

# SAPSA-3100

## BET Surface Area and Pore Size Analyzer



EPCC / PRODUCTS / APPLICATION / SOFTWARE / ACCESSORIES / CONSUMABLES / SERVICES

**Analytical Technologies Limited**

An ISO 9001 Certified Company

[www.analyticalgroup.net](http://www.analyticalgroup.net)

►► **Outline**

The SAPSA 3100 Series can accurately produce surface area and pore size results of powder materials. According to the different test functions, this series of instruments are divided into three types, there are A, B, and C, the C type is configured with 1 torr or 0.1 torr high-sensitive pressure sensors and turbo molecular pump with ultimate pressure of 10<sup>-8</sup> Pa, it can effectively take microporous analysis of microporous materials such as molecular sieve, catalyst, activated carbon, and other microporous materials.



Structural distribution diagram



## ►► Features

### Test Module

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

### Saturated Vapor Pressure P0

Using independent P0 pressure sensor for P0 value by inching test, guarantees the reliability of experimental data. Atmospheric pressure input method to determine P0 also be selected.

|            |        |     |                               |
|------------|--------|-----|-------------------------------|
| p0 *       | 103.94 | kPa | <input type="checkbox"/> Auto |
| p/p0 max * | 0.99   |     |                               |

### Vacuum System

It's a multi-channel, adjustable, and parallel vacuum system. Vacuum degree of this system can be controlled in segments. This design prevents the sample from being pumped into analyzer. Meanwhile, a delicate part was designed for ensuring cleanliness of vacuum system, minimizing dust pollution.

### 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 model, the aperture deviation of micropore is less than 0.02 nm.

### Pressure Sensor

1torr (selectable 0.1torr) makes the partial pressure of P/P0 up to  $10^{-7}$  -  $10^{-8}$  (N2/77K) in the physical adsorption analysis.

### 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 and working with the seal cover assure a constant thermal profile along the length of sample tubes and P0 tubes throughout testing process.

### Turbo Molecular Pump

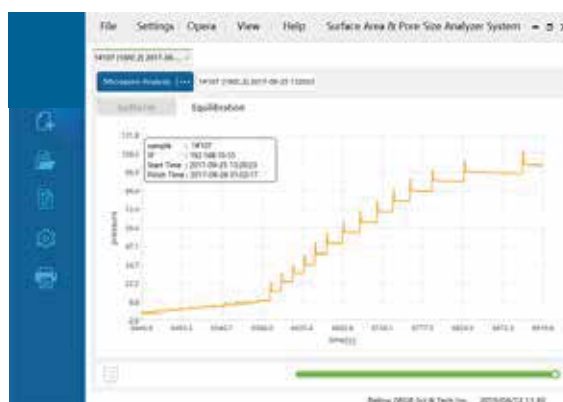
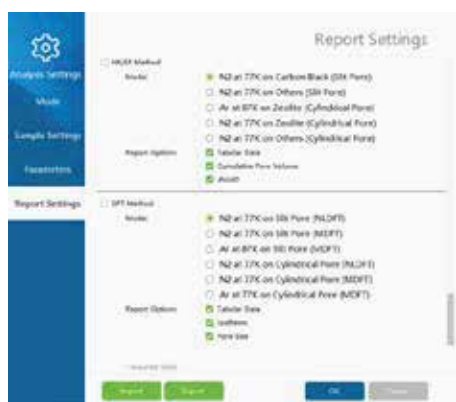
Molecular pump is a standard configuration part on the Micro 100C. The ultimate pressure is up to  $10^{-8}$  Pa, providing a strong support for micropore analysis in the ultra-low pressure. The smallest micro-pore diameter can be tested is 0.35 nm.

## ►► Control and Analysis Software

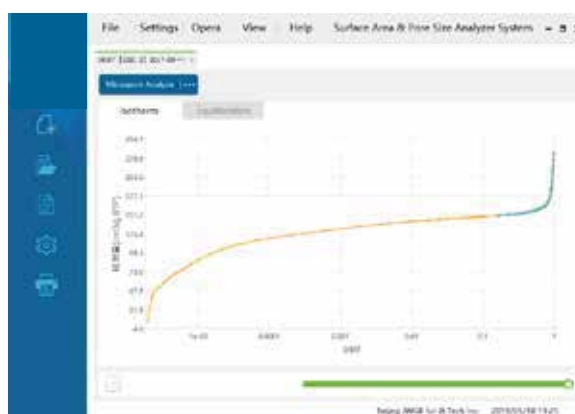
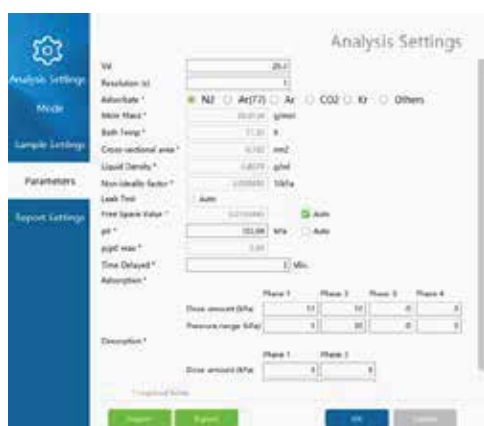
Software is intelligent software in operation control, data acquisition, calculation and analysis and report generation on the Windows platform. This software can communicate with the host through the LAN port and remotely control many instruments at the same time.

### 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
- Dubinin-Radushkevich
- Horvath-Kawazoe
- Saito-Foley



Software adopts a unique intake control method, the pressure in adsorption and desorption process is optimally set in six-stage; 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 which is convenient for sample test and instrument maintenance.

Current state of analyzer can be intuitively understood with the indicator light and 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<sup>2</sup>/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 | 2.09944 | 16:40:34 |
| 4  | 20.49214 | 15.55271 | 0.15266 | 0.06329 | 2.84716 | 16:42:08 |
| 5  | 26.25142 | 20.97835 | 0.20608 | 0.06958 | 3.73041 | 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 | V <sub>m</sub> | C        | C <sub>c</sub> |
|----------|-----------|----------------|----------|----------------|
| 16.90313 | 0.25562   | 0.05828        | 67.12578 | 0.99997        |

Specific surface area (m<sup>2</sup>/g): 0.25410

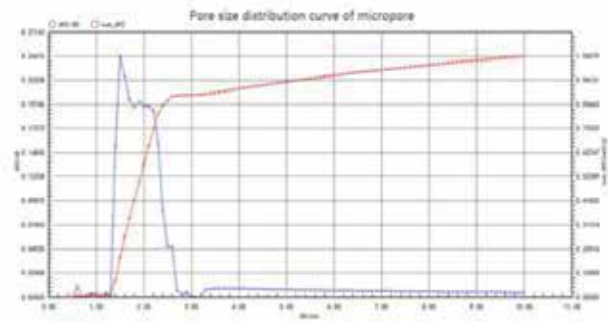
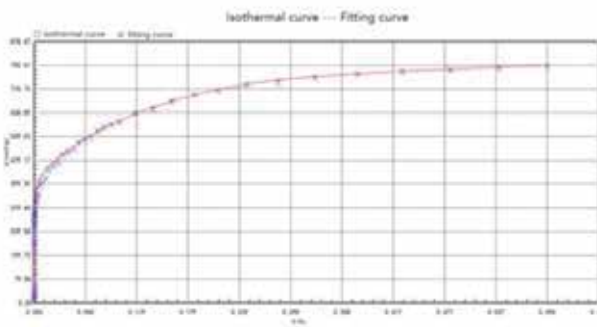
| ID | Pd       | Pcd      | P/Po    | V       | R       | Time     |
|----|----------|----------|---------|---------|---------|----------|
| 2  | 11.12797 | 7.02669  | 0.06872 | 0.05193 | 1.42099 | 14:21:24 |
| 3  | 15.08180 | 11.06897 | 0.10834 | 0.05767 | 2.10708 | 14:22:55 |
| 4  | 21.71276 | 16.45800 | 0.16109 | 0.06420 | 2.99078 | 14:24:39 |
| 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 |

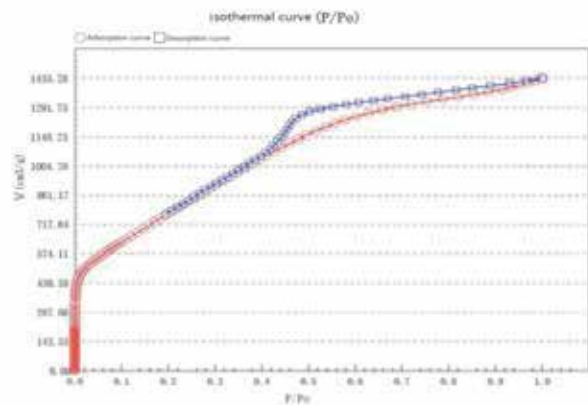
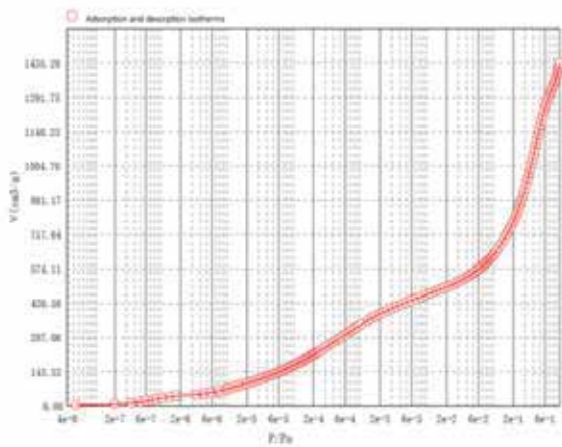
| Slope    | Intercept | V <sub>m</sub> | C        | C <sub>c</sub> |
|----------|-----------|----------------|----------|----------------|
| 16.78425 | 0.27576   | 0.05862        | 61.86487 | 0.99996        |

Specific surface area (m<sup>2</sup>/g): 0.25557

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



Microporous analysis Report of carbon materials as below:



## ►► Specifications

| Feature   | 3100A  | 3100B   | 3100C  |
|---|--|---|--|
| <b>Adsorbed Gas</b>                               | Non corrosive gases, such as N <sub>2</sub> , Ar, Kr, H <sub>2</sub> , O <sub>2</sub> , CO <sub>2</sub> , CO, NH <sub>3</sub> , CH <sub>4</sub> , etc. |   |  |
| <b>Pressure Sensor at Analysis Station</b>        | 1000 torr, 2   | 1000 torr, 2;   | 1000 torr,<br>10 torr, 1 torr (0.1torr Optional)                               |
|   | Accuracy: ±0.15% (F.S.)  |   |  |
| <b>Pressure Sensor at P0 Station</b>              | 1000 torr,2<br>(Accuracy: ±0.15% (F.S.))   |   |  |
| <b>Degas System</b>                               | Two ectopic sample preparation ports;<br>(Analysis station supports in situ sample preparation)  |   |  |
| <b>Degas Temperature</b>                          | Ambient to 400 °C. Free to set up target temperature.  |   |  |
| <b>Cold Trap</b>                                  | 1  |   |  |
| <b>Vacuum Pump</b>                                | Two-stage rotary vane mechanical vacuum pump, the ultimate pressure is 6.7*10 <sup>-2</sup> Pa   |   | Turbo molecular pump (trimate vacuum 10-8 Pa) and front mechanical vacuum pump |
| <b>Analysis Port</b>                              | Samples on the 2 analysis bits can be tested alternately (including P0 test).  |   |  |
| <b>Test Principle</b>                             | Gas adsorption by static-volumetric analysis   |   |  |
| <b>Measurement Range of Specific Surface Area</b> | 0.0005 m <sup>2</sup> /g to the infinity;<br>Standard sample repetition is less than ± 1.0%  |   |  |
| <b>Test Range of Pore</b>                         | 0.35 nm-500 nm;  | 0.35 nm-500 nm;   | 0.35 nm-500 nm;  |
| <b>Diameter</b>                                   | Is less than 0.2 nm in the accurate analysis of porous materials which size is more than 2 nm  | is less than 0.2 nm in the accurate analysis 0.7 nm-2 nm micropore. | is less than 0.2 nm in the accurate analysis 0.35 nm-2 nm micropore            |
| <b>Minimum Pore Volume</b>                        | 0.0001 cm <sup>3</sup> /g  |   |  |
| <b>Range of Relative Pressure P/P0</b>            | 10 <sup>-5</sup> -0.998  | 10 <sup>-6</sup> -0.998   | 10 <sup>-8</sup> -0.998  |
| <b>Overall Dimension</b>                          | Depth: 870 mm; width: 570 mm; height: 890 mm; weight: 80 Kg -90 Kg   |   |  |
| <b>Ambient Temperature</b>                        | 15-40 °C   |   |  |
| <b>Related Humidity</b>                           | 30%-60%  |   |  |
| <b>Electrical Supply</b>                          | AC220 V ± 20 V, 50/60 HZ, maximum power 300W;  |   |  |

## ►► Applications

| Applied Field                 | Typical Materials  | Details  |
|-------------------------------|--|--|
| <b>Material Research</b>      | ceramic powder, metal powder, nanotube                       | According to surface area value of nanotube, hydrogen storage capacity can be predicted.   |
| <b>Chemical Engineering</b>   | 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. |
| <b>New Energy</b>             | lithium cobalt, lithium manganate                            | Increasing surface area of electrode can improve Electrochemical reaction rate and promote iron exchange in negative electrode.  |
| <b>Catalytic Technologies</b> | active alumina oxide, molecular sieve, zeolite               | Active surface area and pore structure influence reaction rate.  |



## HPLC Servicing, Validation, Trainings and Preventive Maintenance :

**HPLC Servicing** :HPLC Servicing : We have team of service engineers who can attend to any make of HPLC promptly @the most affordable cost.

**Trainings** :We also take up preventive Maintenance to reduce downtime of HPLC's Trainings.

**AMC's/CMC** :AMC's/CMC :We offer user training both in-House and at customer sites on HPLC principles, operations, trouble-shooting.

**Validations** :Validations :We have protocols for carrying out periodic Validations as per GLP/GMP/USFDA norms.

**Instruments** :Instruments :We offer instruments/Renting Services Modules like pumps,detector etc. on Rent.



## About Analytical Technologies

Analytical Technologies is synonymous for offering technologies for doing analysis and is the Fastest Growing Global Brand having presence in at least 96 countries across the global. Analytical Technologies Limited is an ISO:9001 Certified Company engaged in Designing, Manufacturing, Marketing & providing Services for the Analytical, Chromatography, Spectroscopy, Bio Technology, Bio Medical, Clinical Diagnostics, Material Science & General Laboratory Instrumentation. Analytical Technologies, India has across the Country operations with at least 4 Regional Offices, 6 Branch Offices & Service Centers. Distributors & Channel partners worldwide.

## Our Products & Technologies



UV/VIS  
Spectro 2080+  
Double Beam



Infra FTIR



Optima Gas  
Chromatograph  
3007



Optima Gas  
Chromatograph  
2979 Plus



Flash  
Chromatograph



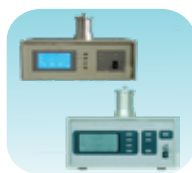
Atomic Absorption  
Spectrophotometer



Liquid Partical  
Counter



Optical Emission  
Spectrophotometer



DSC/TGA



Semi Auto Bio  
Chemistry Analyzer



HEMA 2062  
Hematology  
Analyzer



Micro Plate  
Reader/Washer



URINOVA 2800  
Urine Analyzer



Total Organic  
Carbon 3800



Fully Automated  
CLIA



NOVA-2100  
Chemistry Analyzer



PCR/Gradient PCR/  
RTPCR



TOC  
Analyzer



Laser Particle  
Size Analyzer



Ion Chromatograph



Water purification  
system



## Regulatory compliances



## Corporate Social Responsibility

Analytical Foundation is a nonprofit organization (NGO) found for the purpose of:



**Analytical**  
**Foundation**

1. Research & Innovation Scientist's awards/QC Professional Award : Quality life is possible by innovation only and the innovation is possible by research only, hence ANALYTICAL FOUNDATION is committed to identify such personalities for their contributions across various field of Science and Technology and awarding them yearly. To participate for award, send us your details of research / testing / publication at [Info@analyticalfoundation.org](mailto:Info@analyticalfoundation.org)

2. Improving quality of life by offering YOGA Training courses, Work shops/Seminars etc.

3. ANALYTICAL FOUNDATION aims to DETOXIFY human minds,souls and body by means of yoga, Meditation, Ayurveda, Health Care, Awards, Media, Events, Camps etc.

## Reach us @



HPLC Solutions MultipleLabs Analytical Bio-Med Analytical Distributors Analytical Foundation (Trust)

**Corporate & Regd. Office:**  
Analytical House, # E67 & E68,  
Ravi Park, Vasna Road, Baroda,  
Gujarat 390 015. INDIA

T: +91 265 2253620  
+91 265 2252839  
+91 265 2252370  
F: +91 265 2254395

E: [info@hplctechnologies.com](mailto:info@hplctechnologies.com)  
[info@multiplelabs.com](mailto:info@multiplelabs.com)  
[info@analyticalgroup.net](mailto:info@analyticalgroup.net)  
[info@analyticalbiomed.com](mailto:info@analyticalbiomed.com)

W. [www.analycalgroup.net](http://www.analycalgroup.net)  
[www.hplctechnologies.com](http://www.hplctechnologies.com)  
[www.multiplelabs.com](http://www.multiplelabs.com)  
[www.ais-india.com](http://www.ais-india.com)

Sales & Support Offices:  
across the country :  
Distributors & Channel  
partners World Wide