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Pore size distribution and porosity of solid materials by mercury porosimetry and gas adsorption —

Part 3:
Analysis of micropores by gas adsorption

Distribution des dimensions des pores et porosité des matériaux solides par porosimétrie au mercure et par adsorption de gaz —

Partie 3: Analyse des micropores par adsorption de gaz

Reference number
ISO 15901-3:2007(E)

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Contents

Page

Foreword ... iv

Introduction ... v

1 **Scope** ... 1

2 **Normative references** ... 1

3 **Terms and definitions** ... 1

4 **Symbols** ... 3

5 **Principles** ... 5
5.1 **General** ... 5
5.2 **Methods of measurement** ... 6

6 **Procedure of measurements** ... 6
6.1 **Sampling** ... 6
6.2 **Sample pre-treatment** ... 6
6.3 **Measurement** ... 7

7 **Verification of apparatus performance** ... 7

8 **Calibration** ... 7

9 **Evaluation of the micropore volume** ... 7
9.1 **General** ... 7
9.2 **Determination of the micropore volume according to Dubinin and Radushkevich** ... 9
9.3 **Micropore analysis by comparison of isotherms** ... 10
9.4 **Determination of micropore size distribution by the Horvath-Kawazoe (HK) and the Saito-Foley (SF) method** ... 14
9.5 **Determination of micropore size distribution by non-local density functional theory** ... 15

10 **Test report** ... 19

Annex A (informative) **Horvath-Kawazoe and Saito-Foley methods** ... 20

Annex B (informative) **NLDFT method** ... 23

Bibliography ... 26

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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ISO 15901-3 was prepared by Technical Committee ISO/TC 24, *Sieves, sieving and other sizing methods*, Subcommittee SC 4, *Sizing by methods other than sieving*.

ISO 15901 consists of the following parts, under the general title *Pore size distribution and porosity of solid materials by mercury porosimetry and gas adsorption*:

— *Part 1: Mercury porosimetry*

— *Part 2: Analysis of mesopores and macropores by gas adsorption*

— *Part 3: Analysis of micropores by gas adsorption*

Introduction

According to the IUPAC Recommendations, 1984 [42], micropores are defined as pores with internal widths of less than 2 nm. Different methods for the characterization of micropores are available, including spectroscopy, electron and tunnel microscopy and sorption methods. In view of the complexity of most porous solids, it is not surprising that the results obtained are not always in agreement and that no single technique can be relied upon to provide a complete picture of the pore structure. With regard to the application of microporous material as specific sorbents, molecular sieves and carriers for catalysts and biological active material, the field-proven methods of gas sorption are of special value. On account of the fractality of dispersed and porous materials, the results of adsorption measurements depend on the size of the gas molecules used (effective diameter and space required at the surface). Furthermore, micropores might not be accessible for larger molecules and, thus, exclusion effects can be observed.

The measuring techniques of the methods described in the present standard are similar to those of ISO 15901-2 and ISO 9277 for the measurement of gas adsorption at low temperature. From the measured isotherm, however, the very first part (i.e. relative pressures $< 10^{-1}$) is evaluated and thus the evaluation method is different.