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Edition; Preface to the Second Edition; List of Main Symbols; Superscripts; Subscripts; Use of operator ; Reference; Chapter 1: Introduction; 1.1. The Importance of Adsorption; 1.2. Historical Aspects; 1.3. General Definitions and Terminology; 1.4. Physisorption and Chemisorption; 1.5. Types of Adsorption Isotherms; 1.5.1. Classification of Gas Physisorption Isotherms; 1.5.2. Chemisorption of Gases; 1.5.3. Adsorption from Solution
1.6. Energetics of Physisorption and Molecular Modelling1.7. Diffusion of Adsorbate; References; Chapter 2: Thermodynamics of Adsorption at the Gas/Solid Interface; 2.1. Introduction; 2.2. Quantitative Expression of Adsorption of a Single gas; 2.2.1. Adsorption up to 1bar; 2.2.2. Adsorption Above 1bar and Much Higher; 2.3. Thermodynamic Potentials of Adsorption; 2.4. Thermodynamic Quantities Related to the Adsorbed States in the Gibbs Representation; 2.4.1. Definitions of the Molar Surface Excess Quantities; 2.4.2. Definitions of the Differential Surface Excess Quantities
2.5. Thermodynamic Quantities Related to the Adsorption Process2.5.1. Definitions of the Differential Quantities of Adsorption; 2.5.2. Definitions of the Integral Molar Quantities of Adsorption; 2.5.3. Advantages and Limitations of Differential and Integral Molar Quantities of Adsorption; 2.5.4. Evaluation of Integral Molar Quantities of Adsorption; 2.5.4.1. Integral Molar Energy of Adsorption; 2.5.4.2. Integral Molar Entropy of Adsorption; 2.6. Indirect Derivation of the Quantities of Adsorption from of a Series of Experimental Physisorption Isotherms: The Is ...
2.6.1. Differential Quantities of Adsorption2.6.2. Integral Molar Quantities of Adsorption; 2.7. Derivation of the Adsorption Quantities from Calorimetric Data; 2.7.1. Discontinuous Procedure; 2.7.2. Continuous Procedure; 2.8. Other Methods for the Determination of Differential Enthalpies of Adsorption; 2.8.1. Immersion Calorimetry; 2.8.2. The Chromatographic Method; 2.9. State Equations for High Pressure: Single Gases and Mixtures; 2.9.1. Case of Pure Gases; 2.9.1.1. The van der Waals Equation (1890); 2.9.1.2. The Redlich-Kwong-Soave Equation; 2.9.1.3. The Gasem-Peng-Robinson Equation (2001)
2.9.2. Case of Gas MixturesReferences; Chapter 3: Methodology of Gas Adsorption; 3.1. Introduction; 3.2. Determination of the Surface Excess Amount (and Amount Adsorbed); 3.2.1. Gas Adsorption Manometry (Measurement of Pressure Only); 3.2.1.1. Up to Atmospheric Pressure; 3.2.1.1.1. Gas Adsorption Volumetry; 3.2.1.1.2. Simple Gas Adsorption Manometry; 3.2.1.1.3. Gas Adsorption Manometry with Intermediate Gas Storage and Measurement; 3.2.1.1.4. Differential Gas Adsorption Manometry; 3.2.1.2. Above Atmospheric Pressure
3.2.1.3. Setting the Parameters for an Automated Experiment of Gas Adsorption Manometry

Sommario/riassunto

The declared objective of this book is to provide an introductory review of the various theoretical and practical aspects of adsorption by powders and porous solids with particular reference to materials of technological importance. The primary aim is to meet the needs of students and non-specialists who are new to surface science or who wish to use the advanced techniques now available for the determination of surface area, pore size and surface characterization. In addition, a critical account is given of recent work on the adsorptive properties of activated carbons, oxides, clays and zeolit