



*Lab*   
Analytical Services

**Quantachrome**  
INSTRUMENTS

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09-0041-1 REV E

Measurement	Description	P/N
Single Point BET with Nitrogen	Single point BET specific surface area ( $P/P_0 = 0.3$ ) by nitrogen adsorption at 77 K. Dynamic flow method unless otherwise specified. Requires minimum 1 m <sup>2</sup> total surface area. Customer provides outgassing (preparation) temperature.	06000 -1N
Multi-Point BET with Nitrogen	Multi-point BET specific surface area by nitrogen adsorption at 77 K (minimum 3 data points). Vacuum-volumetric method. Includes single point BET value at $P/P_0 = 0.3$ . Report includes both graphical and tabular multi-point result with BET C constant and correlation coefficient. Requires minimum 1 m <sup>2</sup> total surface area. Customer provides outgassing (preparation) temperature.	06000 -3N
Multi-Point BET with Argon	Multi-point BET specific surface area by argon adsorption at 87 K (minimum 3 data points). Vacuum-volumetric method. Includes single point BET value at $P/P_0 = 0.3$ . Report includes both graphical and tabular multi-point result with BET C constant and correlation coefficient. Requires minimum 1 m <sup>2</sup> total surface area. Customer provides outgassing (preparation) temperature.	06000 -3Ar
Single Point BET with Krypton	Single point BET specific surface area ( $P/P_0 = 0.3$ ) by krypton adsorption at 77 K. Vacuum-volumetric method unless otherwise requested. For surface areas less than 1 m <sup>2</sup> . Customer provides outgassing (preparation) temperature.	06000 -1K
Multi-Point BET with Krypton	Multi-point BET specific surface area by krypton adsorption at 77 K (minimum 3 data points). Vacuum-volumetric method. Includes single point BET value at $P/P_0 = 0.3$ . Report includes both graphical and tabular multi-point result with BET C constant and correlation coefficient. For surface areas less than 1 m <sup>2</sup> . Customer provides outgassing (preparation) temperature.	06000 -3K

Surface Area

Measurement	Description	P/N
Micropore Analysis with Carbon Dioxide	Micropore analysis with CO <sub>2</sub> adsorption at 273.15 K. Vacuum-volumetric method. Report includes both graphical and tabular DR micropore volume and DFT micropore size distribution results. Suitable for carbon samples. Customer provides outgassing (preparation) temperature.	06000 -3C
Total Pore Volume with Argon	Total pore volume and average pore size by argon adsorption at 87 K. Vacuum-volumetric method. Includes multi-point BET area. Customer provides outgassing (preparation) temperature.	06001 -P-Ar
Total Pore Volume with Nitrogen	Total pore volume and average pore size by nitrogen adsorption at 77 K. Vacuum-volumetric method. Includes multi-point BET area. Customer provides outgassing (preparation) temperature.	06001 -P
Mesopore Analysis with Nitrogen	Mesopore analysis by nitrogen adsorption at 77 K. Vacuum-volumetric method. Includes BET multi-point value, BET single point value at $P/P_0 = 0.3$ , t-plot calculation, and total pore volume, where applicable. Report includes both tabular and graphical DFT pore size distribution, multi-point BET surface area, and t-plot results. Other data reduction methods available upon request.	06001 -20AD
Mesopore Analysis with Argon	Mesopore analysis by argon adsorption at 87 K. Vacuum-volumetric method. Includes BET multi-point value, BET single point value at $P/P_0 = 0.3$ , t-plot calculation, and total pore volume, where applicable. Report includes both tabular and graphical DFT pore size distribution, multi-point BET surface area, and t-plot results. Other data reduction methods available upon request.	06001 -20AD-Ar
Micropore and Mesopore Analysis with Nitrogen	Micro- and mesopore analysis by nitrogen adsorption at 77 K. Vacuum-volumetric method. Includes multi-point BET area, total pore volume, and t-plot method, where applicable. Report includes both tabular and graphical DFT pore size distribution and multi-point BET area results. Other data reduction methods available upon request.	06001 -MS
Micropore and Mesopore Analysis with Argon	Micro- and mesopore analysis by argon adsorption at 87 K. Vacuum-volumetric method. Includes multi-point BET area, total pore volume, and t-plot method, where applicable. Report includes both tabular and graphical DFT pore size distribution and multi-point BET area results. Other data reduction methods available upon request.	06001 -MS-Ar
Pore Size Analysis of Thin Films with Kr	Pore size analysis of thin films by krypton adsorption at 87 K. Vacuum-volumetric method. Includes tabular and graphical pore size distributions.	06001 -TF
Pore Size by Mercury Intrusion and Extrusion	Pore volume and size distribution by mercury intrusion and extrusion (to 33,000/60,000 psia or user requested pressure). Report includes total pore volume, total surface area, mean, median, and modal pore sizes, cumulative and differential pore volume and/or area distributions. Both graphical and tabular reports will be provided. Optional data reduction calculations (upon request and where appropriate) include compressibility, fractal dimension, throat/pore ratios, permeability, tortuosity, particle size distributions.	06005

Measurement	Description	P/N
Pore Size Distribution and Density by Mercury Intrusion	Pore volume and size distribution by mercury intrusion and extrusion (to 33,000/60,000 psia or user requested pressure). Report includes total pore volume, total, surface area, and pore size distribution. Data reduction calculations can include cumulative and differential pore volume and/or area distributions vs. pore diameter or pressure. Both graphical and tabular report will be provided. Also includes the envelope density by mercury fill. Optional data reduction calculations include (upon request and where appropriate) compressibility, fractal dimension, throat/pore ratios, permeability, tortuosity, particle size distributions.	06005-PD
Pore Volume and Size Distribution by Capillary Flow Porometry	Pore volume and size distribution by capillary flow porometry up to a pressure of 500 psi (pore sizes from 500 μm down to 18 nm). Suitable for all types of filtration media, woven and non-woven textiles, microporous membranes, sintered metals, battery components, porous plastic sheets, ceramics, porous rock, and others. Conforms to ASTM standard methods D6767, E128, F316, and similar. Both graphical and tabular reports include largest pore diameter (bubble point), mean flow pore diameter, pore distribution, and gas permeability.	06005-3G
Particle Size Distribution by Laser Diffraction, Wet	Particle size distribution of powder analyzed by laser diffraction in liquid suspension. Specify water or isopropanol. Samples are usually submitted dry, though predispersed suspensions can be accepted. Graphical and tabular results reports.	06006-L
Particle Size Distribution by Laser Diffraction, Dry	Particle size distribution of powder analyzed by laser diffraction in dry form. Powder is dispersed in a stream of compressed air. Graphical and tabular results reported.	06006-D
High Pressure Gas Sorption Measurement	High pressure gas sorption analysis at pressures up to 200 bar. Measurement of adsorption/desorption isotherms, PCT curves and kinetics using H <sub>2</sub> , CO <sub>2</sub> , CH <sub>4</sub> , etc. Analysis temperature range from -20 °C to 400 °C. Customer provides outgassing (preparation) temperature.	06001-HP

Pore Size and Volume

Particle Size

Gas Storage and Separation

Measurement	Description	P/N
Vacuum-Volumetric Water Sorption Isotherm	Adsorption/desorption isotherm at user specified temperature. Vacuum-volumetric method. 20 adsorption points plus 19 desorption points. Report includes both tabular and graphical results. Customer provides outgassing (preparation) and analysis temperatures.	06001 -H2O
Vacuum-Volumetric Vapor Sorption Isotherm	Adsorption/desorption isotherm of organic vapor (alkane, alkene, alcohol, etc) at user specified temperature. Vacuum-volumetric method. Report includes both tabular and graphical results.	06001 -V
Gravimetric Water Sorption Isotherm	Adsorption/desorption isotherm at user specified temperature (10-70 deg C). Gravimetric method. 20 adsorption points plus 19 desorption points. Report includes both tabular and graphical results. Kinetic data also included in report. Customer provides outgassing (preparation) and analysis temperatures.	06001 -H2O-DVS
Standard Chemisorption	Standard chemisorption analysis with H <sub>2</sub> , O <sub>2</sub> , CO, CO <sub>2</sub> , or NH <sub>3</sub> . Includes combined, weak, and strong isotherms for determination of monolayer uptake. Report includes tabular and graphical isotherms, monolayer uptake, active metal surface area, metal dispersion (%), and crystallite size. Customer provides reduction (preparation) temperature and metal loading (%) for dispersion and crystallite size calculations.	06007
High Resolution Chemisorption	High resolution chemisorption analysis with H <sub>2</sub> , O <sub>2</sub> , CO, CO <sub>2</sub> , or NH <sub>3</sub> . Includes additional low pressure data. Includes combined, weak, and strong isotherms for determination of monolayer uptake. Report includes tabular and graphical isotherms, monolayer uptake, active metal surface area, metal dispersion (%), and crystallite size. Customer provides reduction (preparation) temperature and metal loading (%) for dispersion and crystallite size calculations.	06007 -H
Customized Chemisorption	Customized analysis, including pulse chemisorption, TPR/TPO/TPD (temperature programmed reduction/oxidation/desorption). Multiple runs to calculate activation energy and/or energy of desorption. Each run counts as one analysis. Alternatives include at least three runs on a vacuum-volumetric system for purposes of determining isosteric heat of adsorption. Comprehensive report provided. Customer provides preparation and analysis conditions.	06007 -C

Water and Vapor Sorption

Chemisorption

Measurement	Description	P/N
True (Skeletal) Density by Gas Pycnometry	Standard procedure determines true density of sample using helium pycnometry and reports average of at least three runs (tabular format only). Nitrogen is recommended for low density (< 1 g/ml) polymers and samples of vegetable origin.	06003
Foam Open/Closed Cell by Nitrogen Pycnometry	Open/closed cell percentage of foam polymers (cellular plastics) using nitrogen, uncorrected for cut sample. Corrected open/closed cell percentage using method ASTM D6226 (Appendix XI, procedure 2) is considered as two analyses. The customer is expected to provide initial 1 inch (2.54 cm) cube sample for analysis. Extra charge for sample preparation.	06003-A
Foam Compressibility by Nitrogen Pycnometry	Compressibility of foam sample using nitrogen pycnometry over approximate pressure range 2-20 psig. Tabular report includes % volume change as a function of initial pressure plus uncorrected open/closed cell percentages.	06003-C
Foam Fracture and Compressibility by Nitrogen Pycnometry	Volume % cell fracture of foam sample by nitrogen pycnometry over approximate pressure range 2-20 psig. Tabular report includes % volume change as a function of initial pressure.	06003-F
Tap Density	Tapped bulk density of powder or coarse particles using 1/8" drop height. Bulk volume recorded every 500 taps until no further observable change in the level of powder in the calibrated cylinder. Tabular report gives tapped bulk volume and density of the sample as a function of number of taps. Analysis can also be performed to ASTM standard specifications upon request.	06004
Envelope (Geometric) Density by Dry Powder Pycnometry	Envelope density of sample determined using a free flowing powder. Usually used for irregular forms/shapes.	06004-D
Envelope (Geometric) Density by Mercury Porosimeter	Envelope (geometric) density by mercury displacement after evacuation. Envelope density reported at fill pressure (bulk density) and at 1 atmosphere (apparent density).	06005-D

Density