



Characterization of Porous Solids and Powders: Surface Area, Pore Size and Density

Volume 16 in the Particle Technology Series
Springer Netherlands, ISBN 1-4020-2302-2
September 2004, 347pp. hardbound

S. Lowell, Quantachrome Instruments, Boynton Beach, USA
Joan E. Shields, Dept. of Chemistry, Long Island University, CW Post Campus, Brookville, NY, USA
Martin A. Thomas, Quantachrome Instruments, Boynton Beach, USA
Matthias Thommes, Quantachrome Instruments, Boynton Beach, USA



To Purchase Online: Go to www.quantachrome.com Click on the bottom banner ad.

This book gives a unique overview of principles associated with the characterization of solids with regard to their surface area, pore size and density. The book covers methods based on gas adsorption (physi- and chemisorption), mercury porosimetry and pycnometry. Not only are the theoretical and experimental basics of these techniques described, but also the most recent developments, particularly in light of the tremendous progress made in recent years in materials science and nanotechnology. The application of classical theories and methods for pore size analysis are discussed in contrast with the most advanced microscopic theories based on statistical mechanics (e.g. density functional theory and molecular simulation). The book will appeal both to students and to scientists in industry who are in need of accurate and comprehensive pore and surface area characterization of their materials.

Review:

An updated version of the classical textbook (Powder Surface Area and Porosity, 3rd ed., 1991) by the first two authors "the book now includes recent developments in the areas of density functional theory, molecular simulations, pore network theories, and it has an expanded section on heterogeneous catalysts..... An interesting aspect is the book's clear division between theoretical aspects (Part 1) and experimental aspects (Part 2) of the various techniques..... The book also demonstrates a good balance between how deep a theoretical concept is being discussed and how many real-world examples are presented.

Summing up: Recommended. Lower-division undergraduates through professionals; two-year technical program students."

H. Giesche, Alfred University, in: CHOICE, May 2005, Vol. 42 No.09

TABLE OF CONTENTS

PART I THEORETICAL

1. Introduction
2. Gas Adsorption
3. Adsorption isotherms
4. Adsorption Mechanism
5. Surface Area from the Langmuir and BET Theories
6. Other Surface Area Methods
7. Evaluation of the Fractal Dimension by Gas Adsorption
8. Mesopore Analysis
9. Micropore Analysis
10. Mercury Porosimetry: Non-Wetting Liquid Penetration
11. Pore Size and Surface Characteristics of Porous Solids by Mercury Porosimetry
12. Chemisorption: site Specific Gas Adsorption

PART 2 EXPERIMENTAL

13. Physical Adsorption Measurements -Preliminaries
14. Vacuum Volumetric Measurements (Manometry)
15. Dynamic Flow Method
16. Volumetric Chemisorption: Catalyst Characterization by Static Methods
17. Dynamic Chemisorption: Catalyst Characterization by Flow Techniques
18. Mercury Porosimetry: Intra and Inter-Particle Characterization
19. Density Measurement

Visit the publishers at: <http://www.springeronline.com> for up-to-date information.



PRODUCT UPDATE

INSTRUMENTS FOR PARTICLE & POROUS MATERIALS CHARACTERIZATION

Visit www.quantachrome.com for more detailed instrument specifications.

Contact your local representative or call 1.800.989.2476 (in USA/Canada)



Aquadyne DVS

The Aquadyne DVS is a fully automated, gravimetric, dual sample water vapor sorption analyzer. It measures adsorption and desorption isotherms of water vapor both accurately and sensitively, including sorption kinetics, with minimal operator involvement. The weight(s) of one or two sample(s) is (are) constantly monitored and recorded as the relative humidity is automatically varied by the blending of dry carrier gas with a saturated gas stream using precision mass flow controllers. The dual balance design allows increased analysis throughput, side-by-side comparison with known or reference materials, or an extended mass range for a single sample..



Autosorb iQ

Automatic gas sorption analyzer available with one or two physisorption analysis ports, both of which can be equipped for low pressure micropore analysis. The two-station micropore unit, the iQ2-MP, features two 1000 torr, two 10 torr and two 1 torr transducers, plus a dedicated saturation pressure (Po) transducer and a dry, high vacuum system. A long life dewar (80+ hours) is standard on the two-station unit, optional on the one-station. One of the ports is available as a chemisorption station, complete with flow-through quartz sample cell, automatic isolation valve, high temperature furnace with fan-assisted cooling, and up to twelve (programmable) analysis gas inputs. A vapor dosing option is available for both physi-and chemi-units. The chemi- version is also offered with mass flow controller, TCD (with or without automatic titration loop) and integrated mass-spec options. The built-in degas stations feature computer-controlled ramp/hold/test protocols, a dedicated cold-trap, and optionally a second (dedicated) vacuum system. Cryostat and calorimeter options extend the capability of the iQ into the most advanced porous materials research programs.



Nova e Series

High speed surface area and pore size analyzers for quality control and research. Meets different throughput needs with single or multi-port (two, three or four sample stations) models. Flexible operation: can be run as stand-alone or PC-based. High-security PC version (21 CFR part 11) is also available. The NOVA's small footprint even includes built-in sample preparation stations! Analyses can be done in either patented no-helium mode, or in classical helium void volume mode.



Zeta Reader

High-resolution micro-electrophoresis unit determines electrophoretic mobility and zeta potential in seconds. Specially constructed cell is filled and emptied by peristaltic pump-eliminating manual filling. The high - magnification video camera system allows zeta-potential measurements to be done on particles as small as 20 nm, and as large as 500 μm . A pH probe and magnetic stirrer plate are included as standard. The Zeta Reader is available with one or three titrators.

