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Natural gas — Upstream area — Determination of hydrogen sulfide content by laser absorption spectroscopy

Gaz naturel — Zone amont — Détermination de la teneur en sulfure d'hydrogène par spectroscopie par absorption laser

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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 documents 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).

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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 3, *Upstream area*.

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.

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Introduction

Four methods for determination of sulfur compounds in natural gas already exist as International Standards:

— ISO 6326-3, *Natural gas — Determination of sulfur compounds — Part 3: Determination of hydrogen sulfide, mercaptan sulfur and carbonyl sulfide sulfur by potentiometry*;

— ISO 6326-5, *Natural gas — Determination of sulfur compounds — Part 5: Lingener combustion method*;

— ISO 16960, *Natural gas — Determination of sulfur compounds — Determination of total sulfur by oxidative microcoulometry method*;

— ISO 19739, *Natural gas — Determination of sulfur compounds using gas chromatography*;

— ISO 20729, *Natural gas — Determination of sulfur compounds — Determination of total sulfur content by ultraviolet fluorescence method*.

Laser absorption spectroscopy is a more efficient method compared with chemical titration because it is an optical and instrumental method. It offers a more convenient and more stable means to analyse H_2S in upstream area natural gas.

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Natural gas — Upstream area — Determination of hydrogen sulfide content by laser absorption spectroscopy

WARNING — The use of this document can involve hazardous materials, operations and equipments. This document does not aim to address all of the safety problems associated with its use. It is the responsibility of the user of this document to establish appropriate safety and health practices and to determine the applicability of any other restrictions prior to use.

1 Scope

This document specifies a method for the determination of hydrogen sulfide content in working field natural gas of upstream area by laser absorption spectroscopy. The analytical range expressed as mole fraction is 10×10^{-6} to 20 %. The analytical range can be expanded to higher content with specific instrument requirements.

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 10715, *Natural gas — Sampling guidelines*

ISO 11095, *Linear calibration using reference materials*

3 Terms and definitions

No terms and definitions are listed in this document.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Principle

4.1 Working principle of the hydrogen sulfide laser absorption analyser

The sketch of the measuring principle is shown in Figure 1. Semiconductor laser generator generates a laser beam, the laser beam goes through the sample. Then, the laser beam is detected by the photoelectric sensor. The energy of the laser beam is attenuated because of the absorption by the testing sample. The absorbance obeys the Lambert-Beer law.

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