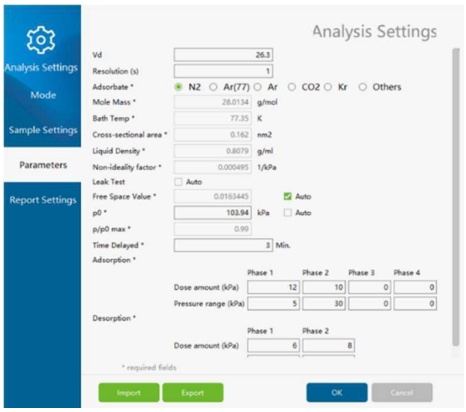
Optimized Manifold Contamination Control
This system features a multi-channel, adjustable, and parallel vacuum design with segmented vacuum control. This setup effectively prevents samples from being drawn up into the analyzer therefore preventing manifold contamination.

Liquid Nitrogen Dewar
The use of 1 L Dewar flasks in conjunction with a sealed cover ensures a stable thermal profile along the entire length of both the sample tubes and P_0 tubes throughout the testing process.

Sample Preparation
Equipped with four in-situ degassing ports, enabling simultaneousdegassing and analysis. Each port offers independent temperaturecontrol from ambient to 400°C, ensuring precise sample preparation.

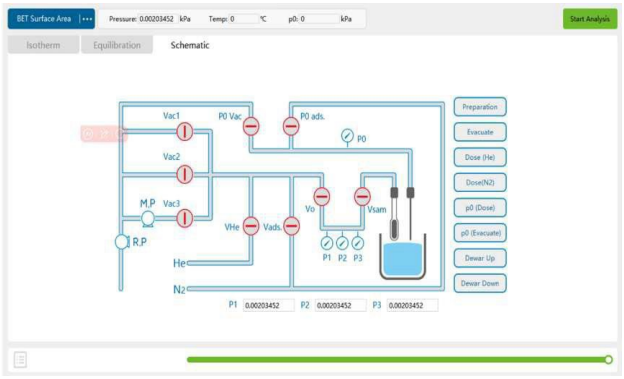
SOFTWARE

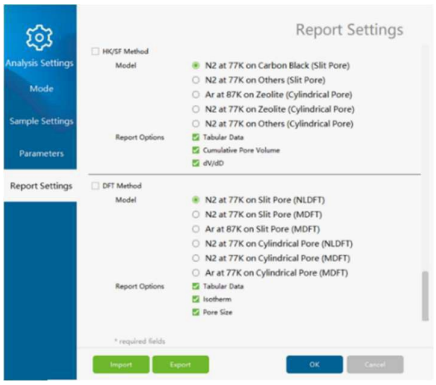
PAS Software is an intelligent solution for operation control, data acquisition, calculation, analysis, and report generation on the Windows platform. It communicates with the host via the LAN port and can remotely control multiple instruments simultaneously.



PAS Software adopts a unique intake control method, optimizing pressure in the adsorption and desorption processes through a six-stage setting, which improves testing efficiency.

Each adsorption equilibrium process is dynamically displayed on the test interface. Adsorption characteristics of the sample can be easily understood.





Changes in pressure and temperature inside the manifold can be directly observed in the test interface, providing convenience for sample testing and instrument maintenance. The current state of analyzer can be intuitively understood with the indicator light and event bar.

A clear and concise report setting interface, including the following:

- Adsorption and desorption isotherms
- Single-/Multipoint BET surface area
- Langmuir surface area
- STSA-surface area
- Pore size distribution according to BJH
- T-plot
- Dubinin-Radushkevich
- Horvath-Kawazoe
- Saito-Foley

TYPICAL ANALYSIS RESULTS

The specific surface area test results of iron ore powder are presented in the figure below. As a material with very small specific surface area, the repeatability error is only 0.0015 m²/g in the test results.

ID	Pd	Pcd	P/Po	V	R	Time
2	10.57665	6.49165	0.06368	0.05149	1.32095	16:39:04
3	14.47043	10.49325	0.10300	0.05714	2.00944	16:40:34
4	20.49214	15.55271	0.15266	0.06328	2.84716	16:42:08
5	26.25142	20.97835	0.20608	0.06958	3.73044	16:43:45
6	31.09524	26.11512	0.25661	0.07540	4.57787	16:45:24
7	36.24625	31.26206	0.30719	0.08122	5.45905	16:47:06

Slope	Intercept	Vm	C	Cc
16.90313	0.25562	0.05828	67.12578	0.99997

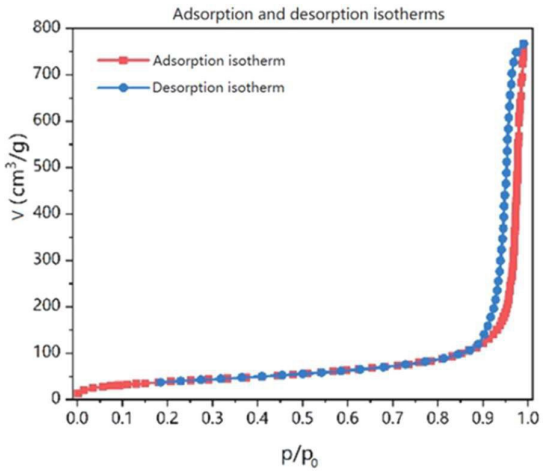
Specific surface area (m2/g): 0.25410

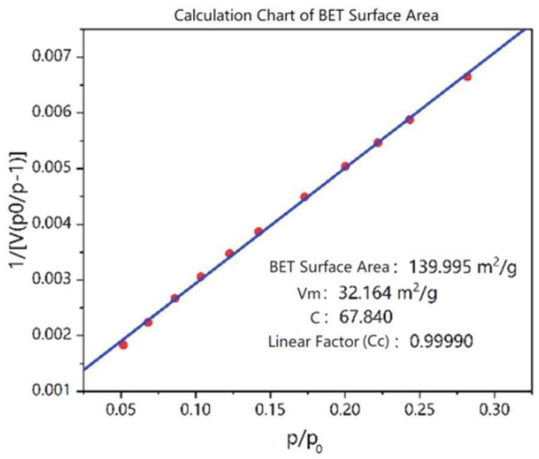
ID	Pd	Pcd	P/Po	V	R	Time
2	11.12797	7.02669	0.06872	0.05193	1.42099	14:21:24
3	15.08480	11.06897	0.10834	0.05767	2.10708	14:22:55
4	21.71276	16.45800	0.16109	0.06420	2.99078	14:24:29
5	27.29098	21.94468	0.21492	0.07083	3.86529	14:26:07
6	32.00053	27.05703	0.26512	0.07653	4.71376	14:27:46
7	37.32853	32.26907	0.31619	0.08262	5.59644	14:29:28

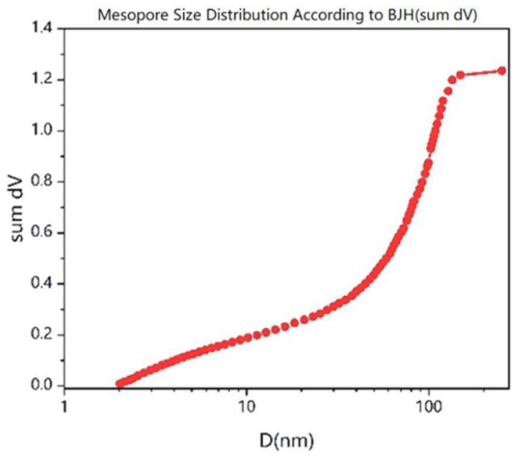
Slope	Intercept	Vm	C	Cc
16.78425	0.27576	0.05862	61.86487	0.99996

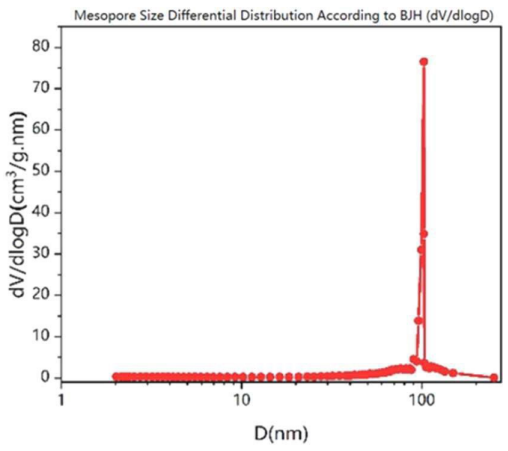
Specific surface area (m2/g): 0.25557

Analysis value of BET Surface area, pore size distribution, and pore volume in amorphous silica as follows:









APPLICATIONS

Applied Field	Typical Materials	Details
Material Research	Ceramic powder, metal powder, nanotubes	According to the surface area value of the nanotube, hydrogen storage capacity can be predicted.
Chemical Engineering	Carbon black, amorphous silica, zinc oxide, titanium dioxide	Introduction of carbon black in rubber matrix can improve mechanical properties of rubber products. Surface area of carbon black is one of the important factors affecting the reinforcement performance of rubber products.
New Energy	Lithium cobalt, lithium manganate	Increasing the surface area of the electrode can improve the Electrochemical reaction rate and promote iron exchange in the negative electrode.
Catalytic Technologies	Active alumina oxide, molecular sieve, zeolite	Active surface area and pore structure influence reaction rate.

SPECIFICATIONS

Model	AMI Meso 400
Analysis Ports	4
P_0 Transducer	4
Analysis Pressure Transducer	4
Accuracy Pressure Transducers	1000 torr
Pump	1 mechanical pumps (ultimate vacuum 10^{-2} Pa)
P/P_0	10^{-4} - 0.998
Surface Area	≥ 0.0005 m^2/g, test repeatability: RSD ≤ 1.0%
Pore Size	0.35-500 nm, test repeatability: ≤0.02 nm
Pore Volume	≥ 0.0001 cm^3/g
Degassing Ports	4 in-situ
Adsorbates	N_2, CO_2, Ar, Kr, H_2, O_2, CO, CH_4, etc.
Cold Trap	1
Volume and Weight	L 38.5 in (980 mm) × W 25.0 in (630 mm) × H 38.5 in (976 mm), 176-199 lbs (90 kg)
Power Requirements	110V or 200-240 VAC, 50/60 Hz, maximum power 300 W