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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 46384.1-2025

Determination of acidity in electronic gas - Part 1: Fourier transform infrared spectroscopy

电子气体中酸度的测定 第1部分：傅里叶变换红外光谱法

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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. This document is Part 1 of GB/T 46384, "Determination of Acidity in Electronic Gases". GB/T 46384 has the following parts published.

1.Fourier Transform Infrared Spectroscopy 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 is under the jurisdiction of the National Technical Committee on Standardization of Semiconductor Equipment and Materials (SAC/TC203). This document was drafted by: Zhejiang Provincial Chemical Research Institute Co., Ltd., China National Petroleum Corporation Planning and Design Institute, and Haohua Gas. Southwest Branch of Limited Company, Shaoxing Municipal Institute of Quality and Technical Supervision and Inspection, Fujian De'er Technology Co., Ltd., Zhejiang Kaide Chemical Co., Ltd. Company, Hubei Heyuan Gas Co., Ltd., Tianjin Luling Gas Co., Ltd., Zhejiang Ruiheng Electronic Materials Co., Ltd., Chongqing Ruixin Gas Sports Co., Ltd., Beijing Leshi Lianchuang Technology Co., Ltd., Nanjing University Optoelectronics (Ulanqab) Co., Ltd., Renxu Testing & Certification (Nanjing) Co., Ltd. Company, Beijing PURE Analytical Instruments Co., Ltd., Shenzhen JG Technology Co., Ltd., China Shipbuilding (Handan) PURE Special Gases Co., Ltd. National Institute of Metrology, China Academy of Testing Technology Chemical Research Institute, Bruker (Beijing) Technology Co., Ltd., CNOOC Energy Development Safety and Environmental Protection Branch of the Joint-Stock Company, Dalian Guangming Chemical Industry Gas Quality Monitoring Center Co., Ltd., Dalian Date Gas Co., Ltd. Company, Hangzhou New Century Mixed Gases Co., Ltd., Shanghai Institute of Metrology and Testing Technology, China Jiliang University, China Metrology and Testing Society Beijing Ruixinjie Environmental Protection Technology Co., Ltd., Suzhou Yivite New Materials Co., Ltd., Guizhou Provincial Institute of Product Quality Inspection and Testing, and Langxi Instruments (Shanghai) Co., Ltd. Limited Company, Southwest Chemical Research and Design Institute Co., Ltd. The main drafters of this document are. Shi Wanjun, Chen Jindian, Qing Ying, Wang Jiangang, Cao Suying,

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Acidity is a crucial technical indicator in electronic gases. To better meet the industry's requirements for acidity measurement, it is necessary to develop a comprehensive system. A series of analytical method standards. GB/T 46384 aims to standardize the determination of acidity in electronic gases and is proposed to consist of two parts.

1.Fourier Transform Infrared Spectroscopy. The aim is to provide a method for determining the acidity of gases using Fourier transform infrared spectroscopy. The experimental method.

2.Conductivity Method. The aim is to provide a test method for determining the acidity of gases based on conductivity. Determination of acidity in electronic gases Part

1 Scope

GB/T 46384.1-2025 is the Chinese national standard covering measuring acidic impurities in a semiconductor process gas by FTIR - the long path cell and the passivation it needs, the absorption bands used, the calibration, and the detection limits for the hydrogen halides that corrode a tool and ruin a wafer. Part 1 of the series, first edition. In force from 1 May 2026. Issued on 31 October 2025, it has been in force since 1 May 2026.

---Personnel using this document should have practical experience working in a formal laboratory. This document does not address all possible safety issues. Users are responsible for taking appropriate safety and health measures and ensuring compliance with relevant national regulations.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included. For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies. This document.

GB/T 4844 Pure Helium, High-Purity Helium and Ultra-Purity Helium

GB/T 8979 Pure Nitrogen, High-Purity Nitrogen and Ultra-Purity Nitrogen

GB/T 10628 Gas Analysis Calibration - Determination and Verification Comparison Method

of Mixture Composition

GB/T 14850 Glossary of Gas Analysis

GB/T 21186 Fourier Transform Infrared Spectrometer

GB/T 43306 Sampling Guidelines for Gas Analysis

GB/T 45133 Gas Analysis - Determination of Composition of Gas Mixtures - Comparative Method Based on Single-Point and Two-Point Calibration

HG/T 5896 High Purity Air

3 Terms and Definitions

The terms and definitions defined in GB/T 14850, GB/T 21186 and GB/T 43306, as well as the following terms and definitions, apply to this document.

3.1 acidity A gas that can ionize into hydrogen ions (H+) in water.

Note. Mainly hydrogen fluoride and hydrogen chloride.

4.Principles Based on the Michelson interferometry principle, after the interfering light passes through the sample, the interfering light containing sample information reaches the detector and is then transformed by Fourier transform. The signal is processed to obtain an infrared absorption spectrum of absorbance as a function of wavenumber or wavelength. This is achieved by considering parameters such as optical path length, gas temperature, and pressure within the gas cell. Under constant conditions, absorbance is directly proportional to the content of gaseous components in the sample. By comparing the absorbance with that of a standard sample, the content of gaseous components in the sample can be determined.