

ICS 71.100.20
CCS G 86



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

GB/T 41752-2022

Gas analysis - Investigation and treatment of analytical bias

Issued on: October 12, 2022

Implemented on: October 12, 2022

**Issued by: State Administration for Market Regulation, China National
Standardization Administration**

Table of Contents

Preface	
Introduction	
1 Scope	1
2 Normative references	1
3 Terms and Definitions	1
4 symbols	2

foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for Standardization Work Part 1. Structure and Drafting Rules for Standardization Documents" drafting.

This document is modified to adopt ISO 15796.2005 "Research and Treatment of Analysis Bias in Gas Analysis".

Compared with ISO 15796.2005, this document has made the following structural adjustments.

--- A chapter on normative references has been added;

--- Adjust the symbol descriptions in 5.2.1.1 and 5.2.2.1 to Chapter 4.

The technical differences between this document and ISO 15796.2005 and their reasons are as follows.

---Change the angle brackets (such as $\langle x \rangle$) representing the average value in the text to an overscore (such as $\bar{x}$), because the overscore is common in our country

The symbolic expression of the average value of ;

---Change the term "traceability" to "measurement traceability", the term "traceability" comes from the term in the old version of VIM

--- Change " $d > 2u[d]$ " in "multiplicative drift correction" to " $d \leq 2u[d]$ " (see 5.3.3), here is the errata;

--- Changed the formula (32) (see 6.2.3.3), here is the errata;

--- Changed the formula (39) (see 6.3.4), here is the errata.

Please note that some contents of this document may refer to patents. The issuing agency

of this document assumes no responsibility for identifying patents.

Introduction

Metrological traceability is key to quality assurance in gas analysis. Metrological traceability usually refers to uninterrupted calibration through documentation

Chain, the property that links a measurement result to a measurement reference standard. If a measurement proves to be insignificant through an uninterrupted chain of comparisons

Significant bias means that the measurement result has metrological traceability within the specified uncertainty range. Metrological traceability through having a clear measurement

It is reflected in the analytical procedure of the amount concentration range and matrix composition, rather than the result of a single measurement. Measurement of relevant components by an analytical procedure has been traced

If it can be shown that the measurement results are not biased, or the bias has been corrected, then the analytical procedure can be regarded as having a representative sample of the source.

traceability. A representative sample can be a reference gas mixture or a specific sample measured in parallel using a reference analytical procedure.

"Bias" is an estimate of what we usually call "systematic error". "Systematic error" together with "random error" constitutes measurement error.

"Systematic error" means that component of measurement error that remains constant or varies in a predictable manner across repeated measurements, and is generally determined by imperfections in the analytical procedure.

It is easy to introduce, and correction compensation can be used for known system errors. ISO 15796 gives the common types of "bias" in gas analysis respectively

Corresponding research and processing methods have been proposed, which has a significant guiding role for workers in the field of gas analysis.

In this document, the term "concentration" has two meanings.

--- As a general term in gas composition analysis, replace the term "content" (see ISO 7504 [4]);

--- As a general alternative term for a specific analyte in gas composition analysis, such as the mass concentration or mole fraction of a specific analyte (see ISO 7504[4]).

Research and Treatment of Analytical Bias in Gas Analysis

1 Scope

This document describes the analysis and correction of bias (systematic error) in gas analysis procedures using a reference gas mixture or a reference analysis procedure.

difference), and a general method for assessing the uncertainty of the corrected value.

The main sources of (and contributors to) analytical procedure bias are instrument drift and matrix interferences, which typically vary with analyte concentration.

Therefore, this document describes the following two methods.

--- Drift analysis and correction of analytical systems with limited stability;

---For a stable analysis system with determined gas sample composition, its bias can be used in subsequent method development and analysis after research and mastery used in method validation studies.

This document establishes two procedures applicable to the analysis of system effects.

a) retrospectively model observed deviations and correct their effects;

b) Averaging system effects and expanding uncertainties.

Usually, the first procedure requires more work, but can obtain smaller uncertainties.

For ease of use, the methods described in this document are all used to analyze gas composition procedures, for example, the concentration of a specific analyte in a mixed gas measurement procedure. These methods are equally applicable to the measurement of physical or chemical properties of pure or mixed gases in relation to gas analysis.

2 Normative references

The contents of the following documents constitute the essential provisions of this document through normative references in the text. Among them, dated references

For documents, only the version corresponding to the date is applicable to this document; for undated reference documents, the latest version (including all amendments) is applicable to

this document.

GB/T 6379.3 Accuracy of measurement methods and results (trueness and precision) Part 3. Standard measurement method precision

Intermediate measurement (GB/T 6379.3-2012, ISO 5725-3:1994, IDT)

GB/T 10628 Determination and verification comparison method of gas analysis and calibration gas mixture composition (GB/T 10628-2008,

ISO 6143.2001, IDT)

GB/T 27418-2017 Evaluation and Expression of Measurement Uncertainty (ISO /IEC Guide98-3.2008, MOD)

3 Terms and Definitions

The following terms and definitions apply to this document.

3.1

bias

An estimate of the systematic error.

Note. Since the true value of the measurand cannot be known exactly, the systematic error cannot be accurately measured and can only be estimated using reference values.

3.2

correction

The procedure for making adjustments to uncorrected measurements to compensate for systematic errors.

Note 1 to entry. A procedure for adjusting uncorrected measurements to compensate for systematic errors. Since the systematic error cannot be fully known, this compensation does not

completely.

Note 2. In ISO /IEC Guide99 [5], the meaning of this term is different.