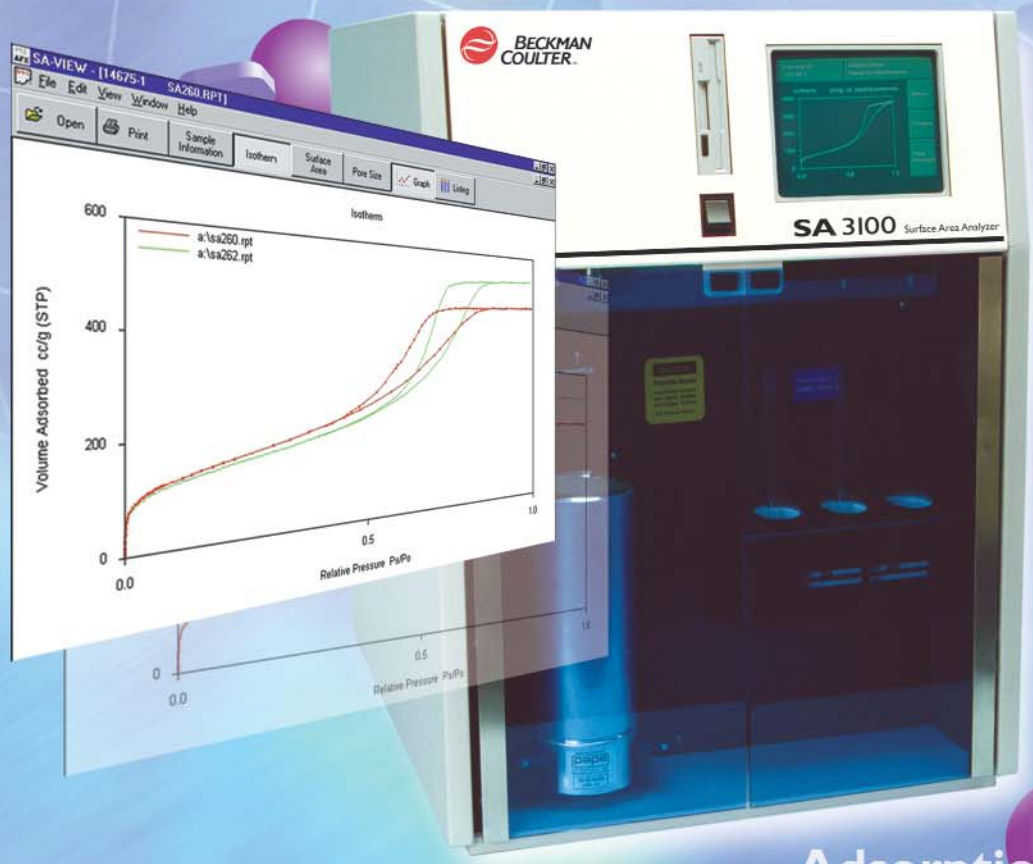
BECKMAN COULTER™

Pore size and *BET* surface area analysis at your *fingertips.*



Adsorption/Desorption

Langmuir t-Plot

BET

SA 3100

Gas Adsorption Analyzer

Introducing

The SA 3100 Surface Area and Pore Size Analyzer

A complete solution for characterizing the surface of solid materials. The SA 3100 utilizes the well-established gas adsorption technique to measure the surface area and porosity of solids.

Everything you need is incorporated into one powerful and easy-to-use package. With an internal PC and flexible software, the SA 3100 gives you the information you need: BET and Langmuir surface area, BJH Adsorption and Desorption, Pore Size Distribution, t-Plot, total pore volume and more. Data is displayed in real-time on the easy-to-read touch screen. Plus, the SA-View Windows viewing software allows you to view, print and archive your data.

Whether you are in a quality control or R&D environment, the SA 3100 is the most versatile and easy-to-use gas adsorption analyzer available today.

The History of Beckman Coulter Particle Characterization

For over 40 years the Particle Characterization Group (PCG) of Beckman Coulter has provided answers and solutions to those involved in the testing and measurement of the physical properties of particles. Offering a complete family of instruments, including:

History of Innovation

- Coulter Counters – 1954
- Pore Characterization Analyzers – 1975
- Photon Correlation Spectroscopy Analyzers – 1983
- Zeta Potential Analyzers – 1988
- Laser Diffraction Analyzers – 1989
- Surface Area/BET Analyzers – 1993
- Digital Pulse Processing – 1999
- Image Analyzers – 2000

We are in a unique position to offer solutions for most particle analysis needs. World-class support, including being listed as an ASTM certified laboratory and with service only a company such as Beckman Coulter can provide. Purchasing an instrument from us will deliver performance, versatility and peace of mind.

The Beckman Coulter Technology Center

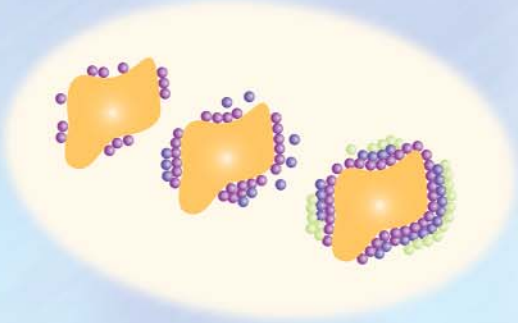
Designed with

the *user* in *mind*.

The Technology

The gas adsorption technique is performed by the addition of a known volume of gas (adsorbate), typically nitrogen, to a solid material in a sample vessel at cryogenic temperatures.

At cryogenic temperatures, weak molecular



attractive forces will cause the gas molecules to adsorb onto (attach to the surface of) a solid material. An adsorbate (gas) is added to the sample in a series of controlled doses, the pressure in the sample vessel is measured after each dosing. There is a direct relationship between the pressure and the volume of gas in the sample vessel. By measuring the reduced pressure due to adsorption, the ideal gas law can then be used to determine the volume of gas adsorbed by the sample.

The resulting relationship of volume of gas adsorbed vs. relative pressure at constant temperature is known as an adsorption Isotherm. From the analysis, and the cross-sectional area of the adsorbate gas molecule, the surface area and pore size distribution of the sample can be derived.

Taking ease-of-use to a new level.

- An innovative touch screen allows easy control of all instrument functions without the use of an external computer.
- A completely integrated, fully automated system allows for true walk-away analysis.
- Intuitive software prompts the user each step of the way.

Using the latest technology to achieve maximum speed of analysis.

- Intelligent "Learn" function decreases analysis time of routine samples by referencing stored sample isotherms.
- Novel sample tube design minimizes equilibration time.
- Concurrent manifold dosing during sample equilibration eliminates unnecessary delays.

Combining versatility, accuracy and power for a complete solution.

- A Sample Port, three degassing ports, a powerful CPU, vacuum pump and automated dewar lift are all integrated into a single unit.
- Nitrogen, Argon or Krypton adsorbate gases can be used to meet your application needs.
- Exceptional Accuracy is achieved by referencing the true saturation vapor pressure for each data point.

The SA-Prep Surface Area Outgas Station

- For customers who need extra capacity
- Prepare up to 6 samples simultaneously
- Flow degassing with Nitrogen, Argon or Helium
- Temperature range from ambient to 400°C

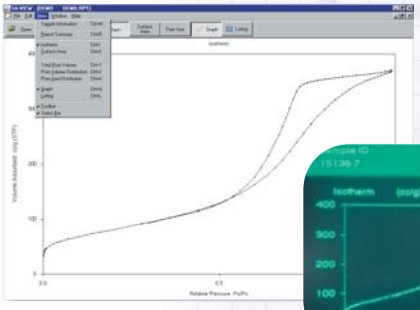
Sample Analysis

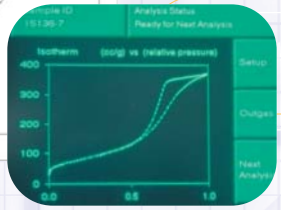
Has *never* been so *simple.*

The User-defined Sample Profiles make using the SA 3100 incredibly simple. Choose a profile and you can produce results quickly, accurately and easily. Running samples is as easy as...

1 **Load your prepared sample in the analysis position.**

2 **Select a profile.**





3 **View your results in minutes.**

The SA 3100 utilizes a totally self-contained vacuum system.

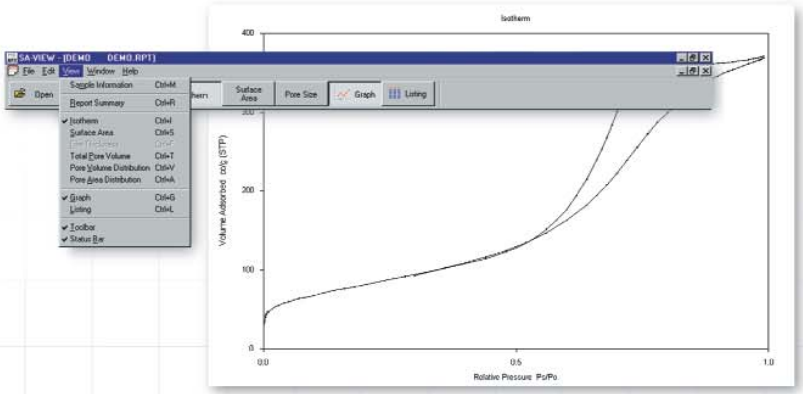
Easy to read screen complete with simple touch pad operation.

Sample pre-treatment or outgassing is completely internal. No additional outgassing apparatus is required. Sample outgassing is done concurrently with sample analysis.

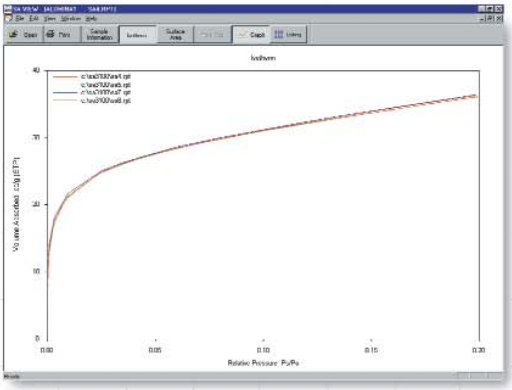
Automated Dewar Lift for walk-away operation.

Software

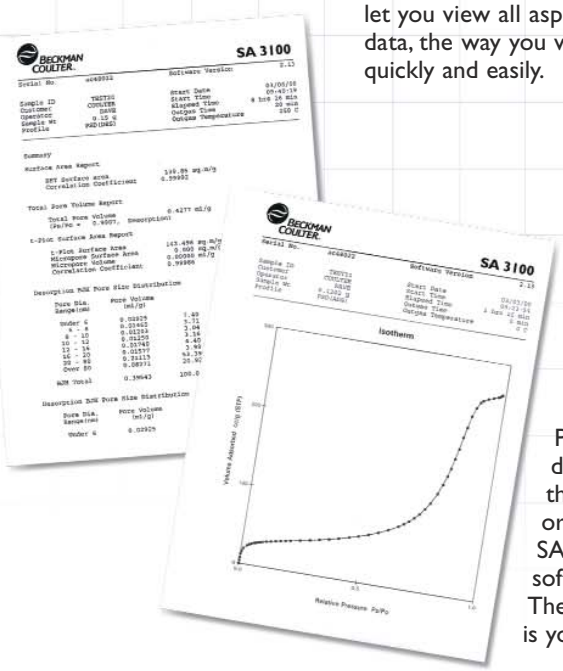
The SA-View data *archiving* and *viewing* software gives you the *flexibility* you need.



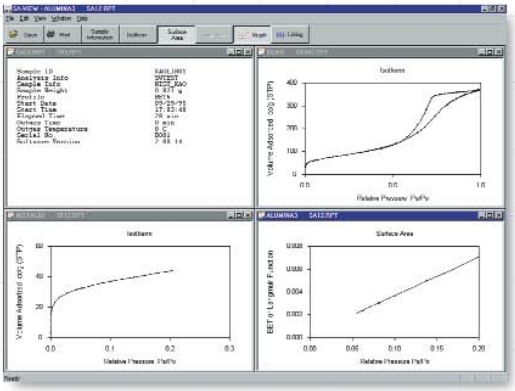
Drop-down menus and toolbars let you view all aspects of your data, the way you want to see it, quickly and easily.



Is reproducibility important to you? The overlay function lets you compare data from run to run, instrument to instrument, or last year and today.



Print reports directly from the SA 3100 or from the SA-View software. The choice is yours.



View isotherms, data tables, BET plots and more, from one or several samples, at a glance.

Applications

Adhesives Alloys Abrasives Carbonates Carbons Catalysts Cements Ceramics Clays Cosmetics Detergents Explosives and Ordnance Fibers Films Fertilizers Filters Glass Food Additives Graphite Metal Powders Minerals Paper Pharmaceuticals Pigments Polishing Compounds Polymers Resins Soils and Sediments

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Visit our web site: www.beckmancoulter.com

TECHNICAL SPECIFICATIONS

SURFACE AREA MEASUREMENT RANGE

SPECIFIC SURFACE AREA RANGE:
From >0.01 m^2/g

PORE SIZE RANGE

MESOPORE SIZE DISTRIBUTION RANGE:
3 to 200 nm

MICROPORE VOLUME AND AREA

BET SURFACE AREA

TYPICAL REPRODUCIBILITY:
<2% CV

PRESSURE MEASUREMENT

OVERALL PRESSURE RANGE:
Vacuum to 1000 mm Hg

MINIMUM RELATIVE PRESSURE:
6×10^{-5}

SAMPLE PRESSURE RESOLUTION:
0.046 mm Hg

TRANSDUCER LINEARITY:
<0.1% BFSL

TRANSDUCER REPEATABILITY:
0.0125% BFSL

CALIBRATED MANIFOLD

TEMPERATURE AT:
45°C Stability ± 0.1°C

VACUUM PUMP

VOLUME RATE DISPLACEMENT:
1.5 m^3/hr

POWER CONSUMPTION:
130W

ULTIMATE VACUUM:
10^{-3} mm Hg

SAMPLE PREPARATION SYSTEM

NUMBER OF OUTGAS PORTS: 3

FURNACE SPECIFICATIONS

TEMPERATURE
Range: 30 to 350°C
Settability: 1°C
Stability: 5°C
Accuracy: ±5°C

ENVIRONMENTAL AND POWER REQUIREMENTS

UNIVERSAL ONE-DESIGN:
Autoswitch power supply, 90-250 Volts 50/60 Hz. 150W

OPERATIONAL POWER CONSUMPTION:
Nominally 500W

OPERATING TEMP. RANGE: 10-35°C

STORAGE TEMP.: 0-50°C

OPERATING ALTITUDE:
up to 10,000 ft. above MSL

OPERATING/STORAGE RELATIVE HUMIDITY:
10-85% RH non-condensing

GAS REQUIREMENTS

GAS PURITY:
Helium – 99.995%
Absorbates – 99.9% (or better)

DIMENSIONS

71.1 cm (21") height x 50.8 cm (20") width x 53.3 cm (21") depth

WEIGHT: 80 lbs. with vacuum pump

BECKMAN COULTER™

P/N: 7221500 RevC