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Analysis of natural gas — Biomethane — Determination of VOCs by thermal desorption gas chromatography with flame ionization and/or mass spectrometry detectors

Analyse du gaz naturel — Biométhane — Détermination des COV par chromatographie en phase gazeuse à désorption thermique avec détecteurs à ionisation de flamme et/ou spectrométrie de masse

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Foreword

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This document was prepared by Technical Committee ISO/TC 193, *Natural gas*, Subcommittee SC 1, *Analysis of natural gas,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 408, *Natural gas and biomethane for use in transport and biomethane for injection in the natural gas grid,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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.

Introduction

This document supports the implementation of specifications for biomethane and biogas when used in the natural gas grids and when used as a transport fuel. Implementation of these specifications require fit-for-purpose test methods with known performance and acceptable metrological traceability to support the trade in renewable gases and conformity assessment.

Depending on the production method, biogas usually contains volatile organic compounds (VOCs) such as terpenes, siloxanes, hydrocarbons, sulfur containing compounds, oxygenated hydrocarbons, halogenated hydrocarbons, ketones, alcohols, and esters. VOCs can also be found in the biomethane even after upgrading.

Analysis of natural gas — Biomethane — Determination of VOCs by thermal desorption gas chromatography with flame ionization and/or mass spectrometry detectors

1 Scope

This document describes a method for sampling and analysis of volatile organic compounds (VOCs), including siloxanes, terpenes, organic sulfur compounds, in natural gas and biomethane matrices, using thermal desorption gas chromatography with flame ionization and/or mass spectrometry detectors (TD-GC-FID/MS).

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 14532, *Natural gas — Vocabulary*

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 Principle

A measured volume of sample gas is drawn through one sorbent tube where VOCs are retained while highly volatile organic compounds as methane matrix gas pass through. Desorption of the tubes is then carried out by thermal desorption (TD) in which the adsorbed substances are released with heat and then transferred into a gas chromatograph (GC) equipped with a capillary column, a mass spectrometer (MS) and/or a flame ionization detector (FID). MS data of the separated VOC components are compared with a mass spectral library for compound identification. The use of the specific ions in addition to the retention time ensure positive identification of a given VOC. Retention indices can also be used to identify peaks by comparing measured retention indices with tabulated values. Quantification is performed using either the FID and/or the MS detector. The expected quantification limit is (2-5) ng which is equivalent to (20-50) µg/m^3 in the sampled gas assuming a 100 ml gas sample volume.

5 Reagents and materials

5.1 Individual VOCs

For calibration purposes, purity > 99 %. Standard mixtures commercially available.