



that can be applied to other biopolymer processing engineering areas. This book will be of interest to practitioners working in a wide variety of industries for which chitin and chitosan are useful materials, researchers in biosensors and heavy-metal adsorption, and to academic researchers investigating the properties, preparation, and uses of these materials. This book aims to provide the scientific community with a novel and valuable approach based on fractal geometry concepts on the important properties and processes of diverse environmental systems. The interpretation of complex environmental systems using modern fractal approaches is compared and contrasted with the more classical approaches. The book will provide the fundamental knowledge necessary for solving practical environmental problems. Furthermore, it examines how the fractal approach has been applied in order to understand the structure and reactivity of natural, environmental systems including flocs, sediments, soils, microorganisms and humic substances. This book is intended to present for the first time experimental methods to measure equilibria states of pure and mixed gases being adsorbed on the surface of solid materials. It has been written for engineers and scientists from industry and academia who are interested in adsorption-based gas separation processes and/or in using gas adsorption for characterization of the porosity of solid materials. Traditional and new measurement methods for gas adsorption equilibria are presented in Chaps. 2-6 and elucidated by quite a number of experimental data sets, most of them having been measured in the authors' laboratories. Special emphasis is given to uncertainties of data and pros and cons of all measurement methods are offered. Also the basic concepts underlying interpretation of measurements and calculations of adsorbed masses from measurement signals, are discussed in Chap. 1. The authors state that in publishing this book they "hope to contribute to... the development of effective and reliable methods to measure pure gas and gas mixture adsorption equilibria; preventing young (and old) experimenters from doing all the mistakes we have done during our laboratory work"; making experimental gas adsorption data measured today in many laboratories more easily comparable to each other, as methods and procedures should become more and more similar and possibly also will be standardized (IUPAC) in the years to come. " This book focuses on structural characterisation techniques for porous materials. Covering a range of techniques, including gas sorption, mercury porosimetry, thermoporometry, NMR and imaging methods, this practical guide presents the basic theory behind each characterisation technique, and discusses the practicalities of the experimental and data analysis approaches needed for complex industrial samples. The book shows readers how to approach characterising a particular sort of material for the first time and then how to develop a strategy for more in-depth analysis. It also demonstrates how to determine the best techniques for solving particular problems, and describes methods of obtaining the required information, as well as the limitations of various methods. It particularly highlights a scientific approach involving parameter validation and simple acquisition. Featuring examples taken from case studies of real-world industrial materials, this book is intended for industrial practitioners and researchers. It provides a manual of potential techniques and answers questions concerning porous materials that arise in areas such as the catalyst industry, the oil and gas sector, batteries, fuel cells, tissue engineering scaffolds and drug delivery devices.