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Petroleum products and other liquids — Standard test method for ethanol determination in gasoline blends by gas chromatography

Produits pétroliers et autres liquides - Éthanol — Détermination de l'éthanol dans les mélanges d'essence par chromatographie en phase gazeuse

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Foreword

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This document was prepared by Technical Committee ISO/TC 28, *Petroleum and related products, fuels and lubricants from natural or synthetic sources*, Subcommittee SC 7, *Liquid Biofuels*.

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.

Petroleum products and other liquids — Standard test method for ethanol determination in gasoline blends by gas chromatography

1 Scope

This document establishes a method for determining the ethanol content in gasoline blends by gas chromatography (GC). This method is applicable to gasoline samples with ethanol contents ranging from 1,02 % to 52,3 %, in volume fraction.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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/

3.1
gasoline
hydrocarbon fuel or blends thereof, which is liquid at atmospheric pressure and is used in spark ignition engines

4 Principle

A sample is analysed by gas chromatography, using a flame ionization detector, split/splitless injector, nonpolar column, and external standardization technique for quantifying the ethanol content in gasoline blends.

5 Apparatus

5.1 Gas chromatograph equipped with a flame ionization detector, split/splitless inlet, automatic sampler, and oven with programmable temperature.

5.2 Electronic instrument for data acquisition, integrated with software for data processing.

5.3 Fused-silica capillary column with nonpolar stationary phase, 100 % dimethylpolysiloxane, and dimensions of 50 m x 0,20 mm x 0,50 µm.

5.4 Analytical balance, with minimum resolution of 0,1 mg.

5.5 GC autosampler vials (e.g 2 ml of volume capacity) with cap and septa [e.g septa of rubber-membrane/self-sealing polytetrafluoroethylene (PTFE)].

5.6 Micro syringe, with a volume of 5 µl or 10 µl, for automatic GC sampler.

5.7 Calibrated volumetric flasks.

5.8 Calibrated pipettes.

6 Reagents

6.1 Ethanol, 99,8 % minimum purity.

In cases of doubt about the ethanol's purity, it is recommended that the water content be verified by coulometric Karl Fischer method, and the result considered in 7.2.7.

6.2 *n*-Heptane or isooctane, 99,5 % minimum purity.

6.3 Carrier gas, hydrogen or helium, 99,995 % minimum purity, gas chromatography quality, dried, and free from organic impurities.

6.4 Auxiliary gases, hydrogen, nitrogen and air, 99,995 % minimum purity, gas chromatography quality, free from organic impurities.

7 Procedure

7.1 Preparation of the apparatus

7.1.1 Install column ends in the chromatograph's injector and detector in accordance with the procedures described in the equipment manufacturer's manual.

7.1.2 Establish a constant pressure at the column inlet, of about 88,25 kPa if using hydrogen as carrier gas, or 171,6 kPa if using helium.

7.1.3 Adjust the following operating conditions on the chromatograph:

a) oven temperature programming, in accordance with Table 1;

Table 1 — Oven temperature programming

Heating rate (°C min^{-1})	Temperature (°C)	Time (min)
_ _	35	6
20	250	10

b) detector temperature: 300 °C;

c) auxiliary nitrogen (make-up gas), hydrogen and synthetic air flows;

It is recommended to use the flow values provided by the manufacturer. The recommended values are nitrogen 35 ml min^{-1}, hydrogen 30 ml min^{-1} and synthetic air 350 ml min^{-1}.

d) injector temperature: 250 °C;

e) injector split ratio: 300:1;

f) injection volume: 1,0 µl;

g) analysis time: 26,75 minutes.