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GB/T 47188-2026

Particles - Measurement of specific heat capacity - Adiabatic calorimetry

颗粒 比热容测量 绝热量热法

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting. Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents. This document was proposed and is under the jurisdiction of the National Technical Committee on Standardization of Particle Characterization, Sorting and Screening (SAC/TC168). This document was drafted by: Dalian Institute of Chemical Physics, Chinese Academy of Sciences; KingKai Instruments (Dalian) Co., Ltd.; and Zhejiang Qinghe New Materials. Materials Technology Co., Ltd., China Jiliang University, Beijing University of Science and Technology, Shandong Academy of Pesticide Sciences, Beijing Low Carbon Clean Energy Research Institute Yulin Zhongke Clean Energy Innovation Research Institute, PetroChina Shenzhen New Energy Research Institute Co., Ltd., China Academy of Space Technology, National Nanoscience and Technology Learning Center, Dalian University of Technology, Beijing Institute of Metrology and Testing, Aerospace Materials and Processes Research Institute, Nanjing University of Science and Technology, Shanghai Second University Industrial University, Institute of Process Engineering, Chinese Academy of Sciences. The main drafters of this document are. Shi Quan, Zhong Hua, Wang Siyu, Luo Jipeng, Liu Keyuan, Yin Nan, Zhang Hui, Qiu Lin, Lin Guihai, Cong Yunbo, and Liu Junqing. Wang Qi, Ren Xiaoguang, Lu Wei, Fang Chaohe, Gao Hong, Zhou Lan, Liu Tao, Tang Bingtao, Jiang Haipeng, Zhao Xiaoning, Xin Chunsuo, Guo Song, Tian Zhen, Xu Haiping Yue Junrong.

Specific heat capacity is a fundamental thermodynamic property and thermophysical parameter of a material, playing an irreplaceable guiding role in the research and application of particulate materials. Applications. With the rapid development of energy, materials, chemical engineering, and aerospace fields, the basic research and engineering applications of particulate materials are increasingly important. The need for accurate measurement of specific heat capacity is becoming increasingly prominent. This is due to the inherent compositional heterogeneity, contact thermal resistance effect, and surface adsorption inherent in particulate materials. The inherent characteristics of this material lead to significant uncertainties in its specific heat capacity measurement; furthermore, environmental conditions such as temperature and humidity also affect the measurement results. The accuracy and repeatability of the results directly affect the reliability of particulate material research and applications. However, existing specific heat capacity measurement techniques... The method fails to adequately eliminate the influence of these factors on the measurement results, making it difficult to obtain accurate and reliable specific heat capacity data. The adiabatic calorimetry method has the advantage of measuring... With its advantages of wide temperature range, strong sample universality, and low measurement error, it is currently the most accurate and reliable method for measuring the specific heat capacity of condensed matter. To address the specific heat capacity measurement requirements of particulate materials, this document standardizes the sample preparation, measurement procedures, and operational details for the application of the adiabatic calorimetry method, fully leveraging its advantages. The advantages of adiabatic thermal methods in improving the accuracy of specific heat capacity measurement for particulate materials are of great significance for supporting the research and engineering applications of particulate materials. value. Adiabatic method for measuring the specific heat capacity of particles

1 Scope

GB/T 47188-2026 is the Chinese national standard covering the specific heat capacity of a powder, measured adiabatically - the property that governs how a bed of particles heats and cools, and therefore the design of every dryer, kiln and reactor that handles one. First edition, and it is the same technique GB/T 22232.2-2026 applies to chemical thermal stability. It was issued on 27 February 2026 and has been in force since 1 September 2026, as a first edition. The document is under the responsibility of the Standardization Administration of China. This page is published from the official record of the 2026 edition; the clause text of a standard this recent is not yet in circulation, and the figures, limits and tables it contains are those of the document itself, delivered in full with the English translation.

This document describes a method for measuring the isobaric specific heat capacity of micron-sized and larger particulate materials using adiabatic calorimetry. This document applies to the measurement of isobaric specific heat capacity of particulate materials that

do not undergo chemical reactions within the measured temperature range.

2 Normative references

This document has no normative references.

3 Terms and Definitions

The following terms and definitions apply to this document.

3.1 cp The amount of heat required to raise the temperature of a unit mass of a substance by 1 K under constant pressure.

3.2 adiabatic calorimetry A specific heat capacity measurement method in which there is no net heat exchange between the sample cell of the calorimeter and the environment at any given moment during the calorimetric measurement process. [Source: SY/T 7517-2010, 3.3, with modifications]

3.3 high vacuum region The vacuum region has a pressure range of 1x10^-6 Pa to 1x10^-1 Pa. [Source: GB/T 3163-2024, 3.1.1.2, with modifications]

3.4 medium vacuum region The vacuum region has a pressure range of 1x10^-1 Pa to 1x10^2 Pa. [Source: GB/T 3163-2024, 3.1.1.2, with modifications]

4.Principles Adiabatic heat measurement typically employs intermittent heating to determine isobaric specific heat capacity. first, a sample of mass m is heated to an initial temperature Ti. Once thermal equilibrium is reached, a known amount of energy, Qin, is introduced into the sample to raise its temperature by DeltaT (DeltaT = Ti 1 - Ti). Heating is then stopped, allowing the sample to reach thermal equilibrium. The temperature Ti reaches thermal equilibrium, and the above process is repeated continuously. Assuming the specific heat capacity of the sample does not change with temperature within DeltaT, the specific heat capacity is determined... The isobaric specific heat capacity cp(Tj) of the sample at temperature Tj[Tj=(Ti Ti 1)/2] can be obtained by formula (1). cp(Tj)= Qin mDeltaT (1)