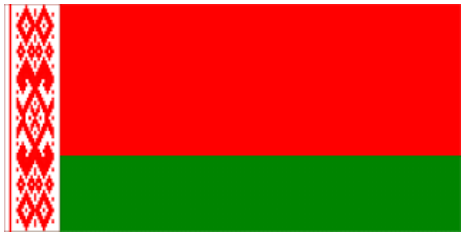

# УЛУЧШЕНИЕ ГОСУДАРСТВЕННЫХ И МЕЖГОСУДАРСТВЕННЫХ СТАНДАРТОВ КОНТРОЛЯ КАЧЕСТВА И БЕЗОПАСНОСТИ АЛКОГОЛЬНОЙ ПРОДУКЦИИ

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# Государственные и межгосударственные стандарты для определения летучих компонентов, в том числе метилового спирта, в алкогольной продукции

GB/T 11858-2009
GB/T 15038-2008
GB 5009.266-2016
GB/T 10781-2021

BIS IS 3752:2005(R2009)

Commission Regulation (EC) No. 2870/2000

AOAC Official Methods 972.10/11, 2005

Norma Mexicana NMX-V-005-NORMEX-2018

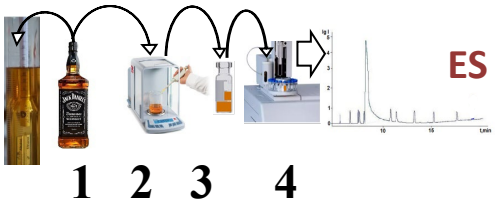
ГОСТ 30536
ГОСТ 31684
ГОСТ 33833
ГОСТ 33834
ГОСТ 33408
ГОСТ 32013
ГОСТ 31811
ГОСТ 14138
ГОСТ 32039
ГОСТ 12280
ГОСТ 13194
ГОСТ 32070
ГОСТ 32036
ГОСТ 10749.3
ГОСТ 10749.6
ГОСТ 10749.13
ГОСТ 10749.14
ГОСТ Р 57893
GOST P 52363
GOST P 51999
GOST P 55878
GOST P 57893
СТБ ГОСТ Р 51698

Все перечисленные национальные стандарты гармонизированы с Регламентом (ЕС) 2870/2000 и используют традиционный метод внутреннего стандарта.

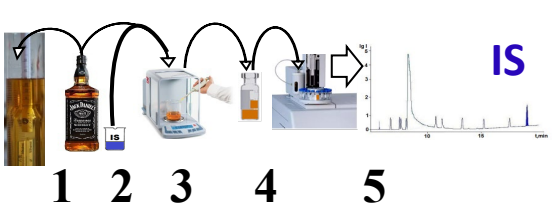
В государствах ЕАЭС одновременно действует более 20 стандартов по методу внешнего стандарта.

# Отличия методов

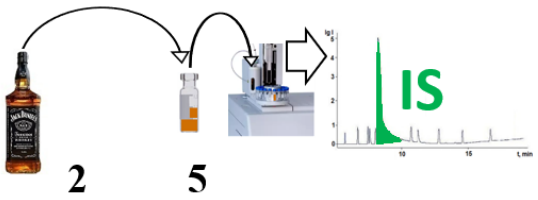
**Сегодня: Метод внешнего стандарта.**
**Только страны ЕАЭС.**




**Сегодня: Метод внутреннего стандарта**
**Китай, Индия, ЕС, США, Мексика, etc.**




**Завтра: Инновационный метод**
**Китай, Индия, ЕС, США, Мексика, etc.**




Определение массовой концентрации *i*-го летучего компонента $C(l)$ в *l*-ом исследуемом образце в размерности мг/л по методу внешнего стандарта проводится по формуле

$$\bar{C}_i(l) = RF_i \cdot \frac{1}{M}\sum_{j=1}^{M} A_{ij}(l),$$

где $A_{ij}(l)$ – величина отклика детектора на *i*-ый летучий компонент, полученная в результате *j*-го измерения *l*-го исследуемого образца, о. е.; $M$ – число измерений *l*-го исследуемого образца, $M \geq 2$.

Значения относительных коэффициентов отклика детектора на исследуемый летучий компонент рассчитывают по следующей формуле:

$$RF_i = \frac{\sum_{k,j}^{M,N} C_i^{st}(k,j) \cdot A_i^{st}(k,j)}{\sum_{k,j}^{M,N} A_i^{st}(k,j))^2}$$

Для расчета концентрации компонента, выраженной в мг/л б.с., необходимо крепость (объемное содержание этанола) образца и разделить на её процентное содержание по объёму.

В соответствии с традиционным методом внутреннего стандарта концентрацию i-го компонента в пересчете на мг/кг определяют по следующей формуле:

$$C_i(\text{мг/кг}) = RRF_i^{IS} \cdot \frac{A_i}{A_{IS}} \cdot C_{IS}(\text{мг/кг})$$

Значения относительных коэффициентов отклика детектора на исследуемый летучий компонент по отношению к отклику на выбранный внутренний стандарт рассчитывают по следующей формуле:

$$RRF_i^{IS} = \frac{C_i^{calibr}(\text{мг/кг})}{C_{IS}^{calibr}(\text{мг/кг})} \cdot \frac{A_{IS}^{calibr}}{A_i^{calibr}}$$

Для расчета концентрации компонента, выраженной в мг/л б.с., необходимо измерить плотность образца и определить его крепость (объемное содержание этанола):

$$C_i\left(\frac{\text{мг}}{\text{л}}\text{ б. с.}\right) = RRF_i^{IS} \cdot \frac{A_i}{A_{is}} \cdot C_{IS}(\text{мг/кг}) \cdot \frac{\rho_{\text{образца}}(\text{кг/л}) \cdot 100\ \%}{\text{"Крепость" (\%, } ABV)}$$

В соответствии с методом «Этанол как внутренний стандарт» концентрация i-го компонента в размерности мг/л безводного спирта (б.с.) определяют по следующей формуле:

$$C_i(\text{мг/л б.с.}) = RRF_i^{Eth} \cdot \frac{A_i}{A_{Eth}} \cdot \rho_{Eth}(\text{mg/L})$$

Значения относительных коэффициентов отклика детектора на исследуемый летучий компонент по отношению к отклику на этанол рассчитывают по следующей формуле:

$$RRF_i^{Eth} = \frac{C_i^{calibr}(\text{мг/л б,с,})}{\rho_{Eth}(\text{мг/л})} \cdot \frac{A_{Eth}^{calibr}}{A_i^{calibr}}$$

1. Нет необходимости добавлять в образец какой-либо внутренний стандарт.
2. Этанол всегда присутствует в алкогольной продукции и его концентрация в мг/л б.с. всегда известна со 100% гарантией и равна плотности этанола $\rho_{Eth} = 789270$ mg/L.

# Пропечатано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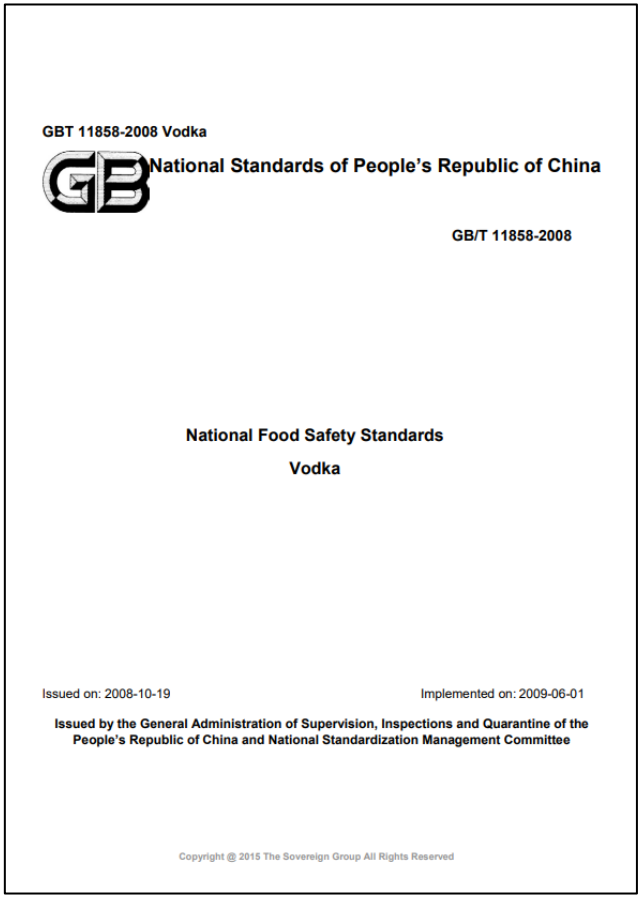
28. Improved document AOAC Official Method 972.11 (USA), https://elab.bsu.by/download.php?id=305
29. Improved document ГОСТ 30536-2013 https://elab.bsu.by/download.php?id=314
30. Improved document СТБ ГОСТ Р 51698-2001 https://elab.bsu.by/download.php?id=313

# Улучшения китайского стандарта GB/T 11858-2008

Использование предлагаемого метода обеспечивает высокую достоверность полученных данных, значительно сокращает временные, трудовые, материальные и финансовые затраты. Анализ летучих соединений в спиртных напитках еще никогда не был таким простым. Здесь вы можете ознакомиться с измененным текстом официальной методики, позволяющей проводить анализ алкогольных напитков по разработанной методике.

Места в текстовом документе, которые нужно удалить, выделены желтым цветом. Добавленные части текста выделены зеленым цветом.



GBT 11858-2008 Vodka

National Standards of People's Republic of China

GB/T 11858-2008

National Food Safety Standards

Vodka

Issued on: 2008-10-19

Implemented on: 2009-06-01

Issued by the General Administration of Supervision, Inspections and Quarantine of the People's Republic of China and National Standardization Management Committee

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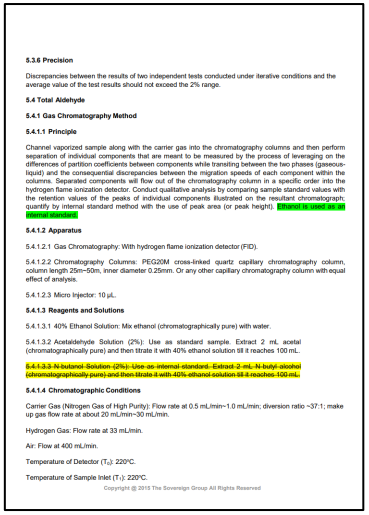

**5.3.6 Precision**

Discrepancies between the results of two independent tests conducted under iterative conditions and the average value of the test results should not exceed the 2% range.

**5.4 Total Aldehyde**

**5.4.1 Gas Chromatography Method**

**5.4.1.1 Principle**

Channel vaporized sample along with the carrier gas into the chromatography columns and then perform separation of individual components that are meant to be measured by the process of leveraging on the differences of partition coefficients between components while transiting between the two phases (gaseous-liquid) and the consequential discrepancies between the migration speeds of each component within the columns. Separated components will flow out of the chromatography column in a specific order into the hydrogen flame ionization detector. Conduct qualitative analysis by comparing sample standard values with the retention values of the peaks of individual components illustrated on the resultant chromatograph; quantify by internal standard method with the use of peak area (or peak height). Ethanol is used as an internal standard.

**5.4.1.2 Apparatus**

5.4.1.2.1 Gas Chromatography: With hydrogen flame ionization detector (FID).

5.4.1.2.2 Chromatography Columns: PEG20M cross-linked quartz capillary chromatography column, column length 25m~50m, inner diameter 0.25mm. Or any other capillary chromatography column with equal effect of analysis.

5.4.1.2.3 Micro Injector: 10 μL.

**5.4.1.3 Reagents and Solutions**

5.4.1.3.1 40% Ethanol Solution: Mix ethanol (chromatographically pure) with water.

5.4.1.3.2 Acetaldehyde Solution (2%): Use as standard sample. Extract 2 mL acetal (chromatographically pure) and then titrate it with 40% ethanol solution till it reaches 100 mL.

5.4.1.3.3 N-butanol Solution (2%): Use as internal standard. Extract 2 mL N-butyl alcohol (chromatographically pure) and then titrate it with 40% ethanol solution till it reaches 100 mL.

**5.4.1.4 Chromatographic Conditions**

Carrier Gas (Nitrogen Gas of High Purity): Flow rate at 0.5 mL/min~1.0 mL/min; diversion ratio ~37:1; make up gas flow rate at about 20 mL/min~30 mL/min.

Hydrogen Gas: Flow rate at 33 mL/min.

Air: Flow at 400 mL/min.

Temperature of Detector ($T_D$): 220°C.

Temperature of Sample Inlet ($T_I$): 220°C.

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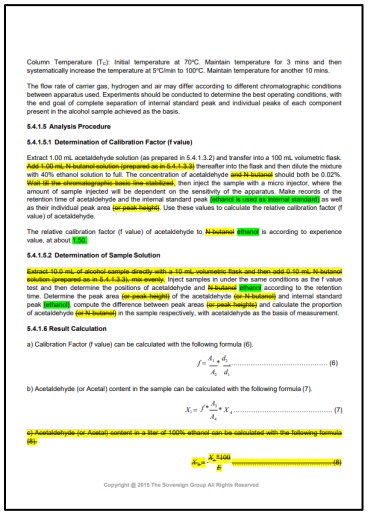

Column Temperature ($T_C$): Initial temperature at 70°C. Maintain temperature for 3 mins and then systematically increase the temperature at 5°C/min to 100°C. Maintain temperature for another 10 mins.

The flow rate of carrier gas, hydrogen and air may differ according to different chromatographic conditions between apparatus used. Experiments should be conducted to determine the best operating conditions, with the end goal of complete separation of internal standard peak and individual peaks of each component present in the alcohol sample achieved as the basis.

**5.4.1.5 Analysis Procedure**

**5.4.1.5.1 Determination of Calibration Factor (f value)**

Extract 1.00 mL acetaldehyde solution (as prepared in 5.4.1.3.2) and transfer into a 100 mL volumetric flask. Add 1.00 mL N-butanol solution (prepared as in 5.4.1.3.3) thereafter into the flask and then dilute the mixture with 40% ethanol solution to full. The concentration of acetaldehyde and N-butanol should both be 0.02%. Wait till the chromatographic basic line stabilizes, then inject the sample with a micro injector, where the amount of sample injected will be dependent on the sensitivity of the apparatus. Make records of the retention time of acetaldehyde and the internal standard peak (ethanol is used as internal standard) as well as their individual peak area (or peak height). Use these values to calculate the relative calibration factor (f value) of acetaldehyde.

The relative calibration factor (f value) of acetaldehyde to N-butanol (ethanol) is according to experience value, at about 1.50.

**5.4.1.5.2 Determination of Sample Solution**

Extract 10.0 mL of alcohol sample directly with a 10 mL volumetric flask and then add 0.10 mL N-butanol solution (prepared as in 5.4.1.3.3), mix evenly. Inject samples in under the same conditions as the f value test and then determine the positions of acetaldehyde and N-butanol (ethanol) according to the retention time. Determine the peak area (or peak height) of the acetaldehyde (or N-butanol) and internal standard peak (ethanol), compute the difference between peak areas (or peak heights) and calculate the proportion of acetaldehyde (or N-butanol) in the sample respectively, with acetaldehyde as the basis of measurement.

**5.4.1.6 Result Calculation**

a) Calibration Factor (f value) can be calculated with the following formula (6).

$$f = \frac{A_{s,4} \cdot d_s}{A_s \cdot d} \quad \text{.....(6)}$$

b) Acetaldehyde (or Acetal) content in the sample can be calculated with the following formula (7).

$$X_1 = f * \frac{A_1}{A_s} * X_{.1} \quad \text{.....(7)}$$

c) Acetaldehyde (or Acetal) content in a liter of 100% ethanol can be calculated with the following formula (8):

$$X_{1,0} = \frac{X_1 \cdot 1000}{E} \quad \text{.....(8)}$$

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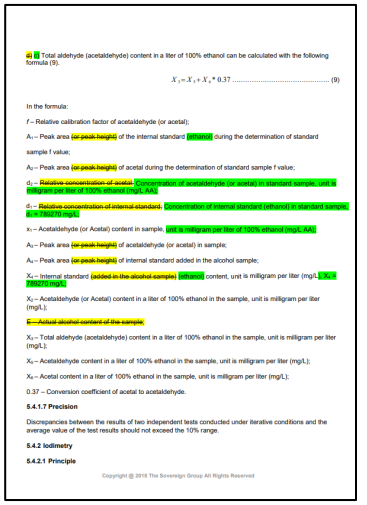

d) Total aldehyde (acetaldehyde) content in a liter of 100% ethanol can be calculated with the following formula (9).

$$X_{.3} = X_{.1} + X_{.2} * 0.37 \quad \text{.....(9)}$$

In the formula:

$f$ – Relative calibration factor of acetaldehyde (or acetal);

$A_1$ – Peak area (or peak height) of the internal standard (ethanol) during the determination of standard sample f value;

$A_2$ – Peak area (or peak height) of acetal during the determination of standard sample f value;

$d_1$ – Relative concentration of acetal, Concentration of acetaldehyde (or acetal) in standard sample, unit is milligram per liter of 100% ethanol (mg/L AA);

$d_2$ – Relative concentration of internal standard, Concentration of internal standard (ethanol) in standard sample, $d_2$ = 1180.78 mg/L;

$x_1$ – Acetaldehyde (or Acetal) content in sample, unit is milligram per liter of 100% ethanol (mg/L AA);

$A_3$ – Peak area (or peak height) of acetaldehyde (or acetal) in sample;

$A_4$ – Peak area (or peak height) of internal standard added in the alcohol sample;

$X_{s4}$ – Internal standard (added in the alcohol sample) (ethanol) content, unit is milligram per liter (mg/L, $X_{s4}$ = 1180.78 mg/L);

$X_{.1}$ – Acetaldehyde (or Acetal) content in a liter of 100% ethanol in the sample, unit is milligram per liter (mg/L);

E – Actual alcohol content of the sample;

$X_3$ – Total aldehyde (acetaldehyde) content in a liter of 100% ethanol in the sample, unit is milligram per liter (mg/L);

$X_2$ – Acetaldehyde content in a liter of 100% ethanol in the sample, unit is milligram per liter (mg/L);

$X_{.2}$ – Acetal content in a liter of 100% ethanol in the sample, unit is milligram per liter (mg/L);

0.37 – Conversion coefficient of acetal to acetaldehyde.

**5.4.1.7 Precision**

Discrepancies between the results of two independent tests conducted under iterative conditions and the average value of the test results should not exceed the 10% range.

**5.4.2 Iodimetry**

**5.4.2.1 Principle**

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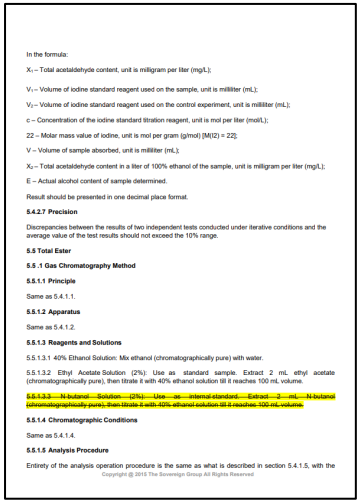

In the formula:

$X_{.1}$ – Total acetaldehyde content, unit is milligram per liter (mg/L);

$V_1$ – Volume of iodine standard reagent used on the sample, unit is milliliter (mL);

$V_2$ – Volume of iodine standard reagent used on the control experiment, unit is milliliter (mL);

c – Concentration of the iodine standard titration reagent, unit is mol per liter (mol/L);

22 – Molar mass value of iodine, unit is mol per gram (g/mol) [M(I2) = 22];

V – Volume of sample absorbed, unit is milliliter (mL);

$X_2$ – Total acetaldehyde content in a liter of 100% ethanol of the sample, unit is milligram per liter (mg/L);

E – Actual alcohol content of sample determined.

Result should be presented in one decimal place format.

**5.4.2.7 Precision**

Discrepancies between the results of two independent tests conducted under iterative conditions and the average value of the test results should not exceed the 10% range.

**5.5 Total Ester**

**5.5 .1 Gas Chromatography Method**

**5.5.1.1 Principle**

Same as 5.4.1.1.

**5.5.1.2 Apparatus**

Same as 5.4.1.2.

**5.5.1.3 Reagents and Solutions**

5.5.1.3.1 40% Ethanol Solution: Mix ethanol (chromatographically pure) with water.

5.5.1.3.2 Ethyl Acetate Solution (2%): Use as standard sample. Extract 2 mL ethyl acetate (chromatographically pure), then titrate it with 40% ethanol solution till it reaches 100 mL volume.

5.5.1.3.3 N-butanol Solution (2%): Use as internal standard. Extract 2 mL N-butanol (chromatographically pure), then titrate it with 40% ethanol solution till it reaches 100 mL volume.

**5.5.1.4 Chromatographic Conditions**

Same as 5.4.1.4.

**5.5.1.5 Analysis Procedure**

Entirety of the analysis operation procedure is the same as what is described in section 5.4.1.5, with the

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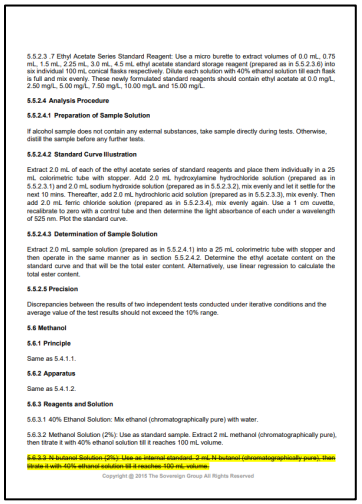

5.5.2.3 .7 Ethyl Acetate Series Standard Reagent: Use a micro burette to extract volumes of 0.0 mL, 0.75 mL, 1.5 mL, 2.25 mL, 3.0 mL, 4.5 mL ethyl acetate standard storage reagent (prepared as in 5.5.2.3.6) into six individual 100 mL conical flasks respectively. Dilute each solution with 40% ethanol solution till each flask is full and mix evenly. These newly formulated standard reagents should contain ethyl acetate at 0.0 mg/L, 2.50 mg/L, 5.00 mg/L, 7.50 mg/L, 10.00 mg/L and 15.00 mg/L.

**5.5.2.4 Analysis Procedure**

**5.5.2.4.1 Preparation of Sample Solution**

If alcohol sample does not contain any external substances, take sample directly during tests. Otherwise, distill the sample before any further tests.

**5.5.2.4.2 Standard Curve Illustration**

Extract 2.0 mL of each of the ethyl acetate series of standard reagents and place them individually in a 25 mL colorimetric tube with stopper. Add 2.0 mL hydroxylamine hydrochloride solution (prepared as in 5.5.2.3.1) and 2.0 mL sodium hydroxide solution (prepared as in 5.5.2.3.2), mix evenly and let it settle for the next 10 mins. Thereafter, add 2.0 mL hydrochloric acid solution (prepared as in 5.5.2.3.3), mix evenly. Then add 2.0 mL ferric chloride solution (prepared as in 5.5.2.3.4), mix evenly again. Use a 1 cm cuvette, recalibrate to zero with a control tube and then determine the light absorbance of each under a wavelength of 525 nm. Plot the standard curve.

**5.5.2.4.3 Determination of Sample Solution**

Extract 2.0 mL sample solution (prepared as in 5.5.2.4.1) into a 25 mL colorimetric tube with stopper and then operate in the same manner as in section 5.5.2.4.2. Determine the ethyl acetate content on the standard curve and that will be the total ester content. Alternatively, use linear regression to calculate the total ester content.

**5.5.2.5 Precision**

Discrepancies between the results of two independent tests conducted under iterative conditions and the average value of the test results should not exceed the 10% range.

**5.6 Methanol**

**5.6.1 Principle**

Same as 5.4.1.1.

**5.6.2 Apparatus**

Same as 5.4.1.2.

**5.6.3 Reagents and Solution**

5.6.3.1 40% Ethanol Solution: Mix ethanol (chromatographically pure) with water.

5.6.3.2 Methanol Solution (2%): Use as standard sample. Extract 2 mL methanol (chromatographically pure), then titrate it with 40% ethanol solution till it reaches 100 mL volume.

5.6.3.3 N-butanol Solution (2%): Use as internal standard. Extract 2 mL N-butanol (chromatographically pure), then titrate it with 40% ethanol solution till it reaches 100 mL volume.

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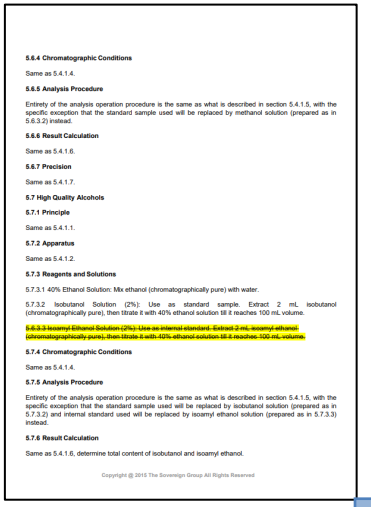

**5.6.4 Chromatographic Conditions**

Same as 5.4.1.4.

**5.6.5 Analysis Procedure**

Entirety of the analysis operation procedure is the same as what is described in section 5.4.1.5, with the specific exception that the standard sample used will be replaced by methanol solution (prepared as in 5.6.3.2) instead.

**5.6.6 Result Calculation**

Same as 5.4.1.6.

**5.6.7 Precision**

Same as 5.4.1.7.

**5.7 High Quality Alcohols**

**5.7.1 Principle**

Same as 5.4.1.1.

**5.7.2 Apparatus**

Same as 5.4.1.2.

**5.7.3 Reagents and Solutions**

5.7.3.1 40% Ethanol Solution: Mix ethanol (chromatographically pure) with water.

5.7.3.2 Isobutanol Solution (2%): Use as standard sample. Extract 2 mL isobutanol (chromatographically pure), then titrate it with 40% ethanol solution till it reaches 100 mL volume.

5.7.3.3 Isoamyl Ethanol Solution (2%): Use as internal standard. Extract 2 mL isoamyl ethanol (chromatographically pure), then titrate it with 40% ethanol solution till it reaches 100 mL volume.

**5.7.4 Chromatographic Conditions**

Same as 5.4.1.4.

**5.7.5 Analysis Procedure**

Entirety of the analysis operation procedure is the same as what is described in section 5.4.1.5, with the specific exception that the standard sample used will be replaced by isobutanol solution (prepared as in 5.7.3.2) and internal standard used will be replaced by isoamyl ethanol solution (prepared as in 5.7.3.3) instead.

**5.7.6 Result Calculation**

Same as 5.4.1.6, determine total content of isobutanol and isoamyl ethanol.

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# Улучшения российского стандарта ГОСТ 30536-2013

Использование предлагаемого метода обеспечивает высокую достоверность полученных данных, значительно сокращает временные, трудовые, материальные и финансовые затраты. Анализ летучих соединений в спиртных напитках еще никогда не был таким простым. Здесь вы можете ознакомиться с измененным текстом официальной методики, позволяющей проводить анализ алкогольных напитков по разработанной методике.

Места в текстовом документе, которые нужно удалить, выделены желтым цветом. Добавленные части текста выделены зеленым цветом.

ЕВРАЗИЙСКИЙ СОВЕТ ПО СТАНДАРТИЗАЦИИ, МЕТРОЛОГИИ И СЕРТИФИКАЦИИ (ЕАСС)

EURO-ASIAN COUNCIL FOR STANDARDIZATION, METROLOGY AND CERTIFICATION (EASC)

МЕЖГОСУДАРСТВЕННЫЙ СТАНДАРТ

ГОСТ 30536–2013

**ВОДКА И СПИРТ ЭТИЛОВЫЙ ИЗ ПИЩЕВОГО СЫРЬЯ**

**Газохроматографический экспресс-метод определения содержания токсичных микропримесей**

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Евразийский совет по стандартизации, метрологии и сертификации

# Улучшения европейского стандарта ЕС 2870/2000

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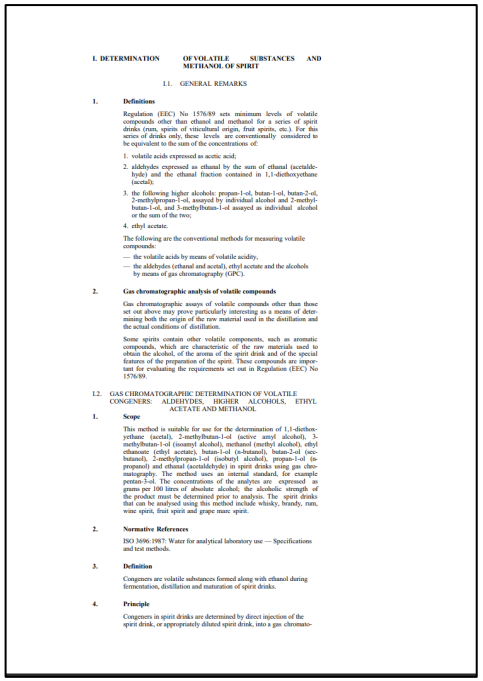


I. DETERMINATION OF VOLATILE SUBSTANCES AND METHANOL OF SPIRIT

I.1. GENERAL REMARKS

1. **Definitions**

Regulation (EEC) No 1576/89 sets minimum levels of volatile compounds other than ethanol and methanol for a series of spirit drinks (rum, spirits of viticultural origin, fruit spirits, etc.). For this series of drinks only, these levels are conventionally considered to be equivalent to the sum of the concentrations of:

1. volatile acids expressed as acetic acid;
2. aldehydes expressed as ethanal by the sum of ethanal (acetaldehyde) and the ethanal fraction contained in 1,1-diethoxyethane (acetal);
3. the following higher alcohols: propan-1-ol, butan-1-ol, butan-2-ol, 2-methylpropan-1-ol, assayed by individual alcohol and 2-methylbutan-1-ol, and 3-methylbutan-1-ol assayed as individual alcohol or the sum of the two;
4. ethyl acetate.

The following are the conventional methods for measuring volatile compounds:

— the volatile acids by means of volatile acidity,

— the aldehydes (ethanal and acetal), ethyl acetate and the alcohols by means of gas chromatography (GPC).

2. **Gas chromatographic analysis of volatile compounds**

Gas chromatographic assays of volatile compounds other than those set out above may prove particularly interesting as a means of determining both the origin of the raw material used in the distillation and the actual conditions of distillation.

Some spirits contain other volatile components, such as aromatic compounds, which are characteristic of the raw materials used to obtain the alcohol, of the aroma of the spirit drink and of the special features of the preparation of the spirit. These compounds are important for evaluating the requirements set out in Regulation (EEC) No 1576/89.

I.2. GAS CHROMATOGRAPHIC DETERMINATION OF VOLATILE CONGENERS: ALDEHYDES, HIGHER ALCOHOLS, ETHYL ACETATE AND METHANOL

1. **Scope**

This method is suitable for use for the determination of 1,1-diethoxyethane (acetal), 2-methylbutan-1-ol (active amyl alcohol), 3-methylbutan-1-ol (isoamyl alcohol), methanol (methyl alcohol), ethyl ethanoate [ethyl acetate), butan-1-ol (n-butanol), butan-2-ol (sec-butanol), 2-methylpropan-1-ol (isobutyl alcohol), propan-1-ol (n-propanol) and ethanal (acetaldehyde) in spirit drinks using gas chromatography. The method uses an internal standard, for example pentan-3-ol. The concentrations of the analytes are expressed as grams per 100 litres of absolute alcohol; the alcoholic strength of the product must be determined prior to analysis. The spirit drinks that can be analysed using this method include whisky, brandy, rum, wine spirit, fruit spirit and grape marc spirit.

2. **Normative References**

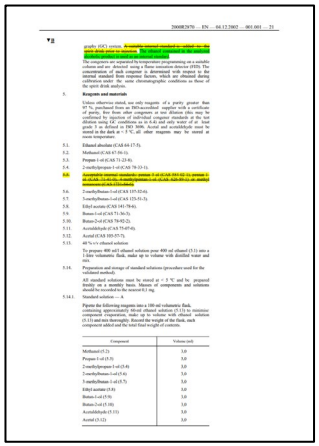
ISO 3696:1987: Water for analytical laboratory use — Specifications and test methods.

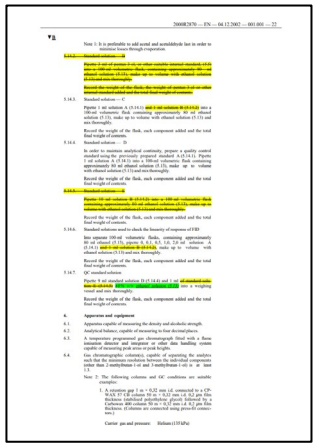
3. **Definition**

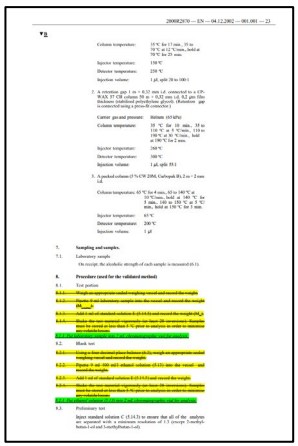
Congeners are volatile substances formed along with ethanol during fermentation, distillation and maturation of spirit drinks.

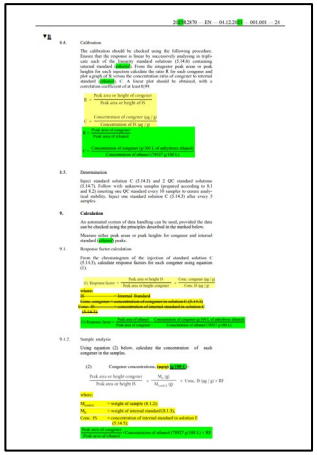
4. **Principle**

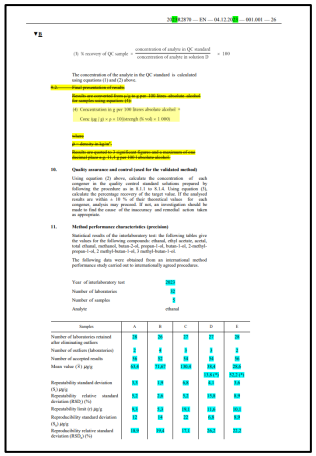
Congeners in spirit drinks are determined by direct injection of the spirit drink, or appropriately diluted spirit drink, into a gas chromato-











# Определение метанола в спиртных напитках

| Результаты для | 40 % ABV | 40 % ABV | 43 % ABV | 40 % ABV | 40 % ABV | 40 % ABV | 40 % ABV | 47 % ABV | 45 % ABV |
|---|---|---|---|---|---|---|---|---|---|
| | **Ром** | **Виски** | **Бурбон** | **Зерн. нап.** | **Бренди** | **Граппа** | **Кальвадос** | **Джин** | **Сливовица** |
| Внеш. станд, мг/л б.с. | 46.6 | 130 | 81.9 | 108.9 | 275 | 328 | 702 | 2.7 | 10884 |
| Инн. метод, мг/л б.с. | 22.3 | 132 | 88.9 | 110.7 | 297 | 412 | 913 | 4.2 | 10603 |
| Внутр. станд, мг/л б.с. | 22.2 | 132 | 88.4 | 111.6 | 297 | 414 | 910 | 4.16 | 10546 |
| Результаты для | 38 % ABV | 14.5 % ABV | 38 % ABV | 15 % ABV | 18 % ABV | 8.5 % ABV | 70 % ABV | 27.5 % ABV | 40 % ABV |
| | **Цикудия** | **Саке** | **Текила** | **Вермут** | **Наливка** | **Глинтвейн** | **Нап. сп. кр.** | **Коктейль** | **Водка** |
| Внеш. станд, мг/л б.с. | 705 | 10.7 | 1259 | 10.8 | 57 | 8.87 | 9.6 | 41.0 | 25.4 |
| Инн. метод, мг/л б.с. | 761 | 18.1 | 1460 | 17.6 | 169.5 | 25.1 | 6.0 | 76.3 | 21.7 |
| Внутр. станд, мг/л б.с | 755 | 18.2 | 1456 | 17.5 | 168 | 25.3 | 6.05 | 77.3 | 21.8 |
| Результаты для | 38 % ABV | 17 % ABV | 35 % ABV | 25 % ABV | 16 % ABV | 16.5 % ABV | 35 % ABV | | |
| | **Ликёры** | | | | | | | | |
| | **Самбука** | **Яичный** | **Травяной** | **Лимонный** | **Вишнёвый** | **Малиновый** | **Терновый** | | |
| Внеш. станд, мг/л б.с. | 0.89 | 6.78 | 12.5 | 10.4 | 3.08 | 41.12 | 14.49 | | |
| Инн. метод, мг/л б.с. | 2.3 | 9.81 | 19.6 | 29.4 | 9.82 | 126 | 20.7 | | |
| Внутр. станд, мг/л б.с. | 2.32 | 9.75 | 19.5 | 29.1 | 9.77 | 127 | 20.5 | | |

**1 400 миллионов**

**1 400 миллионов**

**450 миллионов**

**333 миллиона**

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