User Manual: Calculation №86
«Chromos: Natural gas»

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Dzerzhinsk, Russia

Release date: 2025-05-05
Latest software version: 1.0.6.37
Internet: kb.has.ru

Contents

1. Introduction

The «Chromos: Natural gas» program is designed for calculating calibration factors and mole fractions of components in accordance with GOST 31371.7-2020 «Natural gas. Determination of composition by gas chromatography with uncertainty assessment. Part 7. Methodology for measuring the mole fraction of components», calculation in accordance with GOST 31369-2021 «Natural gas. Calculation of the heat of combustion, density, relative density and Wobbe index based on the component composition» (ISO 6976:2016), as well as for calculating the methane number based on the known component composition according to GOST 34704-2020 «Natural gas. Determination of the methane number».

Before getting started, it is recommended to study the foregoing document.

This software works as an extension and can only be launched on a registered copy of «Chromos» software. To run the program you need a key.

The plug-in installation file and documentation are available on the Internet at: kb.has.ru/soft:dop_raschjot_86.

E-mail your suggestions and comments on the software to: soft@has.ru

2. Installing the Software

Before installing the program «Chromos: Natural Gas» on the PC, the software «Chromos 4» must be installed. You need 5 Mb of free space on your local drive. To install the software, do the following:

1. Run the installation file.
2. Choose your language.
3. In the installer (Fig. 1), specify the components to be installed and click **Install**.

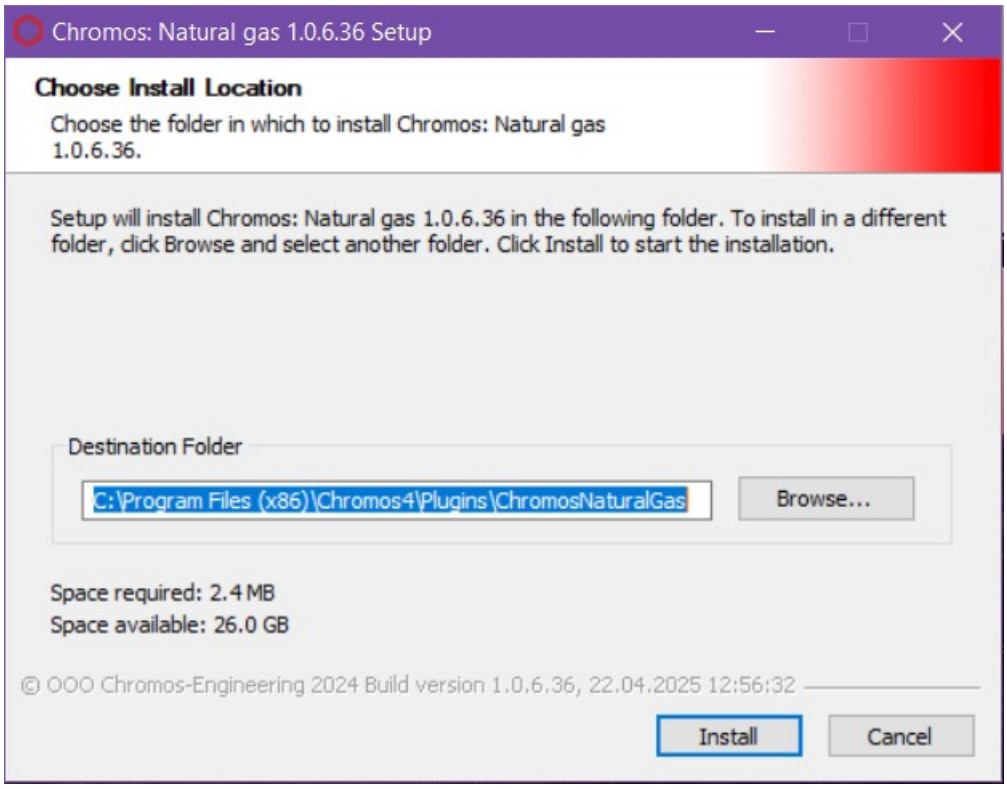

Fig. 1: Installation

4. When installed, click **Finish**.

After the software is successfully installed you can run it from «Chromos» software.

3. Running the Plug-in

This software works as an extension for «Chromos» software. To run the extension, do the following:

1. Connect the key to a USB port.
2. Run «Chromos» software.
3. In the *Data* menu, navigate to **Calculations > Chromos: Natural gas**. The main program window opens (Fig. 2).

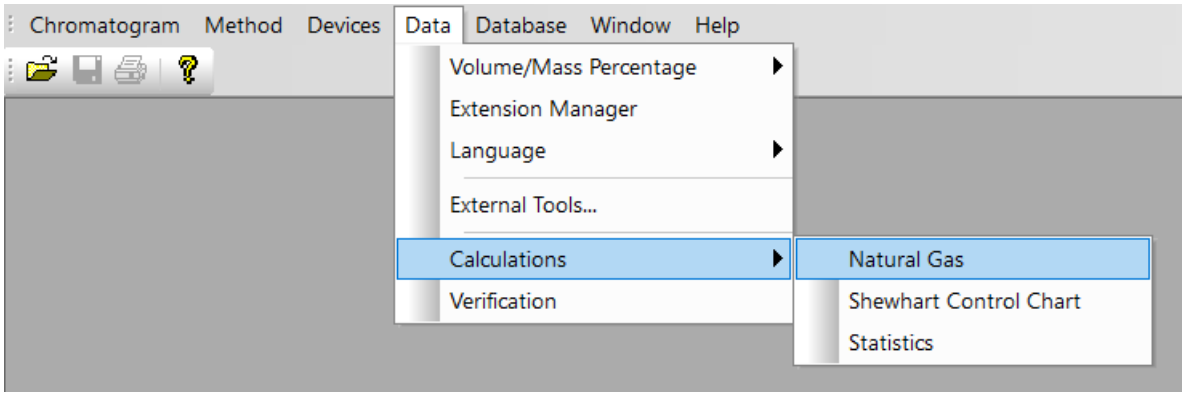

Fig. 2: Running the plug-in

4. Program Overview

The main program window (Fig. 3) consists of a work area and a notification log. The work area contains the information tabs and operation buttons. The notification log displays errors that occurred during the calculation process.

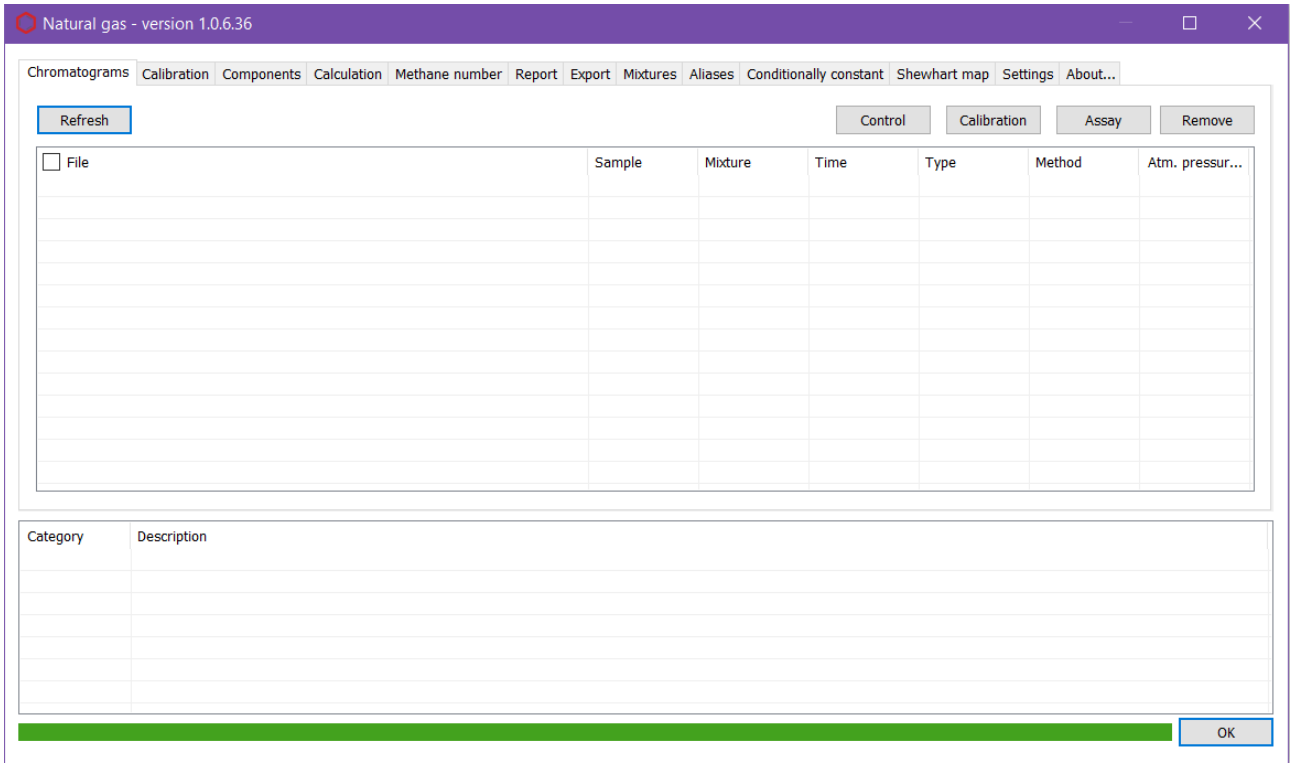

Fig. 3: Main program window

Work area tabs provides the following information:

- *Chromatograms* – a list of chromatograms used for calculation, with data on identifier, sample, mixture, date and time of analysis, type of chromatogram (assay or calibration), method and atmospheric pressure at the start of recording;
- *Calibration* – data for calculating calibration coefficients;
- *Components* – data for calculating the mole fraction of components and their uncertainties;
- *Calculation* – calculation data of physical properties of natural gas;
- *Methane number* – methane number calculation data;
- *Report* – printed form of the report on the component composition of gas;
- *Export* – data export options;
- *Mixtures* – list of calibration mixtures used in the calculation;
- *Aliases* – names of components;
- *Conditionally constant* – data on conditionally constant components;
- *Shewhart map* – Shewhart control map;
- *Settings* – program settings;
- *About...* – program identifier.

5. Measurement Procedure

The «Chromos: Natural gas» software performs the calculation in accordance with GOST 31371.7-2020, GOST 31369-2021 (ISO 6976:2016), and GOST 34704-2020 in the following order:

1. Checking the compliance of a certified reference material (CRM) to GOST 31371.7-2020;
2. Calculation of calibration coefficients;
3. Calculation of molar concentrations of components and their uncertainties;
4. Verification of the correspondence of the values of the molar fractions of the components being determined in the calibration mixture and in the analyzed gas;
5. Calculation of physical indicators;
6. Calculation of the methane number.

If an error occurs at one of the stages, the calculation stops and a warning is displayed on the screen (Fig. 4). The notification log displays messages describing errors.

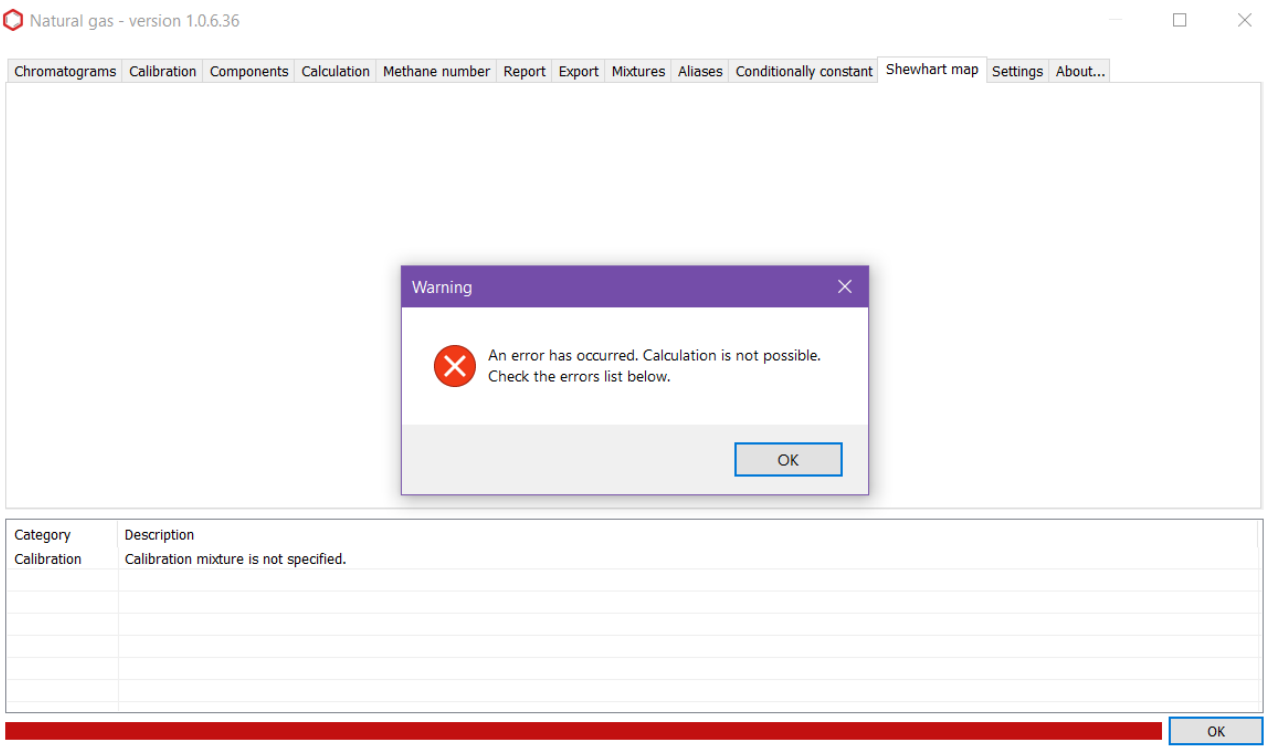

Fig. 4: Calculation error warning

6. Adding Data

To add chromatograms for calculation, on the *Chromatograms* tab, do the following:

1. Click **Calibration, Assay, or Control –** depending on the type of a chromatogram you want to add. The *Select chromatograms* window opens.
2. In the *Select chromatograms* window, select the chromatograms and click **OK**.
3. To refresh the list, click **Refresh**.
4. To remove the selected chromatogram, click **Remove**.
5. (Optional) To show/hide chromatogram identifiers, check the *File* option.

Added chromatograms are displayed in the table with the following information:

- *UUID* – unique chromatogram identifier;
- *File* – chromatogram file name;
- *Sample* – sample name from the chromatogram passport;
- *Mixture* – mixture name from the chromatogram passport;
- *Time* – assay date/time;
- *Type* – chromatogram type (assay, calibration, control);
- *Method* – method name;
- *Atm. pressure (kPa)* – atmospheric pressure at the start of the analysis recording.

To eliminate the influence of atmospheric pressure changes during measurements, in the passport (Fig. 5) of each chromatogram for the parameter *Ambient pressure (kPa)* it is necessary to indicate a value equal to the atmospheric barometric pressure in kPa.

If atmospheric barometric pressure is not indicated for the chromatogram, then normal atmospheric pressure is used for calculations – 101.325 kPa.

To measure atmospheric barometric pressure, it is necessary to use verified measuring instruments.

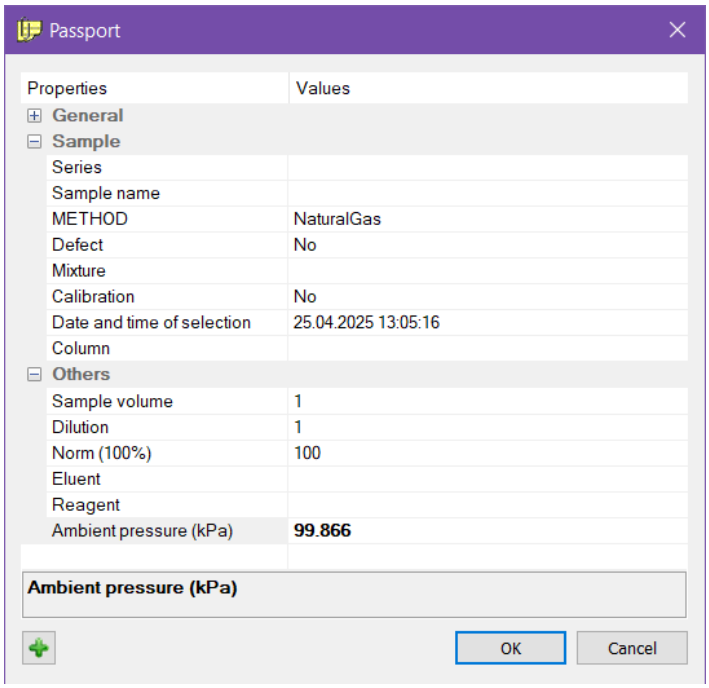

Fig. 5: Passport > Ambient pressure

7. Determining of C6, C7, C8 Pseudo-Components

To use pseudo-components C6, C7, C8 in the calculation, it is necessary to mark all the peaks to be determined in the chromatograms and assign them names with the prefix C6, C7 or C8, in accordance with which pseudo-component they are part of. In the calculation for pseudo-components C6, C7 and C8, the sums of the areas of the peaks included in the component will be used.

When changing the name alias of components C6, C7 and C8, the prefixes for determining the pseudo-components also change.

8. Adding Calibration Mixtures

To add calibration mixtures, in the *Mixtures* tab (Fig. 6), do the following::

1. Click **Add**. The *Certified Reference Material (CRM)* window opens.
2. In the *Compound* field, select the compound from the list. To select all the compounds, choose **All components**.
3. In the *CRM 1* field, select the mixture from the list and indicate its type:

    - CRM-NGS – natural gas simulator CRM;
    - CRM-MNG – main natural gas CRM;
    - CRM-Methane – methane CRM.

4. (Optional) In the *CRM 2* field, select the mixture from the list and indicate its type.
5. Click **Save**.
6. (Optional) To remove the selected compound, click **Remove**.

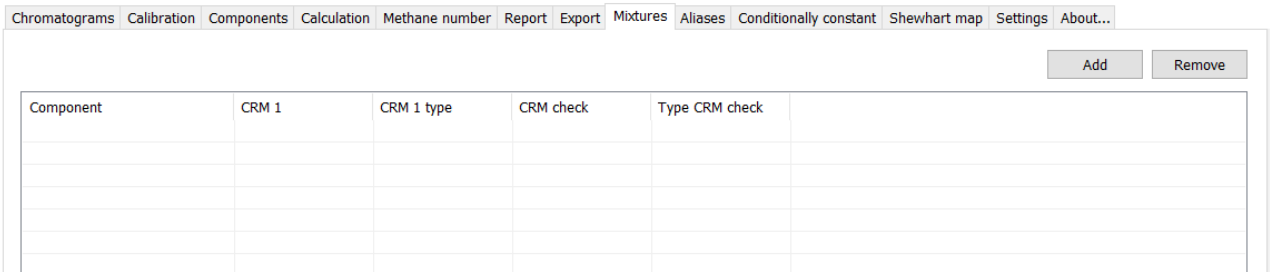

Fig. 6: Mixtures

9. Calibrating

To perform the calculation, you need to obtain a set of calibration chromatograms. Chromatograms are selected on the *Chromatograms* tab. The chromatograms must be calibration chromatograms, and the names of the mixtures must match the settings in the program. The software provides calibration by methods A, B, C1 and C2.

Method A is intended for measuring the molar fraction of all components.

Method B is intended for measuring the molar fraction of nitrogen, oxygen, helium, hydrogen, carbon dioxide, hydrocarbons from C1 to C5 individually, and all hydrocarbons heavier than N-pentane are considered as a single pseudo-component C6+.

Method C is designed for the analysis of natural gas of variable composition. Method C can be implemented in two versions:

- *C1* – for measuring the values of the mole fraction of individual components: helium, hydrogen, nitrogen, oxygen, carbon dioxide, methane, ethane, propane, isobutane, N-butane, isopentane, neopentane, N-pentane, benzene, toluene, and the mole fraction of heavy hydrocarbon isomers in total in the form of pseudo-components C6, C7 and C8;
- *C2* – for measuring the mole fraction of nitrogen, oxygen, helium, hydrogen, carbon dioxide, hydrocarbons from C1 to C5 individually, and the mole fraction of all heavy hydrocarbons in the form of a single pseudo-component C6+ in total using the back-flushing method by the total area of the peaks of hydrocarbons heavier than N-pentane.

9.1. Methods A, B

To calibrate using methods A and B, three measurements for the mixture must be selected. The *Calibration* tab (Fig. 2) displays the following information:

- *Component* – component name;
- *Concentration 1* – molar fraction of a component in CRM 1;
- *C1* – calibration factor for the chromatogram 1;
- *C2* – calibration factor for the chromatogram 2;
- *C3* – calibration factor for the chromatogram 3;
- *K* – arithmetic mean of calibration coefficients;
- *Area 1* – arithmetic mean value of the area of a component in the analysis of CRM 1;
- *Acceptability 1* – the value of the relative range of the obtained values of the calibration coefficients;
- *Acceptability standard 1* – limit of permissible values of the relative range of the obtained values of the calibration coefficients.

9.2. Method C

For calibration using method C, five measurements for each mixture must be selected. The *Calibration* tab (Fig. 3) displays the following information:

- *Component* – component name;
- *Concentration 1* – molar fraction of a component in CRM 1;
- *Concentration 2* – concentration of the component from CRM 2;
- *Area 1* – arithmetic mean value of the area of a component in the analysis of CRM 1;
- *Area 2* – arithmetic mean value of the area of the component in the analysis of CRM 2;
- *b* – equation coefficient;

9.2. Method C

- *B* – equation coefficient;
- *Acceptability 1* – the permissible value 1 of the relative standard deviation of the detector signal, multiplied by two;
- *Acceptability standard 1* – relative deviation of the obtained value of the mole fraction of a component from its value in CRM 1;
- *Acceptability 2* – the permissible value 2 of the relative standard deviation of the detector signal, multiplied by two;
- *Acceptability standard 2* – relative deviation of the obtained value of the mole fraction of a component from its value in CRM 2;
- *Check. relative range* – relative range control;
- *Check. tolerance range* – range tolerance control;
- *Control rate* – control rate;
- *Control standard* – control standard;
- *RSD 1 area* – area of relative standard deviation 1;
- *RSD 1 tolerance* – tolerance of area of relative standard deviation 1;
- *RSD 2 area* – area of relative standard deviation 2;
- *RSD 2 tolerance* – tolerance of area of relative standard deviation 2.

10. Calculations

10.1. Calculation of Molar Concentrations of Components and Their Uncertainties

The molar fraction of components is calculated using the previously performed calibration. The component composition is calculated using the chromatograms selected in the *Chromatograms* tab. A flow (process) chromatograph requires one chromatogram, while a laboratory chromatograph requires two. The calculation result is presented in the *Components* tab (Fig. 4). The following information is displayed:

- *Component* – component name;
- *Time* – component peak exit time;
- *Area* – peak area;
- *Height* – peak height;
- *Concentration (mol. %)* – molar fraction, % of the measured component;
- *Expanded uncertainty* – absolute expanded uncertainty;
- *CRM* – molar fraction, % of the component in the state standard sample used to control the accuracy of measurement results according to GOST 31371.7-2020, clause 12.3;
- *Concentration (vol.%)* – volumetric fraction, % of the measured component;
- *Concentration (mass.%)* – mass fraction, % of the measured component;
- *Acceptability* – the value of the discrepancy between two consecutive measurements, % (for a laboratory instrument);
- *Tolerance* – permissible value of discrepancy between two consecutive measurements;
- *X1* – non-normalized value (molar fraction, %) of the measured component in the first analyzed chromatogram;
- *X2* – non-normalized value (molar fraction, %) of the measured component in the second analyzed chromatogram.

The software implements a check of the conformity of the values of the molar fraction of the components to be determined in the calibration mixture and in the analyzed gas. The check is carried out in accordance with clause 9.5.2.1 of GOST 31371.7-2020 «Natural gas. Determination of composition by gas chromatography with uncertainty assessment. Part 7. Methodology for measuring the molar fraction of components».

Components marked with (*) are not included in the calculation of physical indicator values according to GOST 31369-2021 (ISO 6976:2016), since their molar fraction is less than 0.00005 (0.005% molar fraction).

After the measurements are taken, the results are checked for accuracy in accordance with clause 12.3 of GOST 31371.7-2020. The results of measurements are checked for accuracy using a CRM of natural gas simulator (CRM-NGS) or a CRM of main natural gas (CRM-MNG) for components whose molar fraction exceeds 0.01%. The control result is considered satisfactory if the following condition is met:

$$\left|x_{meas} - x_{pass}\right| \leqslant U\left(x_{meas}\right), \text{ where}$$

x_{meas} — result of measurements of the molar fraction of a component in CRM, %;
x_{pass} — the value of the molar fraction of a component in CRM, by its passport, %;

10.1. Calculation of Molar Concentrations of Components and Their Uncertainties

$U(x_{meas})$ — the value of the absolute expanded uncertainty of the measurement of the molar fraction of a component, calculated using the formulas given in Table 1, %.

10.2. Calculation of Physical Indicators

The calculation of the physical indicators of natural gas is carried out on the basis of previously obtained data on the component composition of the gas. The calculation result is presented in the *Calculation* tab (Fig. 7). The following information is displayed:

- *Name* – name of the calculated value;
- *Value* – value;
- *Expanded uncertainty* – absolute expanded uncertainty.

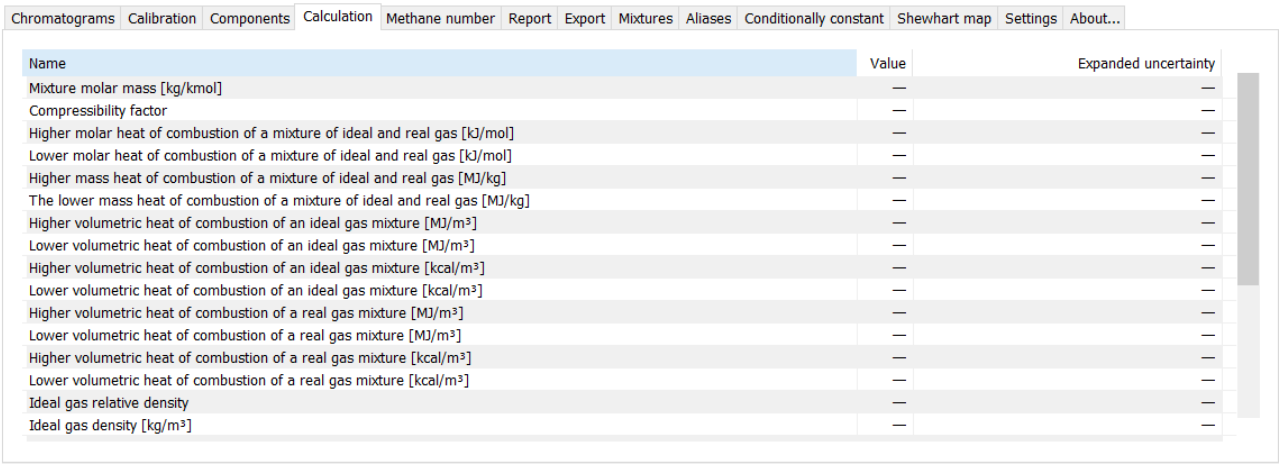

Fig. 7: Calculation

The following values are calculated:

- Mixture molar mass, (kg/kmol);
- Compressibility factor;
- Higher molar heat of combustion of a mixture of ideal and real gas (kJ/mol);
- Lower molar heat of combustion of a mixture of ideal and real gas (kJ/mol);
- Higher mass heat of combustion of a mixture of ideal and real gas (MJ/kg);
- Lower mass heat of combustion of a mixture of ideal and real gas (MJ/kg);
- Higher volumetric heat of combustion of an ideal gas mixture (MJ/m^3);
- Lower volumetric heat of combustion of an ideal gas mixture (MJ/m^3);
- Higher volumetric heat of combustion of a real gas mixture (MJ/m^3);
- Lower volumetric heat of combustion of a real gas mixture (MJ/m^3);
- Ideal gas relative density;
- Ideal gas density (kg/m^3);
- Real gas relative density;
- Real gas density (kg/m^3);
- Higher Wobbe index of ideal gas (MJ/m^3 and $kcal/m^3$);
- Lower Wobbe index of ideal gas (MJ/m^3 and $kcal/m^3$);
- Higher Wobbe index of real gas (MJ/m^3 and $kcal/m^3$);
- Lower Wobbe index of real gas (MJ/m^3 and $kcal/m^3$).

10.2. Calculation of Physical Indicators

In accordance with GOST 31369-2021 «Natural gas. Calculation of combustion heat, density, relative density and Wobbe index based on component composition» (ISO 6976:2016), calculations are reliable only for compressibility coefficient values > 0.9. In case of discrepancy, a warning is displayed in the software.

10.3. Calculation of Methane Number

The calculation of the methane number of natural gas is carried out on the basis of previously obtained data on the component composition of the gas. The calculation result is presented in the *Methane Number* tab (Fig. 8). The following information is displayed:

- *Value* – calculated value;
- *Absolute expanded uncertainty.* – absolute expanded uncertainty;
- *Vol.%, unnorm.* – non-normalized volumetric fraction of a component, %;
- *Vol.%, norm.* – volumetric fraction of a component, %.

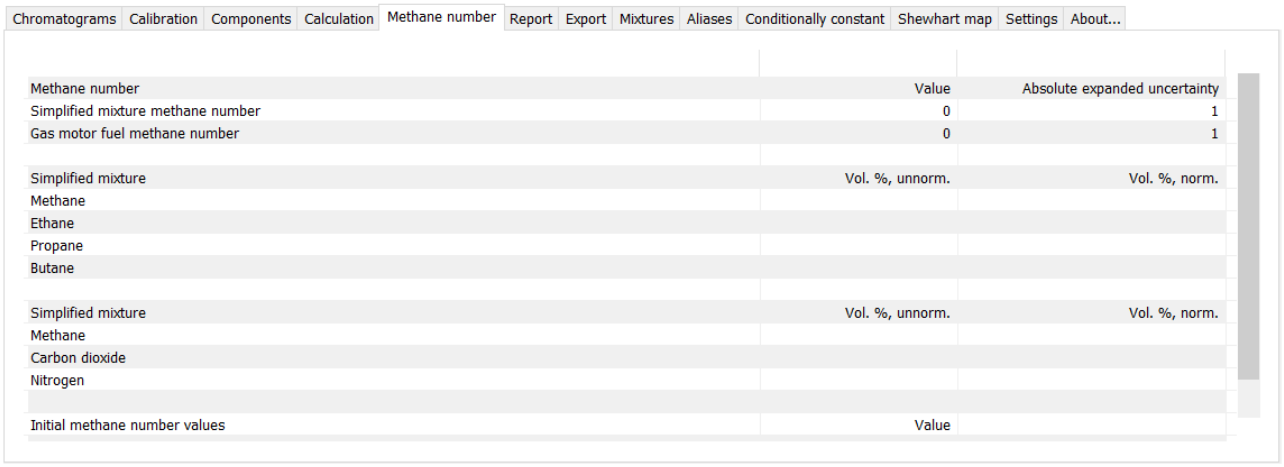

Fig. 8: Methane number

11. Reporting

The program can be used to prepare a printed report form with the obtained data on the component composition of the gas (Fig. 9).

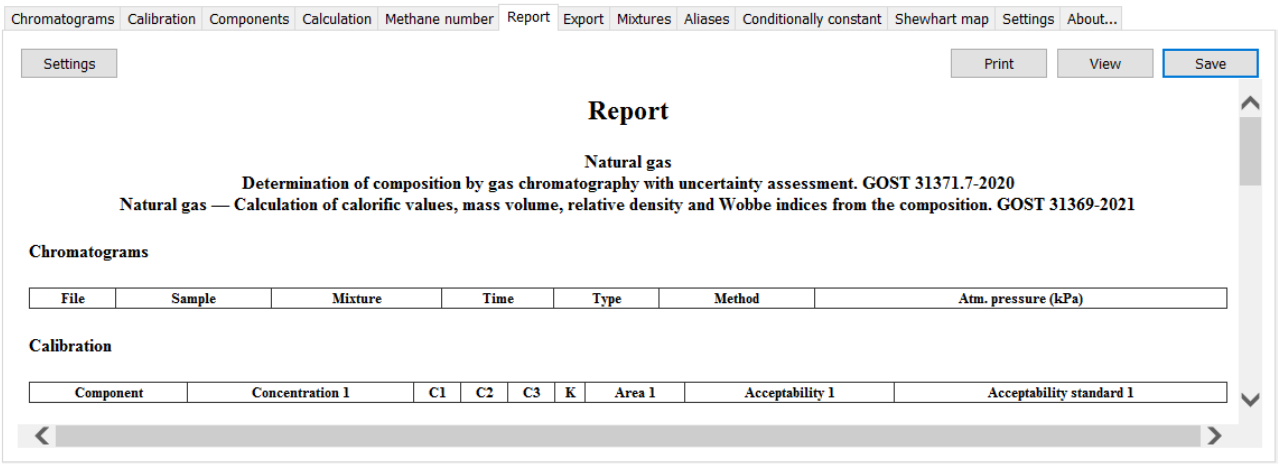

Fig. 9: Report form

To fill in the report form, do the following:

1. Navigate to the *Report* tab.
2. Click **Save**. A dialog window opens.
3. In the dialog window, enter the file name and the folder, then click **Save**. The report is saved as an .html file.
4. To open the print preview, click **View.** To switch between pages, use buttons or enter the page number in the corresponding field.
5. To print the report, click **Print**. A dialog window opens.
6. In the dialog window, select the printing parameters, enter the number of copies, then click **Print**.

12. Adding Additional Parameters to the Report

To add additional parameters to a report, do the following:

1. Navigate to the *Report* tab.
2. Click **Settings**. The *Report: Parameters* window opens (Fig. 10).
3. To add a parameter, click **Add**. A dialog window opens.
4. In the dialog window, enter the name and the value of the parameter.
5. (Optional) To remove the selected parameter, click **Remove**.
6. Click **OK**.

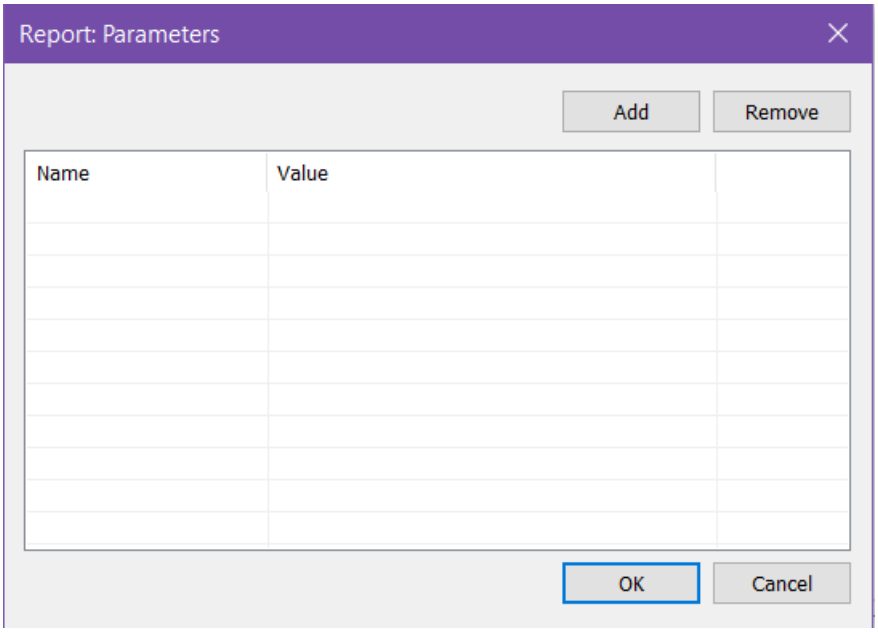

Fig. 10: Report parameters

13. Exporting Data

To export gas component composition data, on the *Export* tab (Fig. 11), do the following:

1. In the *Format* field, select the file format (TXT, JSON, XML).
2. To select data to add to the report, check the corresponding options:
   - *Chromatograms* – list of chromatograms used in the calculation;
   - *Calibration* – result of calculating the calibration coefficients;
   - *Components* – result of calculation of component composition;
   - *Calculation* – result of calculation of physical properties;
   - *Methane number* – methane number calculation result;
   - *Mixtures* – list of calibration mixtures used in the calculation and their component composition;
   - *Settings* – program settings;
   - *Log* – event log.
3. In the *Exporter path* field, enter the path to the application from the LIMS system, that loads the information to the system.
4. In the *Additional* field, enter additional parameters for the data transfer application.
   Note: Instead of the exported file name, enter **%F**. See examples below.
5. Click **Export**.

Example 1.
- «Exporter path» – **CMD**
- «Additional» – **/C move /Y %F C:\out\data.xml**

Example 2.
- «Exporter path» – **notepad.exe**
- «Additional» – **none**

Example 3 (to call the system dialog for saving a file).
- «Exporter path» – **SaveAs**
- «Additional» – **none**

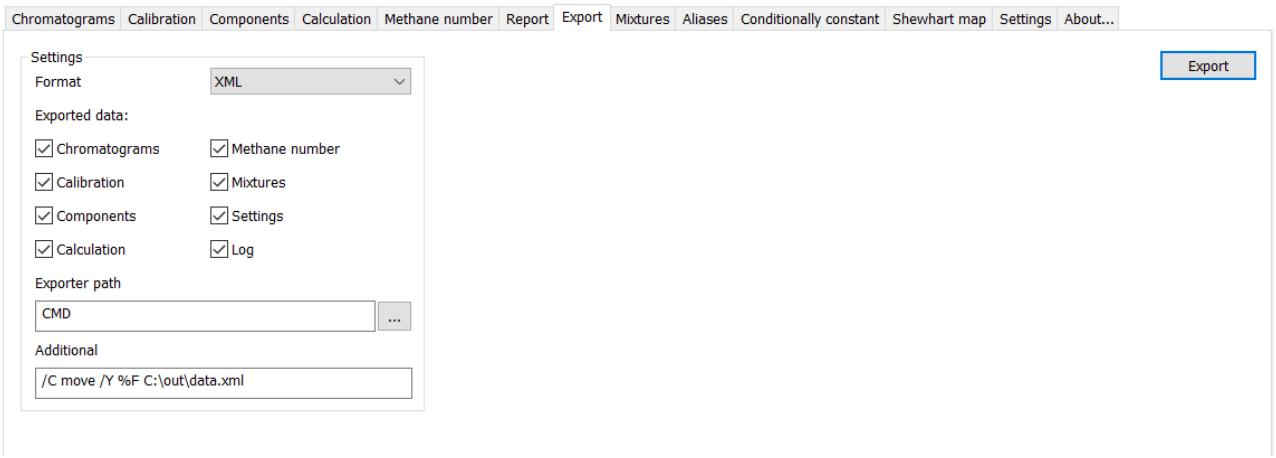

Fig. 11: Export

14. Managing the Components

14.1. Name Alias

To compare components from the calculation and chromatograms, a table of aliases is used (Fig. 12). The table shows the designation of the component and its name (alias), by which the search is performed on the chromatogram.

To change the alias, do the following:

1. Navigate to the *Aliases* tab.
2. In the corresponding cell of the *Name alias* column, double-click and enter the needed value.

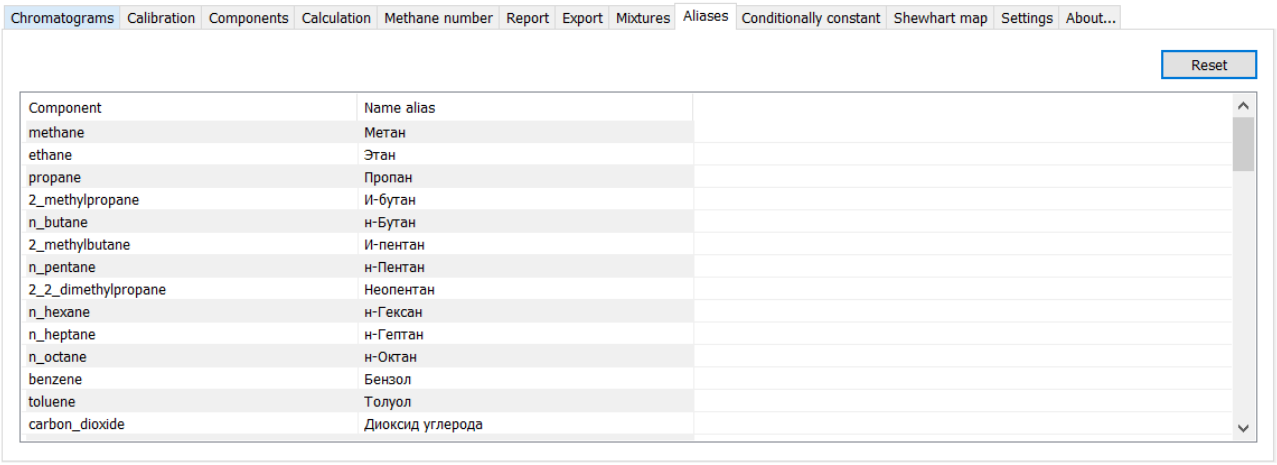

Fig. 12: Aliases

14.2. Conditionally Constant Components

If the method used does not allow for the measurement of the molar fraction of individual components of natural gas (helium, hydrogen, oxygen, methanol, etc.), information on their content should be obtained from other sources and taken into account when calculating the component composition of the natural gas sample. It is also necessary to take into account the molar fraction of unmeasured components, which include sulfur-containing compounds, water vapor, etc.

Information on the content of the specified components must be checked at intervals established for a specific measurement unit in accordance with the enterprise quality system (if necessary, taking into account subsection 4.2 of GOST 31370-2007), but not less than once per quarter, and accepted over the established period as conditionally constant.

To include conditionally constant components in the calculation, in the *Conditionally constant* tab (Fig. 13), do the following:

1. Click **Add**. The *Component* window opens.
2. In the *Component* window, select from the list a conditionally constant component.
3. In the *Concentration* field, enter the molar fraction value (in %).
4. In the *Expanded uncertainty* field, enter the absolute expanded uncertainty value.

14.2. Conditionally Constant Components

5. Click **Save**.
6. To edit the parameters of the added component, double-click in the corresponding cell of the table.
7. (Optional) To remove the selected component, click **Remove.**

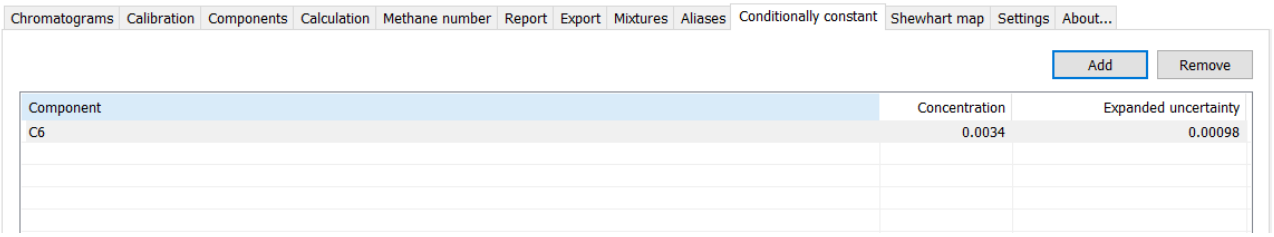

Fig. 13: Conditionally constant components

15. Configuring the Program Settings

To configure the software, in the *Settings* tab (Fig. 14), do the following:

1. Set calibration parameters:
   - In the *Method* field, select the calibration method from the list:

     - *Method A* – is designed to measure the molar fraction of nitrogen, oxygen, helium, hydrogen, carbon dioxide, saturated hydrocarbons up to C5, benzene and toluene individually; the molar fraction of heavy hydrocarbon isomers is measured in total as pseudo-components C6, C7 and C8;
     - *Method B* – is designed to measure the mole fraction of nitrogen, oxygen, helium, hydrogen, carbon dioxide, hydrocarbons from C1 to C5 individually; all hydrocarbons heavier than n-pentane are considered as a single pseudo-component C6+, and its mole fraction is measured in total using the total peak area of hydrocarbons heavier than n-pentane;
     - *Method C1* – is designed to measure the molar fraction of individual components: helium, hydrogen, nitrogen, oxygen, carbon dioxide, methane, ethane, propane, isobutane, i-butane, isopentane, neopentane, n-pentane, benzene, toluene and the molar fraction of heavy hydrocarbon isomers in total in the form of pseudo-components C6, C7 and C8;
     - *Method C2* – is designed to measure the molar fraction of nitrogen, oxygen, helium, hydrogen, carbon dioxide, hydrocarbons from C1 to C5 individually and the molar fraction of all heavy hydrocarbons as a single pseudo-component C6+; its molar fraction is measured in total using the total peak area of hydrocarbons heavier than n-pentane.

   - If the detector is linear for carbon dioxide, nitrogen or oxygen, check the option next to the corresponding component;
   - To carry out calibration control in accordance with clause 9.5.2.5. of GOST 31371.7-2020, check the *Calibration Control* option;
   - To check for compliance of calibration mixtures with the requirements of GOST 31371.7-2020 Appendix B, check the *Check the compliance with GOST 31371.7-2020* option.

2. Set calculation parameters:
   - To make a correction for changes in atmospheric pressure during the measurement, check the *Correction by pressure* option;
   - To make a correction for changes in ambient temperature during the measurement, check the *Correction by temperature* option;
   - In the *Measure* field, select the temperature of measurement value from the list (0, 15, 15.55, 20 °C);
   - In the *Combustion* field, select the temperature of combustion value from the list (0, 15, 15.55, 20, 25 °C);
   - To calculate the mole fraction of methane by difference, check the *Methane by difference* option;
   - To use the identity matrix for calculation of correlation factors, check the *Identity matrix of correlation factor* option;

- To compare actual measurements with calibration ones, check the *Mixture compliance check* option;
- In the *Chromatograph* field, select the chromatograph type from the list (laboratory, process);
- To carry out the control of calculation results in accordance with clause 12.3 of GOST 31371.7-2020, check the *Measurement results correctness check* option;
- To carry out the measurement of the mole fraction of components in the range from 0.001% to 0.005% using a standard sample of appropriate composition and the accuracy specifications of Method A, check the *Extended range (Method B)* option.

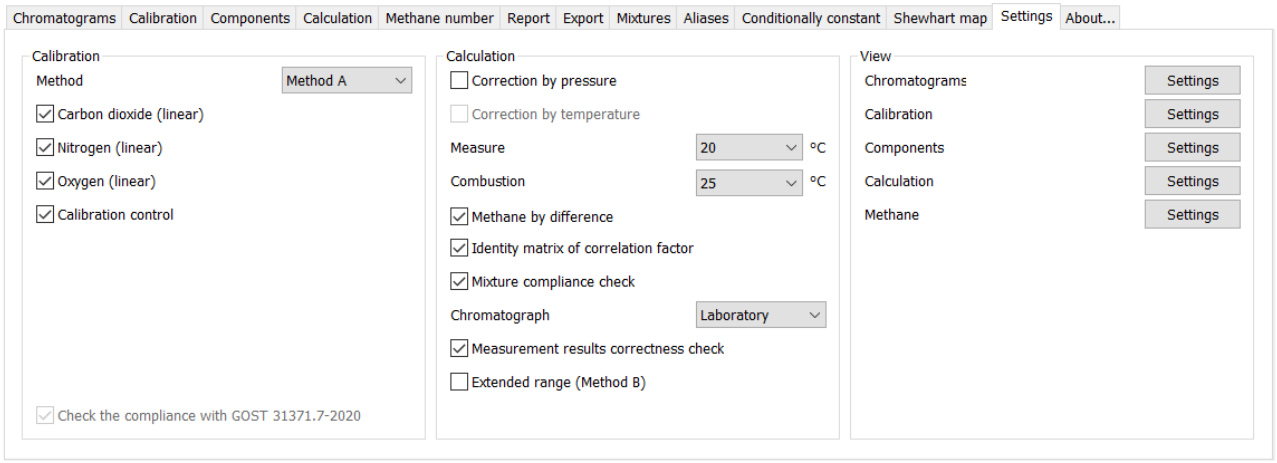

Fig. 14: Settings

3. Set display parameters:
   - To set up the chromatograms display parameters, opposite the *Chromatograms* line, click **Settings**. A dialog window opens (Fig. 15).
     1. To display a column in the table, check the corresponding option.
     2. In the *Atm. pressure* field, enter the number of decimals (integer value).
     3. To save the changes, click **OK**.

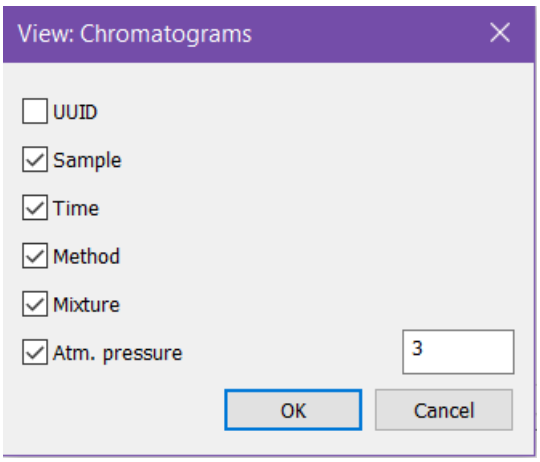

Fig. 15: View: Chromatograms

- To set up the calibration display parameters, opposite the *Calibration* line, click **Settings**. A dialog window opens (Fig. 16).

1. To display a column in the table, check the corresponding option.
2. To set the number of decimals, in the corresponding *Accuracy* field, enter an integer value.
3. To round values in accordance with GOST 31371.7-2020, opposite the corresponding parameter, check the *GOST* option.
4. To save the changes, click **OK**.

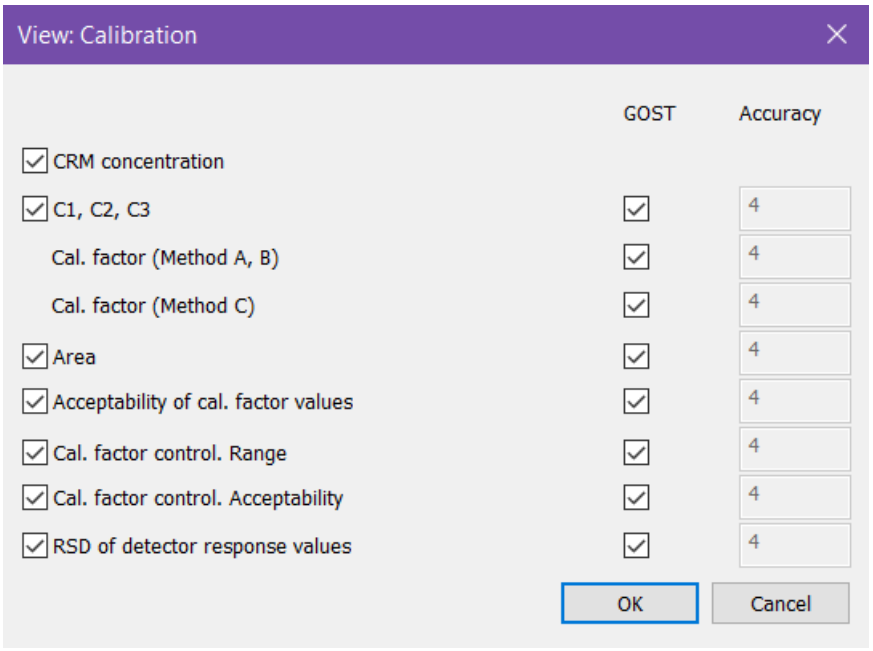

Fig. 16: View: Calibration

- To set up the components display parameters, opposite the *Components* line, click **Settings**. A dialog window opens (Fig. 17).
  1. To display a column in the table, check the corresponding option.
  2. To set the number of decimals, in the corresponding *Accuracy* field, enter an integer value.
  3. To round values in accordance with GOST 31371.7-2020, opposite the corresponding parameter, check the *GOST* option.
  4. To save the changes, click **OK**.

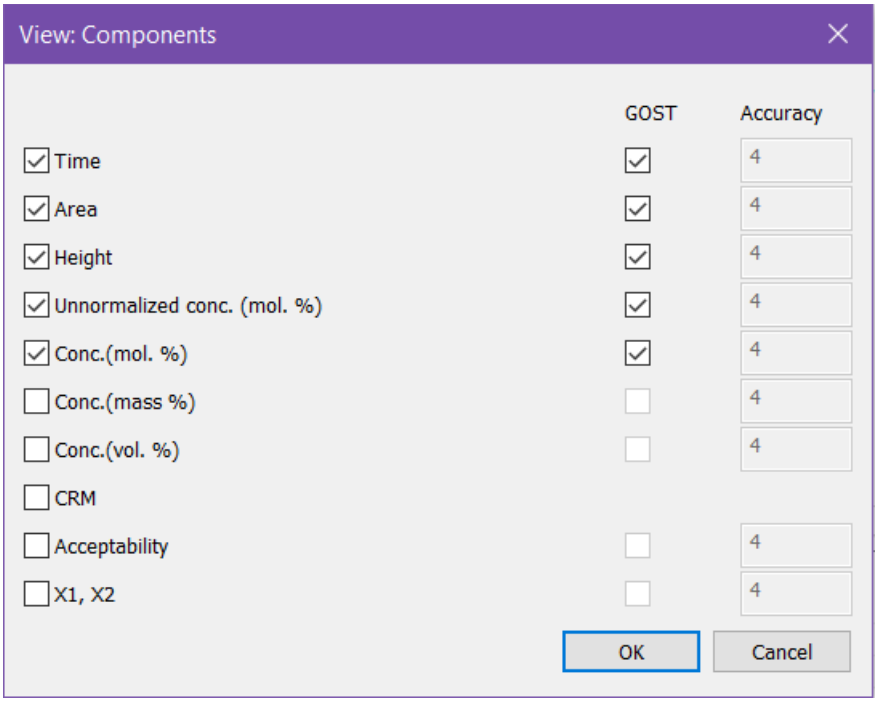

Fig. 17: View: Components

- To set up the calculation display parameters, opposite the *Calculation* line, click **Settings**. A dialog window opens (Fig. 18).
  1. To display a column in the table, check the corresponding option.
  2. To set the number of decimals, in the corresponding *Accuracy* field, enter an integer value.
  3. To round values in accordance with GOST 31369-2021, opposite the corresponding parameter, check the *GOST* option.
  4. To display ideal gas parameters, check the *Show ideal gas parameters* option.
  5. To save the changes, click **OK**.

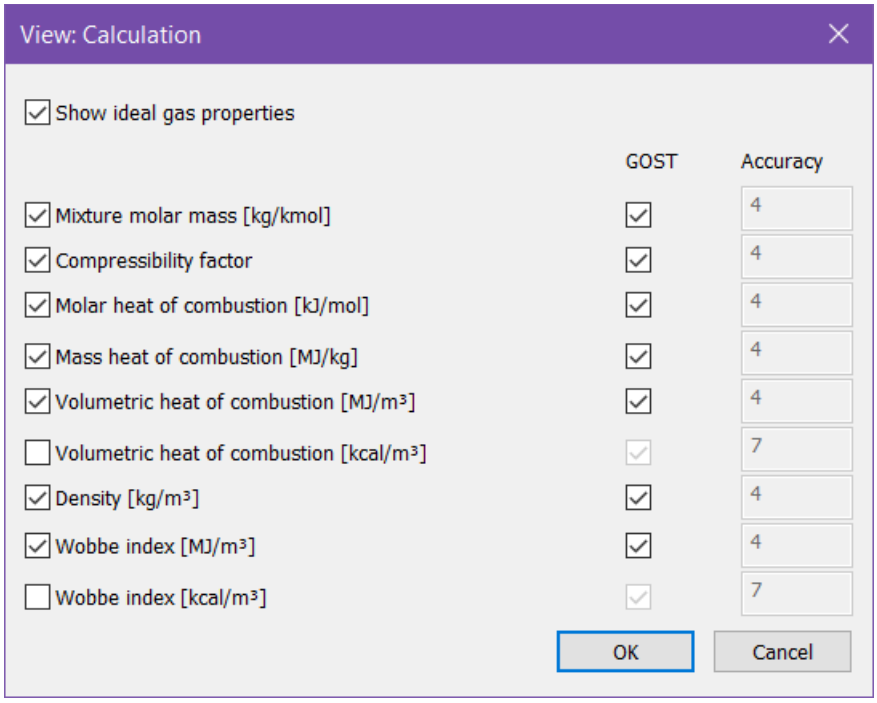

Fig. 18: View: Calculation

- To set up the methane number display parameters, opposite the *Methane number* line, click **Settings**. A dialog window opens (Fig. 19).
  1. To display a column in the table, check the corresponding option.
  2. To set the number of decimals, in the corresponding *Accuracy* field, enter an integer value.
  3. To round values in accordance with GOST 31371.7-2020, opposite the corresponding parameter, check the *GOST* option.
  4. To save the changes, click **OK**.

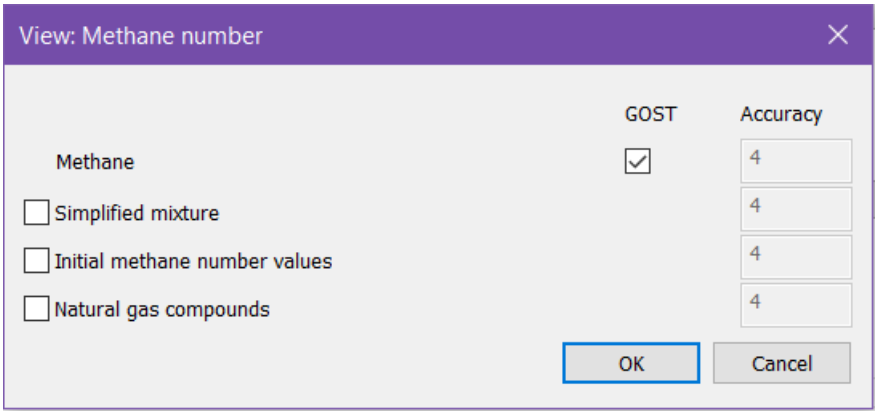

Fig. 19: View: Methane number

16. Hotkeys

The software uses keyboard shortcuts for quick access to actions:

Ctrl + A	Select all
Ctrl + C	Copy to clipboard
Ctrl + D	Delete selected chromatograms
Ctrl + G	Add calibration chromatograms
Ctrl + H	Add assay chromatograms
Ctrl + J	Add control chromatograms
Ctrl + R	Refresh chromatogram list
Ctrl + T	Open chromatogram
Ctrl + E	Copy areas of selected chromatograms to clipboard
Shift + ↑/↓	Select lines above/below

17. Program Identification

The identification data of the software «Chromos: Natural Gas» is placed on the *About...* tab (Fig. 20). In the software «Chromos: Natural Gas», the metrologically significant part is allocated in the form of separate calculation modules protected from intentional changes:

- CalcLibPlugin.dll – does not contain metrologically significant functions;
- CalcLib31371720.dll – contains metrologically significant functions in accordance with GOST 31371.7-2020;
- CalcLib3136921.dll – contains metrologically significant functions in accordance with GOST 31369-2021 (ISO 6976:2016);
- CalcLib3470420.dll – contains metrologically significant functions in accordance with GOST 34704-2020.

The identification data of the certified calculation modules are specified in the certificate of metrological certification of the software «Chromos: Natural Gas».

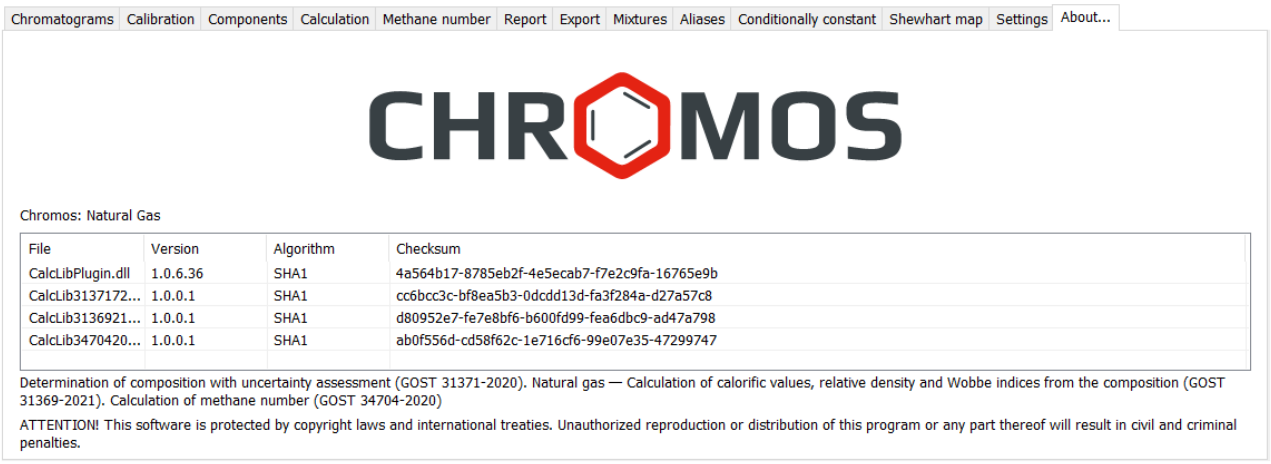

Fig. 20: Program identifier