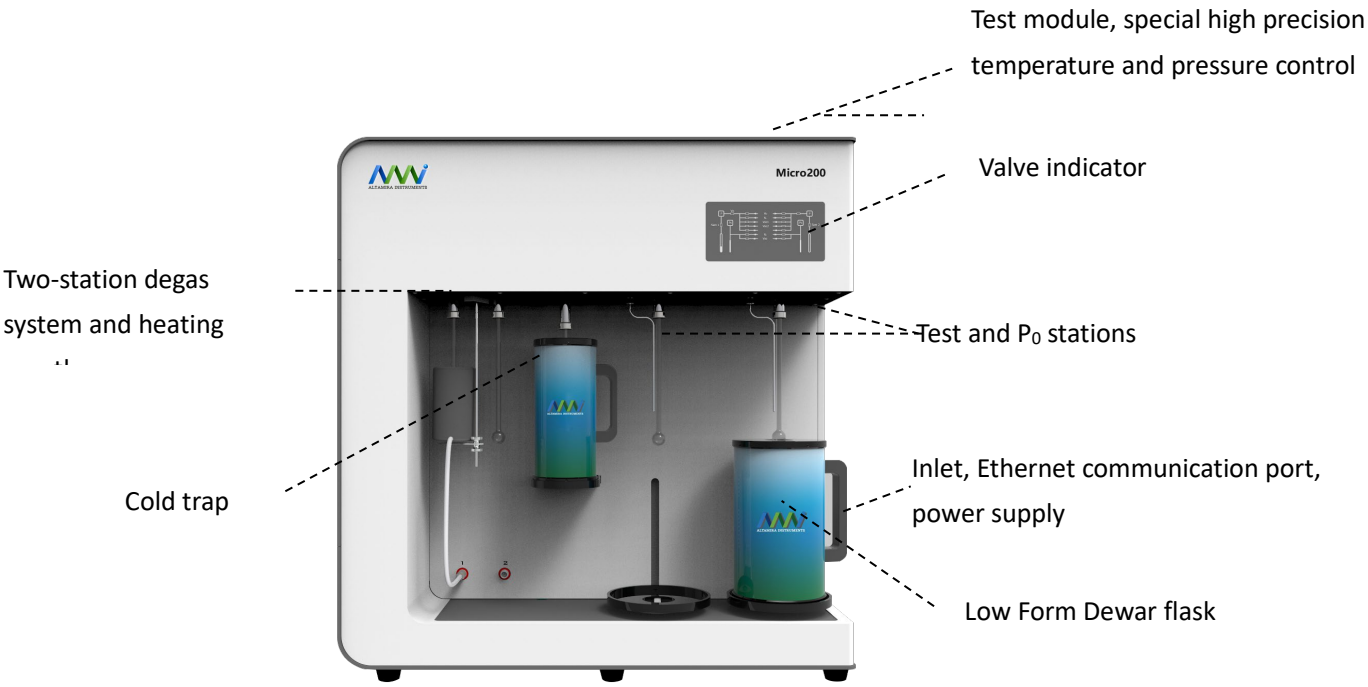
ALTAMIRA INSTRUMENTS

BET Surface Area and Pore Size Analyzer

AMI 200 Series

The AMI Micro 200 Series can accurately produce surface area and pore size results of powder materials. These instruments are divided into three types: A, B, and C, and the C type is configured with 1 torr or 0.1 torr high-sensitive pressure sensors and a turbo molecular pump with ultimate pressure of 10^{-8} Pa. The C series can effectively perform an analysis of microporous materials such as: molecular sieve, catalyst, activated carbon, and other microporous materials.



AMI Micro

Range of Pore Diameter	Range of Specific Surface Area	Repeatability of Median Pore Diameter	Repeatability of Specific Surface Area
0.35 – 500 nm	**> 0.0001 m^2/g**	**< 0.02 nm**	**±1%**

Features

Test Module

Internal temperature of the test module can be controlled through Real-time monitoring, ensuring accuracy of adsorption detection.

Saturated Vapor Pressure P_0

By using an independent P_0 pressure sensor this guarantees the reliability of experimental data. Atmospheric pressure input method to determine P_0 can also be selected.

Vacuum System

The vacuum system is a multi-channel, adjustable, and parallel vacuum system. Vacuum degree can be controlled. This design prevents the sample from being pumped into analyzer.

Sample Preparation System

In addition to two pretreatment stations, the other two analysis stations can be used in preparing samples. There is no interference between pretreatment stations and analysis stations.

Degas temperature can be set individually and controlled from ambient to 400 °C.

Micropore Distribution

Accurately apply the HK method, SF method and other micropore analysis models, the deviation of micropore is less than 0.02 nm.

Pressure Sensor

The Micro 200C with 1torr (selectable 0.1torr) makes the partial pressure of P/P_0 to 10^{-7} - 10^{-8} (N_2/77K).

Cold Free Space

Cold free space can be corrected by Helium automatically, ensuring accuracy of test results.

This calibration method is suitable for testing of any powder or particle material.

Control of Liquid Nitrogen level

Using high volume (3L) Dewar flasks with cover ensures a constant thermal profile along the length of sample and P_0 tubes throughout the testing process.

Turbo Molecular Pump

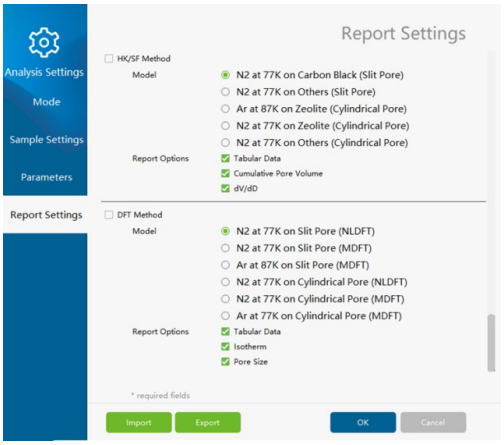
Molecular pump is a standard configuration part on the Micro 200C. The ultimate pressure is down to 10^{-8} Pa, providing for micropore analysis in the ultra-low pressure. The smallest micro-pore diameter that can be tested is 0.35 nm.

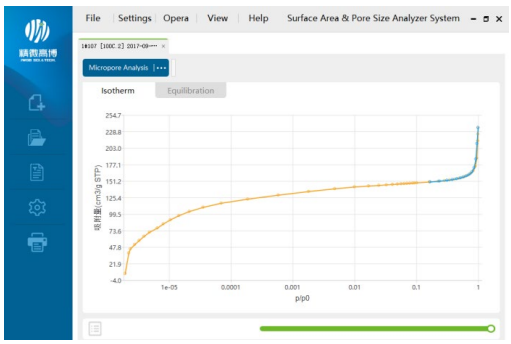
PAS Control and Analysis Software

The PAS Software is for operational control, data acquisition, calculation and analysis, and report generation on a Windows platform. This software can communicate with the host through the LAN port and remotely control several instruments at the same time.

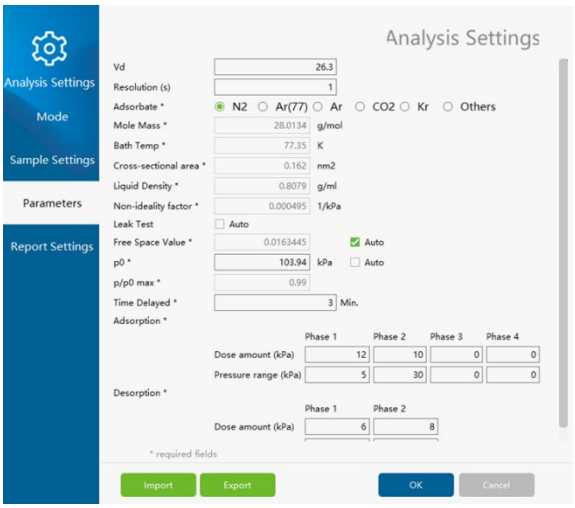
Clear tabular reports include:

- Adsorption and desorption isotherms
- Single-/Multipoint BET surface area
- Langmuir surface area
- STSA-surface area
- pore size distribution according to BJH
- t-plot





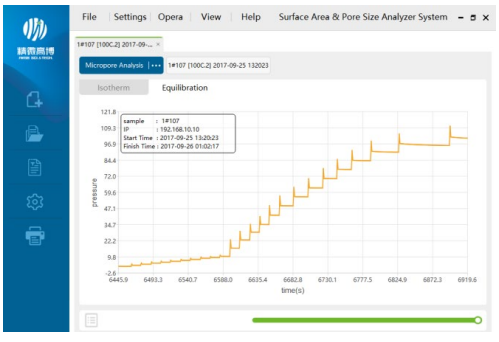
The PAS Software adopts a unique intake control method, the pressure in adsorption and desorption process is optimally set in six-stages; this flexible design is helpful for improving test efficiency.



Changes of the pressure and temperature inside the manifold can be observed directly in the test interface.

Current state of analyzer can be observed with the indicator panel and the event bar.

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



Typical analysis examples

BET repeatability is only 0.0015 m^2 / g in the test of very low surface area powder

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

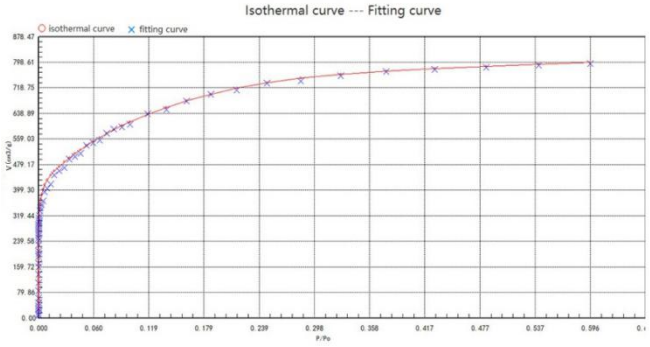
Specific surface area (m2/g): 0.25410

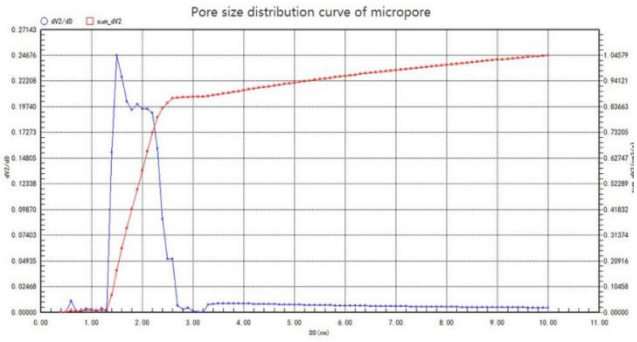
ID	Pd	Pcd	P/Po	V	R	Time
2	11.12797	7.02669	0.06872	0.05193	1.42099	14:21:24
3	15.08480	11.06897	0.10834	0.05767	2.10708	14:22:55
4	21.71276	16.45800	0.16109	0.06420	2.99078	14:24:29
5	27.29098	21.94468	0.21492	0.07083	3.86529	14:26:07
6	32.00053	27.05703	0.26512	0.07653	4.71376	14:27:46
7	37.32853	32.26907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

Slope	Intercept	Vm	C	Cc
16.78425	0.27576	0.05862	61.86487	0.99996

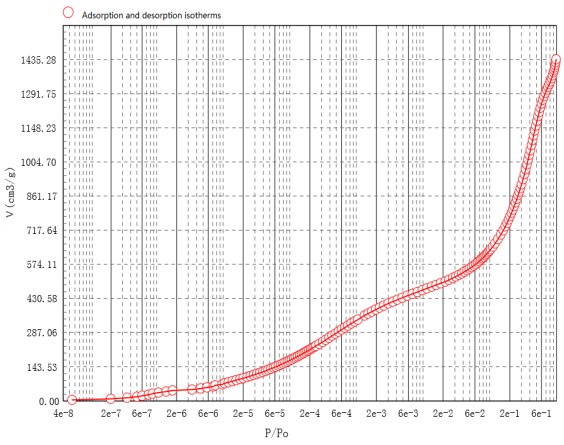
Specific surface area (m2/g): 0.25557

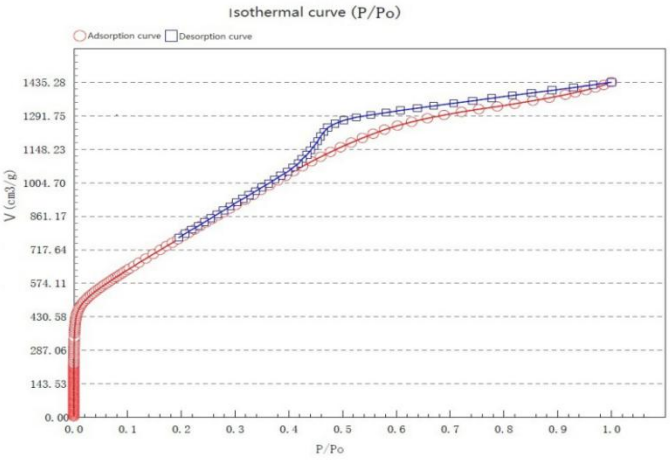
Analysis value of pore size distribution in activated carbon materials as follows:





Microporous analysis Report of carbon materials as below:





Specifications

Type	Meso 200A	Micro 200B	Micro 200C
Adsorbed Gas	Non corrosive gases, such as N_2, Ar, Kr, H_2, O_2, CO_2, CO, NH_3, CH_4, etc.		
Sensor at Analysis Station	2-1000 torr	2-1000 torr; 1-10 torr (optional 2); 1 torr (or 0.1torr), optional 1	2-1000 torr;2-10 torr; 2-1 torr (0.1torr can be selected),
	Accuracy: ±0.15% (F.S.)		
Sensor at P_0 Station	2-1000 torr (Accuracy: ±0.15% (F.S.)		
Degas System	2 station vacuum with heating; Samples on analysis ports can also be degassed		
Degas Temperature	Ambient to 400 °C. Free to pick setpoint		
Cold Trap	1		
Vacuum Pump	Two-stage rotary vane mechanical vacuum pump, the ultimate vacuum is $6.7*10^{-2}$ Pa	Two-stage rotary vane mechanical vacuum pump, the ultimate pressure is $6.7*10^{-2}$ Pa, optional turbo molecular pump	Turbo molecular pump (ultimate vacuum 10^{-8} Pa) and mechanical vacuum pump
Analysis Port	Samples on the 2 analysis ports can be tested simultaneously (including P_0 test).		
Test Principle	Gas adsorption by static-volumetric analysis		
Measurement Range of BET Surface Area	0.0005 m^2/g to the infinity; Standard sample repeat accuracy is less than ± 1.0%	0.0001m^2/g to the infinity; Standard sample repeat accuracy is less than ± 1.0%	0.0001m^2/g to the infinity; Standard sample repeat accuracy is less than ± 1.0%
Test Range of Pore Diameter	0.35 nm-500 nm; Repeatability of pore size is less than 0.2 nm in the accurate analysis of porous materials which size is more than 2 nm	0.35 nm-500 nm; Repeatability of pore size is less than 0.2 nm in the accurate analysis 0.35 nm-2 nm micropore.	0.35 nm-500 nm; Repeatability of pore size is less than 0.2 nm in the accurate analysis 0.35 nm-2 nm micropore.
Pore Volume	0.0001 cm^3/g - minimum		
Relative P/P_0	10^{-5}-0.998	$10^{-6}/10^{-8}$-0.998	10^{-8}-0.998
Overall Dimension	Depth: 34''; width: 23''; height: 35''; weight: 190lbs		
Room Conditions	Temperature: 15-40 °C, Related Humidity: 30-60%		
Electrical Supply	AC110-220 V ± 20 V, 50/60 HZ, maximum power 300W;		

Applications

Applied Field	Typical Materials
Material Research	ceramic powder, metal powder, nanotube
Chemical Engineering	carbon black, amorphous silica, zinc oxide, titanium dioxide
New Energy	lithium cobalt, lithium manganate
Catalytic Technologies	active alumina oxide, molecular sieve, zeolite

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