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Technologies Limited

BETSAA

BET Surface Area Analyzer

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

Analytical Technologies Limited

An ISO 9001 Certified Company

www.analyticalgroup.net

Description

The BETSAA are the instruments of choice for hundreds of labs globally. These rapid, high-throughput vacuum volumetric gas sorption analyzers provide quality control and research labs alike with the surface area and pore size analysis capabilities they require – and all this at an affordable price. Either two or four analysis stations with four built-in vacuum or flow degassing stations reduce the overall bench space while maximizing performance. A 21 CFR Part 11 compliant version of the software is available for pharmaceutical customers.

Feature

- Surface Area Analysis
- Mesopore Size Distribution
- Standard Micropore Analysis
- Degassing Ports
- Analysis Stations
- Color Touchscreen
- Live Graphical/Tabular Display of Analyses
- Local and Remote PC Control
- Extended Life Dewar
- Robust Coolant Level Sensor
- Flow Degassing
- Vacuum Degassing
- Dedicated Po Cell
- Dedicated Po Transducer
- Dedicated Backfill Transducer

Applications

- Carbon for rubber, adsorbents (gas separation and water purification), gas masks, inks, laser printers and copiers.
- Catalysts for the automotive, fertilizer, fuel cell and petrochemical industries.
- Organic materials for adhesives, chromatography, cosmetics, foodstuffs, detergents, explosives, ion exchange resins, pharmaceuticals and plastics.
- Minerals such as alumina, clays, hydroxyapatite, pigments, phosphates, silicas, zirconia, etc., used for abrasives, adsorbents, biomaterials, ceramics, cements, desiccants, fillers, papers and paints.
- Powdered metals and ferrites for batteries, pressure formed/ sintered products, electronics, magnets and magnetic tape.

Specifications

Measurement types	B.E.T., STSA, adsorption isotherm, desorption isotherm
Surface area range	0.01 m2 / g to no known upper limit
Pore size range	0.35 to 500 nm (3.5 to 5000 Å)
Minimum pore volume (liquid)	2.2 x 10^{-6}ml / g
Minimum pore volume (STP)	0.0001 cc / g
Nitrogen	√
Other non-corrosive gases (Ar, CO_2, H_2, C_4,H_{10}, etc.)	√
Preparation ports	4
Temperature range	ambient - 450ºC*, 1ºC intervals
Programmable heating protocols	Multi-step ramp rates / hold times
Accuracy (% of span)	±0.1
A/D converter	24-bit
Minimum pressure (mm Hg) resolution	6 x 10^{-5}
Minimum relative pressure P/Po (N2) resolution	6 x 10^{-8}
Dimensions (WxDxH)	61.6 cm x 49.2 cm x 82.9 cm
Weight	43 kg (95 lbs.)
Electrical	100-240 V, 50/60 Hz

Physisorption Analysis Systems: BET Surface Area & Porosity Measurement

- High throughput analysis system with 3 analysis ports.
- The system offered shall have minimum ONE port of true N2 Micropore analysis with all ports able to performs N2 mesopore analysis.The system shall meet the following operation specifications:
    * Minirnun measurable surface area: 0.01 m^2/g (N_2) 0.0005 rn2/g (Krypton)
    * Pore Diameter Range: 3.5 - 5000 Angstroms
    * Micropore Volume Detectable within O.O:JC1 cc/g
- Absorptive Gas Inlets: The system sha r ave Six(S) user definable gas inlets
- The system shall have the option to upgrade to full (Three Ports) micropore analysis capability in the fileld without having to ship the upgrade process.
- The system Shall have 1000 Torr, 10 Torr, and 0.1 Torr transducers to measure surface area and porosity for a wide range of materials. All these transducers shall be included in the offer and should not be optional.it is mandatory to specify the quantity of the pressure transducers offer in the system as below
    * Minimun quantity of 1000 Torr Transducers in the system shall be 5 or more
    * Minimun quantity of 10 Torr Transducers in the system shall be 2 or more
    * Shall have at least 1 unit of 0.1 Torr Transducer
- The analysis system shall have a dedicated saturation pressure measurement transducer to measure the realtime saturation pressure of the cryoqen.
- The individual Ports their own dedicated transducers MUST not shared with the other ports for an accurate pressure measurement of each port independent of other ports
- The instrument an active temperature controlled manifold at 45+/- 0.05C to provide the utmost accurate adsorbed gas quantitation using gas law principle.
- The instrument a high accuracry analogue-to-digital conversion of 25 bit resolution or better for gas pressure measurements used in the systems
- Gas Dosing and evacuation control: The system shall have a servo valve to control the dosing/evacuation of adsorptive gases. Needle valve is not prefer as it lacks the accuracy of administrating the gases doses. Piease specify the technology used for gas dosing control in this section.
- The lowest achievable N_2 dosing relative pressure of 10-9 P/P0 with appropriate microporous materials.
- The manifold shall be made from stainless steel manifold for the best gas storage performance with lowestt possible gas leaks possible.

- The gas control utilizing Pneumatic control valve with 316L stainless steel body, fully contained PCTFE seal seat design with VCR face seal.The electronic soleniod valves with O-ring seal is not a prefer solution.Pls specify the technology used for gas valves in this section.

  * The gas diaphragm valves shall have excellent resistance to contamination
  * Improved helium leak test performanc
  * Used compressed-air to turn-on/off to prevent heating up the minute gases within the gas valve

- Sample Elutriation protection - The system protection filter frit in each ports to prevent fine powders acidentally sucked into the manifold during evacuation step
- Crogen Control Method - The system cryogen control solution shall meet the following criteria in order to achieve the highest accuracy in voids space determinations.

  * Reliable solution with no consummables required in the long run of using the instrumen
  * The jacketed sample tube for maintening constant cold/warm zone throughout the measurement proces
  * Any dewar movement during analysis during normal operations process to prevent temperature fluctuations during the cource of analys
  * Option to refill liquid nitrogen during the analysis should the sample required extended analysis time WITHOUT jeopardizing the analysis in progress.

- Analysis Dewar: The capacity of the dewar shall be ≥ 3.2Liter or better
- Sample Tubes requirement : The sample tube of the system shall fulfill the following requirments:
- Sample Tubes requirement : The sample tube of the system shall fulfill the following requirments:

  * 12mm diameter glass sample tube for easy loading/unloading sample and easy cleaning.Small diameter sample tube is not prefer for this purpose.Pls state the diameter of sample tubes offer by the systems.
  * Sample tube shall have a sealing mechanism to prevent ambient gas from entering into the sample tube after degassed, transfer for weighing or to analysis port Rubber stopper is not a preferred solution for sealing the sample tubes.
  * The sample tube prefer to have a flat-bottom design for best performance in heat dissipation as the gas adsorption is an exothermic process.

Vacuum System

- The vacuum system for the analysis shall be a high performance hybrid turbo pumping system.
- The roughing pump of the vacuum system shall be a dry pumping system comprising of 4 stages pumping able to achieve vacuum level of 1.1 Torr.
- The ultimate vacuum level of less than 3.75 x 10-10 mmHg is preferred
- The system shall have a dual hybrid gauge - Cold Cathode+ Pirani gauge for the most accurate vacuum measurement

Degasser System

- Less than SIX(6) degas ports for high-throughput sample preparations
- The degas system shall use either vacuum degassing method OR Flow degassing method. For Vacuum degassing method offered, it has to have ar indepa.1de1: vacuum system separating from analysis vacuum to prevent cross- aontaminations.the Sharing of vacuum pump for both analysis/Degas is not allowed.
- The temperature rang of the degasser from ambient to 450 ˚C with computer controllable ramping rate and duration of degas.
- The degasser up to 5 ramp anc soak cycles
- Each degasser port their own independent temperature control systems
- The degasser programmable ramp rate from 5˚C/min to 20˚C/min
- The degasser fully automated under full PC control without manual intervention from starts to end

Chemisorption Analysis System: Catalyst Dispersion, TPR/TPD/TPO/Pulse Chemisorptio

- The system added functionality to perform chemisorption analysis using the static chemisorption analysis as well as dynamic chemisorption analysis method
- High temperature furnance capable to heat up to 1100°C provide quick and accurate ramp rates to desired temperature with precise temperature control and repeatability(+/- 1 °C)
- The chemisorption system VCR seal system provide high levels of system cleanliness, low outgas rates
- Quick trasition between chernisorption and physisorption within minutes without special tools required
- High-precision Mass Flow Controller provides accurate,programmable gas control up to 200ml/min

- Sixteen gas inlets allow multiple probe gases to be investigated maximizing efficiency and range of applications.
- Sample cell made from quartz for high-temperature, high-precision quartz cell improves the accuracy and sensitivity for challenging analysis.
- The system able to perform static chemisorption analysis for studies of %Metal dispersion, Metal suface area, metal crytallite sizes etc.
- The system able to perform dynamic chemisorption analysis with the integral thermal conductivity Detector(TCD) build-in the system.
- The dynamic chemisorption analysis includes;
    * Temperature Controlled Reduction(TPR)
    * Temperature Controlled Desorption(TPD)
    * Temperature Controlled Oxidation (TPO)
    * Temperature Controlled Reactions(TPRx)
    * Pulse-Chemisorption/Gas Titration
- Includes a localized injection loop option for automated pulse chemisorption. It shall also include a restrictor for flow control and local temperature measuremenUcontrol at loop injections
- Connected to FOUR(4) gas inlets for flexibility to control various probe gases.
- The system shall have a cold trap to trap unwanted gas/vapor species from the reaction preventing it from going to the TCD detector. The cold trap shall be able to use a thermoelectric / Peltier cooling to cool down to -10°C to trap unwanted water vapor from TPR reaction. The Cold trap solution shall last as long as the reaction is still running without drying out or thaw in temperature which is a typical problem using ice as cooling medium.
- External connection port ready for future upgrade for external detector connection which is able to be trigger from the system for stop/start of external detector sugh as Mass Specttrorneter etc.

Data Reduction & Reporting

- The data reduction software compatible with the latest MicrosoftTM Windows 64 Bit Operating system
- The data reduction software fully interactive with full graphical interface for ALL models data reductions.
- The data reduction software includes tne following models for both physisorption and chemisorption models for comprehensive data reduction of isotherm data

- Physisorption
    * Single Point BET Surface Area
    * Multiple Points BET Surface Area
    * Angmuir Surface Area
    * t-Plot Model
    * Rouquerol BET Plot
    * Alpha-S Mode
    * BJH Model
    * Dollimore Heals Model
    * Harvath Kawazoe
    * Dubinin Radushkevich
    * Dubinin Ashtakov
    * MP Method
    * DFT Pore Size Model
    * DFT Surface Energy
- The data reduction software shall also includes the following advanced OFT models
    * Advanced Dual DFT model that can combined N2/Co2 isotherm to provide a complete spectrum of pore size distribution from ultra micropore to mesopore.
    * Heterogeneous Surface DFT Model applicable for some application nano-materials.
- Static Chemisorption- The software able to perform data reduction to obtain % Metal Dispersion, Active Metal surface area, crystallite Size(hemisphere) etc from Static Chemisorption experiment.
    * Difference Method to deduce the chemisorption from overall adsorption for static chemisorption data reduction
    * Freundlich Method to deduce the chemisorption from overall adsorption for static chemisorption data reduction
    * Sinfelt Method to deduce the chemisorption from overall adsorption for static chemisorption data reduction
    * Langmuir Method to deduce the chemisorption from overall adsorption for static chemisorption data reduction
    * Temkin Method to deduce the chemisorption from overall adsorption for static chemisorption data reduction

- Dynamic Chemisorption

  * The software peak editor to integrate TCD signals for all dynamic chemisorption experiment.
  * Able to calibrate TCD signal to concentration of sorbed gases.
  * Able to add user define Stoichiometry factor for any specific reaction.
  * Extensive active metal library which can can also edited and expanded when necessary.
  * Able to auto integrate all TCD peaks and also has the flexibility for manual integrate the TCD peaks when necessary.
  * Able to import MS signal for ker process and can overlay with TCD signa! in the same report.
  * Able to process TPR analysis data.
  * Able to process TPD data and calculates Heat of Desorption from multiple runs of TPD data of different temperatures.
  * Able to process Pulse Chemisorption data

- The data reduction able to allow user-defined models not available in the models library by means of using scripting programming language like Python script.

Instrument Control Software

- Easy Graphical User Interface for user to control/monitor all aspects of the instrument
- Method wizard to assist user to create a method of analysis
- Smart monitoring for the system health and user can obtain suite of information for full critical system component functioning, through real-time analysis views.
- Able to store methods in the library as template that can be re-use when applicable.
- Able to setup the instrument to automaticall & nteligently running diagnostic analysis to determine the health states of the instrument when instrument is idle.

Regulatory compliances

Corporate Social Responsibility

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

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 personallities 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

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 @

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