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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 28124-2025

Replacing GB/T 28124-2011

Gas analysis - Determination of the trace contents of hydrogen, oxygen, methane and carbon monoxide in inert gases - Gas chromatography with zirconia detector

气体分析 惰性气体中微量氢、氧、甲烷、一氧化碳含量的测定 氧化锆气相色谱法

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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 replaces GB/T 28124-2011 "Determination of Trace Amounts of Hydrogen, Oxygen, Methane and Carbon Monoxide in Inert Gases by Gas Chromatography".

Compared with GB/T 28124-2011, apart from structural adjustments and editorial changes, the main technical changes are as follows.

- The chapter on "Scope" has been revised (see Chapter 1, Chapter 1 of the 2011 edition);

- A new chapter on "Terms and Definitions" has been added (see Chapter 3);

- A new chapter on "Experimental Conditions" has been added (see Chapter 5);

- Added "Calibration Requirements" (see 7.2) and "Metrological Verification or Calibration" (7.3) to the "Instruments and Equipment" section;

- Added sections related to "Sampling Type" (see 8.2), "Air Tightness Test of Sampling System" (see 8.3.1), and "Material of Sampling System" (see 8.3.1).

8.3.2), "Pressure and Flow Regulators" (8.3.3), and "Connection Method of Sampling Equipment" (see 8.3.5);

- Requirements for "shutdown" (see 9.4) and "exhaust emissions and treatment" (see 9.5) have been added;

- A new chapter on "Precision and Measurement Uncertainty" has been added (see Chapter 11);

- A new chapter on "Quality Assurance and Control" has been added (see Chapter 12);

- Added "Evaluation of Measurement Uncertainty of Component Content Determination Results" (see Appendix B).

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 by the China Petroleum and Chemical Industry Federation.

This document is under the jurisdiction of the National Technical Committee on Gas Standardization (SAC/TC206).

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The release history of this document and the document it replaces is as follows.

- First published in 2011 as GB/T 28124-2011;

- This is the first revision.

Gas analysis of trace amounts of hydrogen, oxygen, methane, and other inert gases Determination of carbon monoxide content by zirconium oxide gas chromatography Warning---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.

1 Scope

This document explains the principle of determining trace amounts of hydrogen, oxygen, methane, and carbon monoxide in inert gases using gas chromatography with a zirconia detector.

The document specifies the experimental conditions, reagents and materials, instruments and equipment, samples, experimental procedures, experimental data processing, precision and measurement uncertainty, and quality.

Requirements for quantity control and assurance and test reports.

This document applies to the determination of trace amounts of hydrogen, oxygen, methane, and carbon monoxide in nitrogen, helium, neon, argon, krypton, and xenon.

Range. (0.05~20)x10-6 (mole fraction).

2 Normative references

GB/T 8170

GB/T 43306

3 Terms and Definitions

The following terms and definitions apply to this document.

3.1 inert gases

A general term for nitrogen, helium, neon, argon, krypton, and xenon.

4 Principles

Based on the fact that hydrogen, oxygen, methane, and carbon monoxide can cause changes in electromotive force in a stable zirconium oxide solid electrolyte galvanic cell.

This type of galvanic cell is used as a detector in a gas chromatograph, employing components that are identical to or do not affect the separation of the target components in the gas sample being tested.

Using an inert gas as the carrier gas, at a certain temperature, the detector outputs a background electromotive force. When the analyte gas sample is separated by the chromatographic column, it is categorized as hydrogen, oxygen, etc.

Gas, methane, and carbon monoxide enter the detector in that order. Oxygen increases the oxygen content in the detector, leading to a background electromotive force.

This reduces the formation of negative chromatographic peaks; while hydrogen, methane, and carbon monoxide participate in electrochemical reactions in the detector, generating positive electromotive force, leading to this...

An increase in the base voltage results in a positive chromatographic peak. The target component in the analyte gas sample is calculated using a comparative method and gas standard samples. content.

5 Test conditions

The following requirements should be met.

- Ambient temperature. 5°C~40°C;

- Relative humidity. 20%~85%;

- There is no strong electromagnetic interference, no corrosive gases, and no strong vibrations in the surrounding area;