



Diablo Analytical, Inc.

A Technology and Development Company

EZReporter 4.0 Natural Gas Analysis Module

The EZReporter Natural Gas Analysis (NGA) Module is designed to perform standard Natural Gas and Refinery Gas Analysis heating value and related calculations. The results from these calculations are available for reporting, monitoring, trend plotting, and exporting.

Standard Calculations

The EZReporter 4.0 NGA Module can be configured to calculate and report results based on the following industry standards:

- GPA 2172
- ASTM D3588
- ASTM D2598
- GPA 2177
- ISO 6976
- ISO 8973
- GPA 2261-03 and 2261-13 Repeatability and Reproducibility*

*Requires Results Database license

With the optional Natural Gas Liquids module you can also calculate NGL / extended analysis reports based on the GPA 2186-02 and 2186-14 standards.

Summary of Component Results Calculated

- Normalized Mole%
- Normalized Weight%
- Normalized Liquid Volume%
- Gross Heating Value (BTU / ideal cu. Ft.) or Superior Calorific Value (MJ / m³) on a volumetric basis
- Gross Heating Value (BTU/lbm) or Superior Calorific Value (MJ / kg) on a mass basis
- Gross Heating Value (BTU/gal.)
- Superior Calorific Value (kJ / mol) on a molar basis (ISO only)
- Net Heating Value (BTU/ideal cu. ft.) or Inferior Calorific Value (MJ / m³) on a volumetric basis
- Net Heating Value (BTU/lbm) or Inferior Calorific Value (MJ / kg) on a mass basis
- Inferior Calorific Value (kJ / mol) on a molar basis (ISO only)
- Relative Gas Density (Specific Gravity)
- Gas Density (lbm / cu.ft. or kg/m³)
- GPM (Gal. / 1000 cu.ft.)
- Compressibility
- Molecular Weight
- Vapor Pressure (psia and psig)
- Relative Liquid Density (Specific Gravity)
- Liquid Density (lbm / gal.)
- Molecular Weight
- Volume (cu.ft. / gal)
- D2598 Vapor Pressure (psia and psig)
- D2598 Relative Density
- ISO 8973 Vapor Pressure (kPa)

Standard Component Data Sources

EZReporter 4.0 includes component physical property constants from the following standard data sources that can be used in the NGA calculations:

- GPA 2145-09
- GPA 2145-03
- GPSA Engineering Data Book
- GPA TP-17
- ASTM D3588-98 (2003)
- ASTM D2598-02 (2007)
- ISO 6976
- ISO 8973 (1977)

In addition, the component constants can be edited manually to use constants from other data sources.

Summary of Total Results Calculated

- Total Raw (unnormalized) Amount
- Water Mole Fraction and Mole% (Saturated, Flowing , or As Measured)
- Gross Heating Value (BTU / cu. ft.) or Superior Calorific Value (MJ / m³) on a volumetric basis (ideal and real)
- Gross Heating Value (BTU / lbm) or Superior Calorific Value (MJ / kg) on a mass basis
- Gross Heating Value (BTU / gal.)
- Superior Calorific Value (kJ / mol) on a molar basis (ISO only)
- Net Heating Value (BTU / cu. Ft.) or Inferior Calorific Value (MJ / m³) on a volumetric basis (ideal and real)
- Net Heating Value (BTU / lbm) or Inferior Calorific Value (MJ / kg) on a mass basis
- Net Heating Value (BTU / gal.)
- Inferior Calorific Value (kJ / mol) on a molar basis (ISO only)
- Relative Gas Density (ideal and real)
- Gas Density (lbm / ideal and real cu.ft. or kg / m³)
- Compressibility (Z) factor
- GPM
- Total Molecular Weight
- Wobbe Index
- Vapor Pressure (psia and psig)
- Liquid Density (lbm / gal. and lbm / bbl)
- Relative Liquid Density (Specific Gravity)
- Volume (cu.ft. / gal.)
- API Gravity
- D2598 Vapor Pressure (psia and psig)
- D2598 Relative Density
- ISO 8973 Vapor Pressure (kPa)



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Example NGA Report

The NGA report can be easily customized to add or remove results from the report, change the titles, captions, labels, and fonts.

Natural Gas Analysis Report						
Sample Information						
Sample Information						
Sample Name	GPA 2172-09 Calculation Check at 14.696 psia					
Report Date	2015-04-28 15:34:33					
EZReporter Configuration File	CG+ default.11.cfgx					
EZReporter Data File	GPA 2172-09 Example Data at 14.696 psia.ezrx					
NGA Phys. Property Data Source	GPA Standard 2145-09 (FPS)					
Data Source	Manually entered data					
Component Results						
Component Name	Ret. Time	Peak Area	Norm%	Gross HV (Dry) (BTU / Ideal cu.ft.)	Relative Gas Density (Dry)	GPM (Dry) (Gal. / 1000 cu.ft.)
Helium	0.000	0.0	0.0300	0.0	0.00004	0.003
Hydrogen	0.000	0.0	0.0000	0.0	0.00000	0.000
Nitrogen	0.000	0.0	0.3200	0.0	0.00310	0.035
Oxygen	0.000	0.0	0.0000	0.0	0.00000	0.000
Methane	0.000	0.0	83.0200	838.5	0.45985	14.084
Carbon Dioxide	0.000	0.0	2.0200	0.0	0.03069	0.345
Ethane	0.000	0.0	7.4500	131.8	0.07735	1.994
Propane	0.000	0.0	4.3900	110.5	0.06684	1.210
i-Butane	0.000	0.0	0.8300	27.0	0.01666	0.272
n-Butane	0.000	0.0	1.0800	35.2	0.02167	0.341
i-Pentane	0.000	0.0	0.3100	12.4	0.00772	0.113
n-Pentane	0.000	0.0	0.2500	10.0	0.00623	0.091
Hexanes Plus	0.000	0.0	0.3000	15.4	0.00965	0.130
Water	0.000	0.0	0.0000	0.0	0.00000	0.000
Total:			100.0000	1180.8	0.69979	18.618
Results Summary						
Result	Dry	Sat. (Base)				
Total Raw Mole% (Dry)	100.0000					
Pressure Base (psia)	14.696					
Temperature Base	60.0					
Water Mole%	-	1.7447				
Gross Heating Value (BTU / Ideal cu.ft.)	1180.8	1160.2				
Gross Heating Value (BTU / Real cu.ft.)	1184.6	1164.4				
Relative Density (G), Real	0.7018	0.7007				
Compressibility (Z) Factor	0.9968	0.9964				
Wobbe Index	1414.2	1391.1				

Diablo EZReporter Natural Gas Analysis

Optional Modules

The following optional modules can be added to the Natural Gas Analysis Edition to provide additional capability.

- **Natural Gas Liquids Module:** Performs standard Natural Gas Liquids extended analysis and reporting based on the GPA 2186-02 and GPA 2186-14 (and related) standards.
- **Results Database Module:** Allows you to capture all results and save them in a local SQLite database. Results in the database can be searched by sample name and date range and can be batch re-processed for printing, exporting or trend plotting.

Water Content Calculations

Natural Gas Analysis calculations are initially performed on a "Dry" basis. Results are then corrected and reported for the water content of the sample. EZReporter 4.0 supports the following water content calculations:

- **Saturated:** Results are calculated for a water-saturated gas at the base temperature and pressure.
- **Flowing:** Results are calculated for a water-saturated gas at a user-specified flowing temperature and pressure. EZReporter uses the "Water Content Correlation" calculation described in the GPA 2172-09 Standard.
- **As Measured:** Results are calculated for a partially water-saturated gas as measured by an external water analyzer. You can enter the water amount for the "As Measured" calculation using units of either "Mole%" or "Pounds/MMCF".

Export to Flow Calculators

EZReporter's flexible Export Template technology allows you to create templates to export results to flow calculators like Flow-Cal and PGAS and most any other flow calculator or database that can import data from text files.

Monitor Important Results

You can set high/low alarm limits for important results like the Total Un-normalized Amount to monitor the quality of your data.

Supported Data Systems

EZReporter 4.0 currently supports automatic processing of results from the following chromatography data systems*

- Agilent Technologies EZChrom (Elite, SI, and OpenLab)
- Agilent Technologies GC/LC ChemStation ("Classic" and OpenLab)
- INFICON EZ IQ
- INFICON Micro GC Fusion

*Please contact Diablo Analytical regarding support for other chromatography data systems.



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