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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 5275.7-2025

Replacing GB/T 5275.7-2014

**Gas analysis - Preparation of calibration gas mixtures using
dynamic methods - Part 7: Thermal mass-flow controllers**

气体分析 动态法制备校准用混合气体 第7部分：热式质量流量控制器

(English Translation)

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Table of Contents

Preface
Introduction
1 Scope
2 Normative References
3 Terms and Definitions
4 Symbols
5 Principle
6 Main Components
6.1 Overview
6.2 Constant Flow Source Thermal Mass Flow Controller
6.3 Thermostatically Controlled Thermal Mass Flow Controller
7 Preparation of mixed gases
7.1 Test Procedure
7.2 Valid Scope
7.3 Operating Conditions
8 Calculate
8.1 Volume fraction
8.2 Sources of Uncertainty
8.3 Measurement Uncertainty
Appendix A (Informative) Preparation of High Dilution Ratio Mixtures Using Premixed Gases
A.1 Calculation of Volume Fraction
A.2 Uncertainty of volume fraction
Appendix B (Informative) Application Tips
B.1 Equipment
B.2 Operation
B.3 Calibration and Accuracy
Appendix C (Informative) Calculation of Uncertainty

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 7 of GB/T 5275. GB/T 5275 has the following parts published.

- Preparation of Calibration Mixtures for Dynamic Gas Analysis - Part 1: General Requirements;
- Preparation of Calibration Mixtures for Dynamic Gas Analysis - Part 2: Piston Pumps;
- Preparation of Calibration Mixtures for Gas Analysis Using Dynamic Volumetric Methods, Part 4: Continuous Injection Method;
- Preparation of Calibration Mixtures for Gas Analysis Using Dynamic Volumetric Methods, Part 5: Capillary Calibrators;
- Preparation of Calibration Mixtures for Dynamic Gas Analysis, Part 6: Critical Flow Through Sharp Orifices;
- Preparation of Calibration Mixtures for Dynamic Gas Analysis - Part 7: Thermal Mass Flow Controllers;
- Preparation of Calibration Mixtures for Gas Analysis Using Dynamic Volumetric Methods, Part 8: Diffusion Methods;
- Preparation of Calibration Mixtures for Gas Analysis Using Dynamic Volumetric Methods, Part 9: Saturation Method;
- Preparation of Calibration Mixtures for Gas Analysis Using Dynamic Volumetric Methods, Part 10: Permeation Method;
- Preparation of Calibration Mixtures by Dynamic Volumetric Methods for Gas Analysis, Part 11: Electrochemical Generation Methods.

This document replaces GB/T 5275.7-2014 "Preparation of Calibration Mixtures by Dynamic Volumetric Method for Gas Analysis - Part 7: Thermal Mass Analyzer".

Compared with GB/T 5275.7-2014, the main technical changes in the "Flow Controller" standard, apart from structural adjustments and editorial modifications, are as follows.

- Corrected a bug in the dilution ratio calculation (see 7.1, 6.1 in the 2014 version);
- Added restrictions on volume fraction calculations (see 8.1);
- Added the method for verifying the composition of the calibration gas mixture prepared by the mixing system (see 8.3).

This document is equivalent to ISO 6145-7:2018 "Gas analysis - Dynamic methods - Preparation of calibration mixtures - Part 7: Thermal mass spectrometry".

Flow controller.

The following minimal editorial changes have been made to this document.

---The uncertainty figures have been corrected, and the $\pm$ sign before the uncertainty figures has been removed (see 7.1);

---The reference 6.1 in note B.1 of Appendix B is corrected to 7.1;

---Corrected the representation of ϕ_A in Appendix C and the editorial errors in the formula for calculating the relative standard uncertainty (see Appendix C).

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).

Introduction

Dynamic methods are a major class of important methods for preparing calibration gas mixtures, and ISO has specifically developed the ISO 6145 series of standards for this purpose.

(ISO 6145-3 is obsolete).

GB/T 5275 (all parts) is equivalent to the ISO 6145 series of standards. Due to its length, ISO 6145 is divided into 11 parts.

GB/T 5275 is consistent with ISO 6145, and is also divided into 11 parts. Since ISO 6145-3 has been repealed, GB/T 5275 Part 3...

Some parts are also correspondingly missing. GB/T 5275 (all parts) specifies the general requirements for the preparation of calibration mixed gases by dynamic methods, and specifically specifies...

The principles, main equipment, preparation precautions, and preparation results of nine methods for preparing calibration mixed gases, including the thermal mass flow controller method, are defined.

The technical requirements for calculating the component content (volume fraction) and evaluating the uncertainty of the calibration gas mixture must be met to ensure the accuracy of the prepared calibration gas mixture.

Improve the quality of the mixed gas and enhance the preparation level of the mixed gas for calibration.

GB/T 5275 (all parts) is intended for use by trained and experienced professionals.

GB/T 5275 consists of ten parts.

---Part 1: General Requirements. This section specifies the basic information and applicability of each preparation method, operational precautions for dynamic preparation systems, etc.

The calibration methods for dynamic preparation systems, the calculation and verification methods of the content and uncertainty of each component in the calibration mixed gas, etc.

This component forms the basis for the other nine parts. Its purpose is to provide a framework for the rational selection of one or more calibration gas mixture preparation methods.

Basic information, and linking the methods described in these nine parts with national measurement standards to ensure the composition of the prepared gas mixture.

Metrological traceability.

---Part 2: Piston Pumps. The purpose is to provide a method for the continuous preparation of calibration mixtures from pure gases and mixed gases using a piston pump.

The method, the calculation method of the content of each component in the prepared calibration gas mixture, and the uncertainty evaluation method.

---Part 4: Continuous Injection Method. The purpose is to provide a method for continuously injecting pure gas or a gas mixture into a balanced gas via a syringe.

A method for continuously preparing calibration gas mixtures by means of standard components, and a method for calculating the content of each component in the prepared calibration gas mixture.

Calculation methods and uncertainty assessment methods.

---Part 5: Capillary Calibrator. The purpose is to provide a device that utilizes single or multiple capillary combinations to calibrate pure gas or mixed gas.

A method for continuously preparing calibration mixed gases, and a method for calculating the content of each component in the prepared calibration mixed gas.

And the uncertainty assessment method.

---Part 6: Critical Flow Sharp Orifice. The purpose is to provide a method for the continuous preparation of calibrated mixtures from pure gas or gas mixtures using a critical flow sharp orifice.

The gas method, the calculation method of the content of each component in the prepared calibration gas mixture, and the uncertainty assessment method.

---Part 7: Thermal Mass Flow Controllers. The purpose is to provide a method for using thermal mass flow controllers to handle pure gas or gas mixtures.