

FINAL
DRAFT

INTERNATIONAL
STANDARD

ISO/FDIS
11626

ISO/TC 193/SC 1

Secretariat: NEN

Voting begins on:
2023-12-07

Voting terminates on:
2024-02-01

Natural gas — Determination of sulfur compounds — Determination of hydrogen sulfide content by UV absorption method

*Gaz naturel — Détermination des composés soufrés — Détermination
de la teneur en sulfure d'hydrogène par la méthode d'absorption UV*

iTeh Standards

(<https://standards.iteh.ai>)

Document Preview

ISO/FDIS 11626

<https://standards.iteh.ai/catalog/standards/sist/bf25e66f-8981-4409-b769-463ecfe4b855/iso-fdis-11626>

RECIPIENTS OF THIS DRAFT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY RELEVANT PATENT RIGHTS OF WHICH THEY ARE AWARE AND TO PROVIDE SUPPORTING DOCUMENTATION.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.



Reference number
ISO/FDIS 11626:2023(E)

© ISO 2023

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[ISO/FDIS 11626](https://standards.iteh.ai/catalog/standards/sist/bf25e66f-8981-4409-b769-463ecfe4b855/iso-fdis-11626)

<https://standards.iteh.ai/catalog/standards/sist/bf25e66f-8981-4409-b769-463ecfe4b855/iso-fdis-11626>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2023

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword.....	iv
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	1
4 Test conditions.....	1
5 Principle.....	2
6 Instrument.....	2
6.1 General requirements.....	2
6.2 Sample processing system.....	2
6.3 Optical analysis system.....	3
6.4 Data processing and recording system.....	3
7 Reagents and materials.....	3
7.1 Zero gas.....	3
7.2 Hydrogen sulfide calibration gas mixture.....	3
7.3 Hydrogen sulfide absorption solution.....	3
8 Sampling.....	3
8.1 Installation location.....	3
8.2 Materials requirement.....	3
8.3 Online sampling requirement.....	3
9 Sample testing.....	4
9.1 Instrument status confirmation.....	4
9.2 Calibration curve establishment.....	4
9.2.1 General.....	4
9.2.2 Single-point calibration.....	4
9.2.3 Multi-point calibration.....	4
9.3 Analytical procedure.....	4
10 Instrument verification.....	5
11 Precision.....	5
11.1 Repeatability, r	5
11.2 Reproducibility, R	5
12 Uncertainty evaluation.....	6
12.1 Principle.....	6
12.2 Random uncertainty of test results ($u_{rel,As}$).....	6
12.3 Uncertainty of calibration signal ($u_{rel,Aref}$).....	6
12.4 Uncertainty of reference material ($u_{rel,Cref}$).....	6
12.5 Combined uncertainty of reported result ($u_{rel,Cs}$).....	6
12.6 Expanded uncertainty of reported result ($U_{rel,Cs}$).....	6
Annex A (informative) Example of statistical procedure for estimation of the precision.....	7
Bibliography.....	12

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 193, *Natural gas*, Subcommittee SC 1, *Analysis of natural gas*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Natural gas — Determination of sulfur compounds — Determination of hydrogen sulfide content by UV absorption method

1 Scope

This document describes the test method for the determination of hydrogen sulfide content in natural gas by UV absorption method.

This document applies to the determination of hydrogen sulfide content in natural gas, in the range from 1 mg/m³ to 50 mg/m³.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6141, *Gas analysis — Contents of certificates for calibration gas mixtures*

ISO 6142-1, *Gas analysis — Preparation of calibration gas mixtures — Part 1: Gravimetric method for Class I mixtures*

ISO 6143, *Gas analysis — Comparison methods for determining and checking the composition of calibration gas mixtures*

ISO 6145, *Gas analysis — Preparation of calibration gas mixtures using dynamic methods*

ISO 10715, *Natural gas — Gas sampling*

ISO 12963, *Gas analysis — Comparison methods for the determination of the composition of gas mixtures based on one- and two-point calibration*

ISO 14532, *Natural gas — Vocabulary*

ISO 14912, *Gas analysis — Conversion of gas mixture composition data*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14532 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Test conditions

The test conditions are the same as the calibration conditions.

The reference conditions of the measurement results are the same as those on the calibration gas certificates.

NOTE The reference conditions on the calibration gas certificates usually are 101,325 kPa, 20 °C or 101,325 kPa, 15 °C or 101,325 kPa, 0 °C.

5 Principle

5.1 The ultraviolet (UV) light emitted by the light source is split by a grating or a prism, absorbed by a gas sample and then projected onto a photomultiplier tube. After the photoelectric conversion and amplification of the drawn ultraviolet absorption spectrum, hydrogen sulfide can be quantitatively analysed. The absorbance detected by the receiving unit and the content of hydrogen sulfide in the measured gas conform to Lambert-Beer's law.

5.2 The UV light is delivered from the pulsed light source to the flow cell by a fibre-optic cable. In the flow cell, the continuous natural gas samples interact with the light in an optical path. Hydrogen sulfide absorbs different amounts of light at different wavelengths. The UV light leaves the flow cell after passing through the sample and then goes to the spectrum analyser through the optical fibre. A spectroscopic holographic grating decomposes UV light into continuous wavelengths, focuses each decomposed wavelength on a specific photodiode on the diode array and calculates the hydrogen sulfide content according to Lambert-Beer's law through a built-in algorithm.

5.3 Calculation formula: if the analytical signal is absorbance, the content of hydrogen sulfide is calculated by [Formula \(1\)](#):

$$C_S = \frac{A_S}{A_{ref}} C_{ref} \quad (1)$$

where

C_S is the content of hydrogen sulfide in the natural gas sample, expressed in mg/m³;

A_S is the absorbance of hydrogen sulfide in the natural gas sample;

C_{ref} is the content of hydrogen sulfide in the calibration gas, expressed in mg/m³;

A_{ref} is the absorbance of hydrogen sulfide in the calibration gas.

6 Instrument

6.1 General requirements

Choose an instrument with an appropriate measuring range according to the content of hydrogen sulfide in the analysed gas. The instrument shall be regularly maintained to ensure its performance according to the instrument manual. The instrument shall meet the requirements of the work site, including but not limited to, explosion-proof, power supply, air tightness, etc.

6.2 Sample processing system

The sample processing system shall ensure that there is no water, liquid hydrocarbon and particulate matter in the sample. Adjust the sample gas to the injection pressure and temperature required by the instrument, and keep them stable.