Edition: BP 2025 (Ph. Eur. 11.6 update)

Helium

General Notices

(Ph. Eur. monograph 2155)

He 4.00

Ph Eur

DEFINITION

Content

Minimum 99.5 per cent *V/V* of He.

This monograph applies to helium obtained by separation from natural gas and intended for medicinal use.

CHARACTERS

Appearance

Colourless, inert gas.

IDENTIFICATION

Examine the chromatograms obtained in the assay. The retention time of the principal peak in the chromatogram obtained with the substance to be examined is approximately the same as that of the principal peak in the chromatogram obtained with the reference gas.

TESTS

Methane

Maximum 50.0 ppm *V/V*.

Infrared analyser.

Gas to be examined The substance to be examined. It must be filtered to avoid stray light phenomena (3 µm filter).

Reference gas (a) *helium for chromatography R*.

Reference gas (b) Mixture containing 50.0 ppm *V/V* of *methane R* in *helium for chromatography R*.

The infrared analyser generally comprises an infrared source emitting broadband infrared radiation, an optical device, a sample cell, a detector and in some analysers a reference cell. The optical device may be positioned either before or after

the sample cell. It consists of one or more optical filters, through which the broadband radiation is passed. The optical device is selected for methane determination. The measurement light beam passes through the sample cell and may also pass through a reference cell if the analyser integrates such a feature. When methane is present in the sample cell, absorption of energy in the measurement light beam will occur according to the Beer-Lambert law, and this produces a change in the detector signal. This measurement signal is compared to a reference signal to generate an output related to the concentration of methane. The generated signal is linearised in order to determine the methane content.

Calibrate the apparatus and set the sensitivity using reference gases (a) and (b). Measure the methane content in the gas to be examined.

Oxygen

Maximum 50.0 ppm *V/V*, determined using an oxygen analyser equipped with an electrochemical cell and a detector scale ranging from 0-100 ppm *V/V*.

The gas to be examined passes through a detection cell containing an aqueous solution of an electrolyte, generally potassium hydroxide. The presence of oxygen in the gas to be examined produces a variation in the electric signal recorded at the outlet of the cell that is proportional to the oxygen content.

Calibrate the analyser according to the instructions of the manufacturer. Pass the gas to be examined through the analyser using a suitable pressure regulator and airtight metal tubes and operating at the prescribed flow rates until constant readings are obtained.

Water (*2.5.28*)

Maximum 67 ppm *V/V*.

ASSAY

Gas chromatography (*2.2.28*).

Gas to be examined The substance to be examined.

Reference gas *helium for chromatography R*.

Column:

— *size*: *l* = 2 m, Ø = 4.5 mm;

— *stationary phase*: *molecular sieve for chromatography R* (0.5 nm).

Carrier gas *argon for chromatography R*.

Flow rate 60 mL/min.

Temperature:

— *column*: 50 °C;

— *detector*: 150 °C.

Detection Thermal conductivity.

Injection 0.5 mL.

Inject the reference gas. Adjust the injected volumes and operating conditions so that the height of the peak due to helium in the chromatogram obtained is at least 35 per cent of the full scale of the recorder.

System suitability Reference gas:

— *symmetry factor*: minimum 0.6.

Calculate the content of He in the gas to be examined.

STORAGE

As compressed gas or liquid at cryogenic temperature, in appropriate containers, complying with the legal regulations.

IMPURITIES

Specified impurities *A, B, C.*

A. CH_4: methane,

B. O_2: oxygen,

C. H_2O: water.

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