INTERNATIONAL STANDARD

ISO 22854

Fourth edition
2021-07

Liquid petroleum products — Determination of hydrocarbon types and oxygenates in automotive-motor gasoline and in ethanol (E85) automotive fuel — Multidimensional gas chromatography method

Produits pétroliers liquides — Détermination des groupes d'hydrocarbures et de la teneur en composés oxygénés de l'essence pour moteurs automobiles et du carburant éthanol pour automobiles E85 — Méthode par chromatographie multidimensionnelle en phase gazeuse

Reference number
ISO 22854:2021(E)

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

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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 28, *Petroleum and related products, fuels and lubricants from natural or synthetic sources*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 19, *Gaseous and liquid fuels, lubricants and related products of petroleum, synthetic and biological origin,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 22854:2016), which has been technically revised.

The main changes compared to the previous edition are as follows:

— the Scope and precision have been extended in concentration range;

— the precision statement has been updated;

— new examples of typical chromatograms have been added to Annex B;

— the text has been further harmonized with ASTM D6839[7].

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

Previous editions of this document were used for determination of saturated, olefinic, aromatic and oxygenated hydrocarbons in automotive motor gasoline according to European fuel specifications.

An interlaboratory study has shown that the method can be used for gasolines with a higher concentration of oxygenated compounds, including methanol. The interlaboratory study also provided data to calculate precision for toluene in gasoline.

Annex B now includes example chromatograms of gasolines with a variety of oxygenates which can be used for the correct identification of these oxygenates.

The test method described in this document is harmonized with ASTM D6839[7].

Liquid petroleum products — Determination of hydrocarbon types and oxygenates in automotive-motor gasoline and in ethanol (E85) automotive fuel — Multidimensional gas chromatography method

1 Scope

This document specifies the gas chromatographic (GC) method for the determination of saturated, olefinic and aromatic hydrocarbons in automotive motor gasoline and ethanol (E85) automotive fuel. Additionally, the benzene and toluene content, oxygenated compounds and the total oxygen content can be determined.

NOTE 1 For the purposes of this document, the terms % (*m/m*) and % (*V/V*) are used to represent respectively the mass fraction, *w*, and the volume fraction, *φ*.

This document defines two procedures, A and B.

Procedure A is applicable to automotive motor gasoline with total aromatics of 19,32 % (*V/V*) up to 46,29 % (*V/V*); total olefins from 0,40 % (*V/V*) up to 26,85 % (*V/V*); oxygenates from 0,61 % (*V/V*) up to 9,85 % (*V/V*); oxygen content from 1,50 % (*m/m*) to 12,32 % (*m/m*); benzene content from 0,38 % (*V/V*) up to 1,98 % (*V/V*) and toluene content from 5,85 % (*V/V*) up to 31,65 % (*V/V*).

The method has also been tested for individual oxygenates. A precision has been determined for a total volume of methanol from 1,05 % (*V/V*) up to 16,96 % (*V/V*); a total volume of ethanol from 0,50 % (*V/V*) up to 17,86 % (*V/V*); a total volume of MTBE from 0,99 % (*V/V*) up to 15,70 % (*V/V*), a total volume of ETBE from 0,99 % (*V/V*) up to 15,49 % (*V/V*), a total volume of TAME from 0,99 % (*V/V*) up to 5,92 % (*V/V*), and a total volume of TAEE from 0,98 % (*V/V*) up to 15,59 % (*V/V*).

Although this test method can be used to determine higher-olefin contents of up to 50 % (*V/V*), the precision for olefins was tested only in the range from 0,40 % (*V/V*) to 26,85 % (*V/V*).

Although specifically developed for the analysis of automotive motor gasoline that contains oxygenates, this test method can also be applied to other hydrocarbon streams having similar boiling ranges, such as naphthas and reformates.

NOTE 2 For Procedure A, applicability of this document has also been verified for the determination of *n*-propanol, acetone, and di-isopropyl ether (DIPE). However, no precision data have been determined for these compounds.

Procedure B describes the analysis of oxygenated groups (ethanol, methanol, ethers, C3 – C5 alcohols) in ethanol (E85) automotive fuel containing ethanol between 50 % (*V/V*) and 85 % (*V/V*). The gasoline is diluted with an oxygenate-free component to lower the ethanol content to a value below 20 % (*V/V*) before the analysis by GC.

The sample can be fully analysed including hydrocarbons. Precision data for the diluted sample are only available for the oxygenated groups.

NOTE 3 For Procedure B, the precision can be used for an ethanol fraction from about 50 % up to 85 % (*V/V*). For the ether fraction, the precision as specified in Table 6 can be used for samples containing at least 11 % (*V/V*) of ethers. For the higher alcohol fraction, too few data were obtained to derive a full precision statement and the data presented in Table 6 are therefore only indicative.

NOTE 4 An overlap between C9 and C10 aromatics can occur. However, the total is accurate. Isopropyl benzene is resolved from the C8 aromatics and is included with the other C9 aromatics.